Tutorial

LAYOUTS

Making Map Layouts

with

TNTmips®

TNTedit™

TNTview®

Before Getting Started

All the tools you need to create simple or complex maps and posters are found in the Hardcopy Layout, or Map & Poster Layout, process. The ability to precisely position objects on the page is part of any layout package, but TNTmips® and TNTview® also provide the ability to add scale bars, map grids, legends, and annotation text as part of the powerful map and poster layout features found in the visualization process.

Prerequisite Skills This booklet assumes you have completed the exercises in *Displaying Geospatial Data* and *Navigating* tutorials. The exercises in those booklets show you how to select and view raster, vector, CAD, TIN, and database objects stored in Project Files. You should know how zoom, pan, and enhance display objects. Please be sure you remember how to add and remove layers from a multilayer view, and how to use the reference manual. You should also know how to set up and select your printer. This booklet does not present these basic skills again. Please consult *Displaying Geospatial Data* and *Navigating* for any review you need.

Sample Data The exercises presented in this booklet use sample data distributed with the TNT products. If you do not have access to a TNT products CD, you can download the data from MicroImages' web site. The exercises in this booklet use objects from all Project Files in the MAPLO folder of DATA. The objects in the TOWNS Project File in the CARTOSCR folder are also used. Be sure to make a read-write copy of these files on your local drive.

More Documentation This booklet is intended only as an introduction to the functions in Hardcopy Layout. Consult the TNTmips reference manual and the *Printing* tutorial for more information.

TNTmips and TNTlite® TNTmips comes in two versions: the professional version and the free TNTlite version. This booklet refers to both versions as "TNTmips." If you did not purchase the professional version (which requires a software license key), TNTmips operates in TNTlite mode, which limits the size of your project materials and does not support export to other file formats. All exercises in this booklet can be completed in TNTlite using the sample geodata provided.

Merri P. Skrdla, Ph.D., 9 June 2003

It may be difficult to identify the important points in some illustrations without a color copy of this booklet. You can print or read this booklet in color from MicroImages' web site. The web site is also your source of the newest tutorial booklets on other topics. You can download an installation guide, sample data, and the latest version of TNTlite.

http://www.microimages.com

Welcome to Making Map Layouts

Printing maps and posters generally requires you to assemble and arrange several objects on a page. These objects may all be in a single georeferenced group, but you may more often require scale bars, annotation text, map grids, legends, and other objects such as a north arrow or your company logo. The ability to create map grids, scale bars, legends, and annotation text is an integral part of TNTmips' map and poster layout process, which is known as Hardcopy Layout.

All of the tools and features in Spatial Data Display are available for hardcopy layouts, including insertion of sketch layers and 3D groups. Display Layout lets you arrange objects relative to each other in the view window while Hardcopy Layout adds the concept of positioning relative to a page, which is necessary for printing. Any layout you create can be saved for printing and further refinement or as a template to be reused in a series of maps.

Georeference is the basis for positioning layers in the same group and for the relative sizing of separate groups. When objects are georeferenced, you can print to a specified map scale, which can be reflected in a scale bar and explicitly designated in text if desired. Objects that are not georeferenced, such as logos and text, are placed in separate groups so they can be sized and positioned independently. Some layouts may contain no georeferenced components, such as layouts made of screen captures and text for inclusion in a report.

The full layout capabilities of TNTmips are available in TNTlite, however in TNTlite you are restricted to a maximum layout size of 11" x 17" (tabloid size page). The professional version of TNTmips supports printing on a variety of large scale printers (paper sizes up to 36" x 50", or 54" rolls) and printing over multiple pages. Support for dithered color printing up to 11" x 17" is included in the base price of TNTmips.

Vocabulary: Most printers cannot print up to the edge of the paper. The area that cannot be printed is called the **unprintable margin**. The size of the unprintable margin varies from one printer model to the next.

STEPS

- launch TNT
- select Display / Spatial Data from the main menu and click on the New Hardcopy Layout icon on the Display toolbar

- click on the Setup icon, click on the View tab, and turn off the first option on the View panel (Redraw after any change)

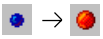
Pages 4–10 describe position-ing and orienting multiple groups on a page, adding map grids, and printing. On pages 11–18 you develop a more complex layout that includes annotation text, a legend, logo, north arrow, and scale bars in addition to multiple layers in a georefer-enced group with a map grid. The rest of the booklet provides information about development of maps in a series, templates, legend types, databases in layouts, sizing and scale issues, and printing to files and network printers.

Positioning Two Groups on a Page

STEPS

- click on the Add Multiple Groups icon
- add the COMPOSITE object in the CIR_COMP Project File twice, click on [OK] in the Select Objects window, then click on the Redraw icon
- click on the Group Settings icon for Group 2

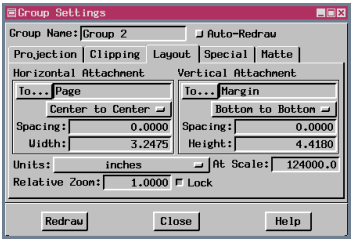
- turn off the Auto-Redraw toggle button at the top right of the Group Settings window
- click on the Layout tab and change the entry in the At Scale field at the lower right of the Group Settings window to 124000
- click on [To] in the Vertical Attachment panel
- double click on Margin in the list in the window that opens
- select Bottom to Bottom from the option menu in the Vertical panel
- click on the Select icon for Group 1 to make it the active group



- click on [To] in the Vertical Attachment panel
- double click on Margin in the window that opens
- select Top to Top from the option menu in the Vertical panel, and click on [Redraw]

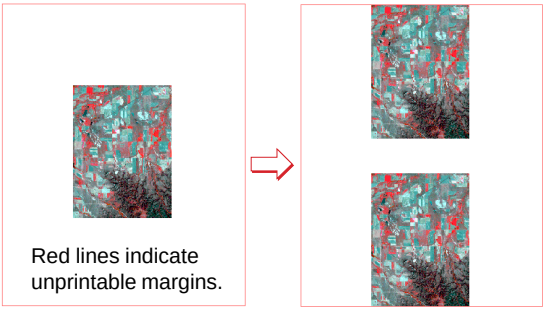
Keep this layout open through the exercise on p. 8.

Automatic group placement in Hardcopy Layout differs from that in Display Layout. Groups are automatically tiled in the Display Layout mode and have no specific attachments. All Groups added in Hardcopy Layout have an initial group attachment that centers them on the page. Customized group placement is established in the Group Settings window, which you open by clicking on the Group Settings icon found in the group icon row of the Layout Controls window, or with the Placement tool. The parameters set apply to the currently active group. You change the group you are making settings for by changing the active group.



You can change group names by typing a new name in the Group Settings window or the Layout Controls window, but in this example there are just two groups with Group 1 at the top of the page and Group 2 at the bottom, so we'll leave the default names.

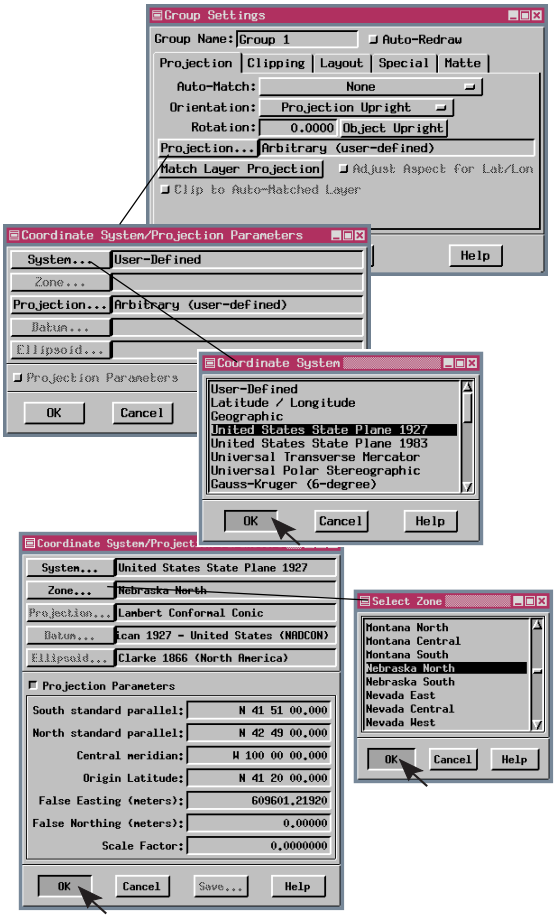
The map scale at which your layout is printed is set in the At Scale field at the lower right of the Group Settings window. The value in this field is the same as that in the Map Scale field of the Page Setup window; a change made to one of these fields is updated to the other.



Red lines indicate unprintable margins.

Setting Group Projections

The default group orientation uses the object coordinates of the first (bottom) layer in the group. If you want the group orientation to be derived from map coordinates, you need to set the Auto-Match feature to None and choose a projection for use in orientation. Once you choose a group projection, the layers in the group may be reoriented according to the projection. The selected projection and the geometry of the objects selected for display determine whether a Projection Upright orientation is noticeably different from an Object Upright orientation.



STEPS

- with Group 1 active, click on the Projection tab in the Group Settings window and choose None on the Auto-Match option button, then click on [Projection]
- click on [System] in the Coordinate System / Projection Parameters window that opens
- choose United States State Plane 1927 from the Coordinate System window and click [OK]
- click on [Zone], choose Nebraska North from the Zone Selection window (listing is alphabetical), and click [OK]
- click [OK] in the Coordinate System / Projection Parameters window
- click on the Select icon for Group 2 and check that the Auto-Match option is set to First Raster or First Layer

Note: when rasters are rotated in a layout, they tend to slow the printing process. Within the size constraints of TNTlite or when rotated to 90°, 180°, or 270°, the effect is not significant. However, when printing large rasters, you may shorten the printing time by rotating and saving the raster (Process / Raster / Resample / Automatic) prior to printing. Then substitute the rotated raster for the original in the layout.

Adding Map Grids

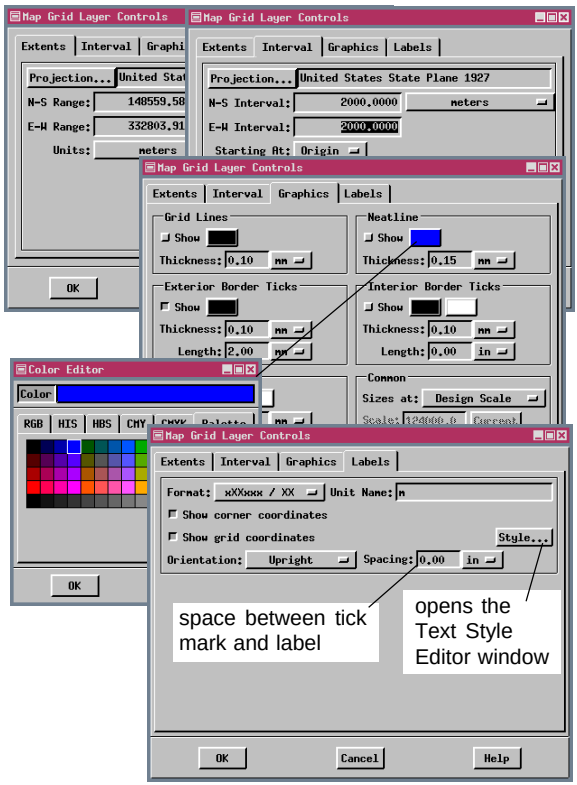
STEPS

- click on the Add Map Grid icon in Group 1's icon row 
- check that the Projection is United States State Plane 1927 and that the units are set to meters
- on the Interval panel, set N-S and E-W Intervals to 2000 and the Starting At option to Origin
- on the Graphics panel, check that the Show buttons for Grid Lines, Neatline, and Exterior Border Ticks are on
- click on the color tile next to each of the selected graphic elements, and change Grid Lines and Exterior Border Ticks to black and the Neatline to blue
- change the Neatline Width to 1.5 mm (leave defaults for others, as shown at right)
- choose Design Scale on the Sizes at option menu
- on the Labels panel, click on [Style], set font to Arial or a similar font, set the Ascender height to 5 Points, check that the At Scale option is set to Design, and click [OK] in the Text Style Editor
- set the Coordinates Format to xXXxxx / XX, and turn on the Show grid coordinates toggle
- click on [OK] in the Map Grid Layer Controls window

A map grid may contain one or more of the following components: grid lines, neatline, border, interior/exterior tick marks, and coordinate labels. We will use all except interior tick marks. You can set the color and size independently for each of these. You can also set the font and style for coordinates.

Any map grid added comes up by default in the selected group projection. You can always change this projection, either for the group as a whole or for the map grid. You can also overlay multiple map grids in different projections on a single group.

The default map grid colors are a medium gray so they have a fair chance of showing up over most images and backgrounds. Let's set the neatline color to blue and all others to black.



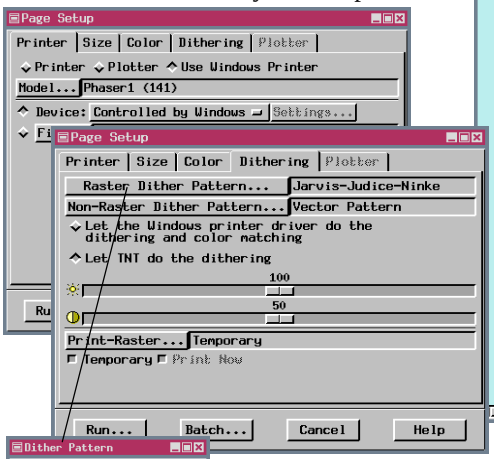
Printing a Layout

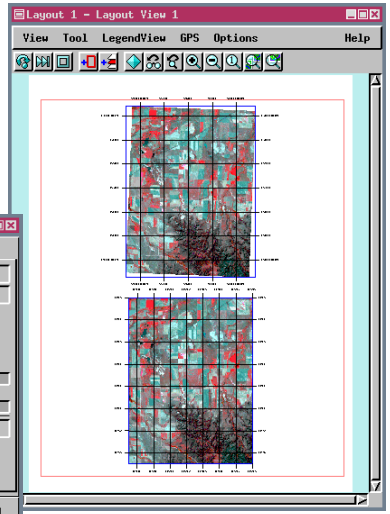
For most applications you would print a single large image with two different map grids overlaid rather than two separate groups with their own map grids as we have here. The point of the exercise, however, is not only adding map grids, but also group positioning, projection, and orientation.

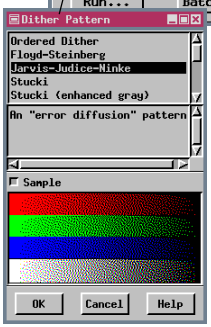
We are now ready to print this layout. The default printer is always the last selected printer so you should be set to go from your printing exercise in the *Displaying Geospatial Data* tutorial. If you know your printer is correctly set up, you can just click on the Print icon in the Layout Controls, as will be suggested for later exercises. However, it is always a good idea to check your page setup when you haven't printed for a while unless you know no one else uses your computer.

STEPS

- click on the Add Map Grid icon in Group 2's icon row 
- check that the Projection is Latitude / Longitude on both the Extents and Interval panels with a N-S and E-W interval of 0 01 00.00
- check that the settings made in steps 4–8 on the previous page have been maintained
- click on [OK], then Redraw 





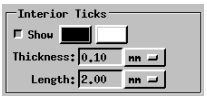


The optimal dither pattern will vary from printer to printer. You may even wish to let Windows do the dithering. The selected dither pattern is the one I prefer for color raster images on my printer. Be sure to leave the Non-Raster Dither Pattern set to Vector Pattern.

- choose Print from the Layout menu in the Layout Controls window
- verify that the printer Model and Destination are as intended
- click on the Dithering tab and set the Raster Dither Pattern to Jarvis-Judice-Ninke (or let Windows do the dithering)
- click on [Run]

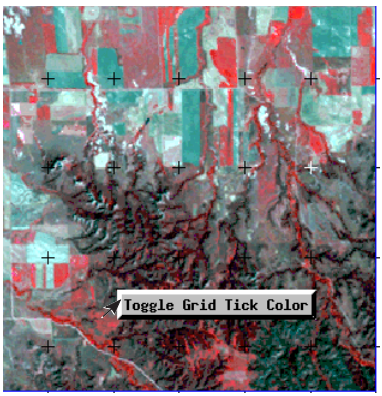
Toggling Tick Mark Colors

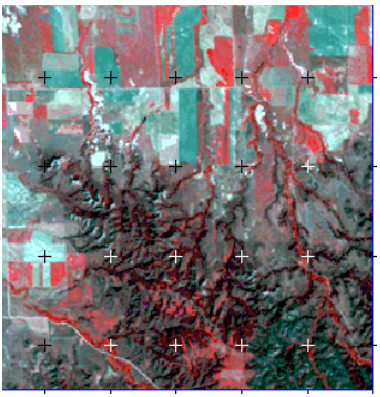
- click on the Map Grid icon for the grid in Group 2
- turn off the Show toggle for Grid Lines, and turn on the Show toggle for Interior Ticks
- set the left color button to black and the right to white, the thickness to 0.1 mm and the length to 2 mm in the Interior Ticks panel, then click [OK]
- position the cursor toward the bottom of Group 2 (bottom group) over the butte, and press the + key to zoom
- open the GeoToolbox and choose its Select tool
- right click over the butte and select the menu choice that pops up
- repeat for the other tick marks over the butte
- save your layout if desired



TNTmips provides the ability to toggle between any two colors for interior map grid tick marks. Use of this feature creates greater visibility of map grid tick marks over the entire map area when there is considerable variation in brightness over the underlying image or vector. You choose a primary color, which is initially assigned to all interior tick marks, and a secondary color, which can be assigned to individual tick marks as shown in this exercise. Interior border tick color can also be toggled.

You toggle tick mark color using the Select tool in the GeoToolbox, not the Select tool in the View window. When you right click with this tool, a menu with a single choice pops up. If you actively choose Toggle Grid Tick Color from the right mouse button menu, the single, closest interior tick mark or internal border tick from all the map grid layers is changed to the secondary color. If you subsequently change the secondary tick mark color, the color of the tick marks assigned to the secondary color will also change when the layout is redrawn just as for tick marks drawn in the primary color. You can, of course, also toggle a tick mark back to the primary color.





Relative and Absolute Size

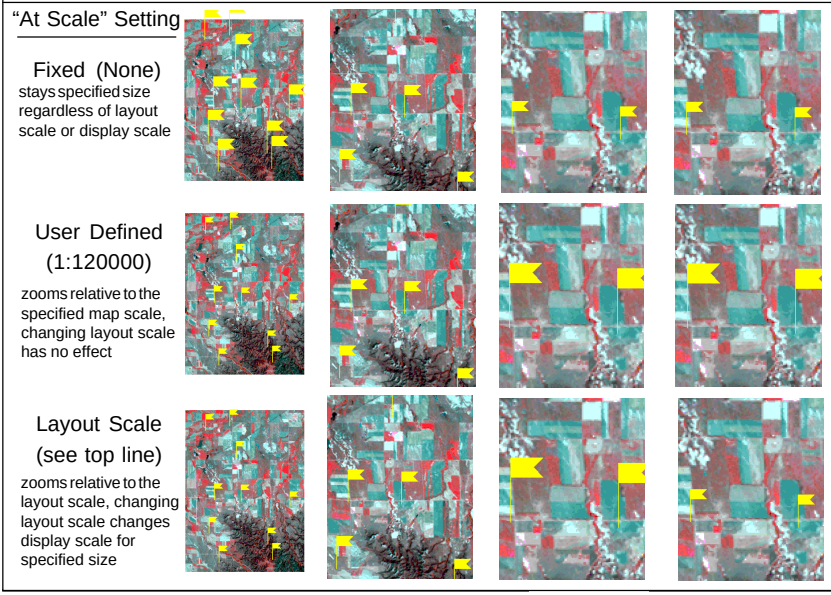
The point of using a map layout product, such as TNTmips, instead of a page layout product like Adobe® PageMaker® or Microsoft® Publisher, is that a map layout product uses georeference information to determine accurate map scales for printing and precise geographic overlay of a variety of object types. However, often not all components of a map or other layout are georeferenced (for example, annotation text, legends, and company logos). The size for such components must be set when designing a layout, and that size needs to be either absolute (unchanging) or relative to some map scale.

You set how to determine size for text, legends, line patterns, symbols, and some scale bar parameters. Map scale enters into displayed sizes, so your choice also determines if the size changes as you zoom in and out. How to set the size for ungeoreferenced objects like logos and text is discussed in the Relative Group Zoom exercise.

STEPS

- click on New Hardcopy Layout 
- click on the Add Layer(s) icon  and select the two objects in the CIR_COMP Project File (select vector second)
- open the Display Controls for the SITES object, click on [Specify] for All Same point style, and set the At Scale option to None
- click [OK] in the Style Editor and Display Controls windows
- zoom in and out and note the effects
- change the At Scale option to User Defined (120000) and then Layout (repeat steps 3–5 for each)

Layout Scale	1:120000	1:120000	1:120000	1:60000
Display Scale	1:240000	1:120000	1:60000	1:60000

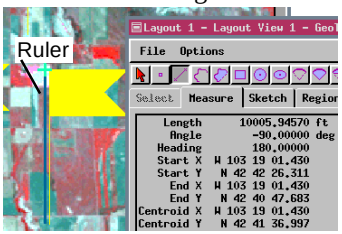


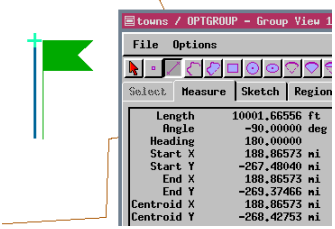
Symbols with Fixed Ground Dimensions

- with the two objects from the previous exercise still displayed, click on the Vector icon for the SITES layer 
- on the Points panel of the Vector Layer Controls, click on [Specify] for Style
- set the units to Inches and the Height to 1.00
- set At Scale to User-Defined, enter 120000 in the field to the right, and click [OK] in the Style Editor and Vector Layer Controls windows
- click on Redraw 
- click on the Geo-Toolbox icon, then on the Ruler 
- zoom up on one of the flag symbols and measure the pole length
- click on the Open icon, choose Open Group, and select the OPTGROUP* object in the TOWNS Project File from the CARTOSCR folder 
- click on the icon for TOWNS vector, click [Styles] on the Object tab, navigate to the SITES object in the CIR_COMP Project File, and select its VECTSTYLE subobject 
- click on the Points tab, change the Style to All Same, click on [Specify], then set the Point Type to Point Symbol, click on f2 to select the symbol, and set the height and scale as in steps 3 and 4
- repeat steps 5–7

You may want to design a symbol or line pattern so that it is always the same size or width on the ground regardless of the scale of your layout or the resolution of your data. For example, a four lane divided highway should have the same width on the ground whether displayed over a raster with 1-meter or 10-meter cell size, and a symbol for a radar reflector that measures ten feet across should represent ten feet whether displayed at 1:60000 or 1:120000.

Fixed ground dimensions are not a property of the symbol or line pattern—they are a property of the style. Achieving such real-world sizes across map scales requires that the At Scale option be set to User-Defined. You could theoretically set the symbol size or line width at a map scale of 1:1, which would eliminate scaling calculations, but the Style Editor attempts to display the sample at the requested absolute dimensions, and a 10-meter symbol far exceeds the available sample area. A number of reasonable size examples are provided below to assist you in setting your own scales.





The symbology used in this exercise is not significant, but the results are. The difference in the exact measurements shown is less than one screen pixel for objects whose extents vary by approximately ten-fold.

at 1:12000, 1" = 1000 feet
at 1:120000, 1" = 10000 feet
at 1:1200, 1" = 100 feet

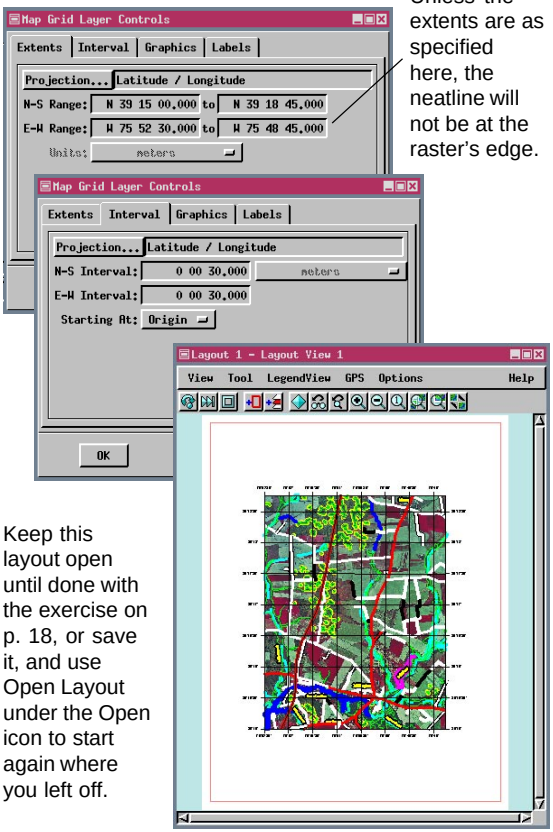
at 1:1000, 10mm = 10 meters
at 1:10000, 10mm = 100 meters

* Do not save the changes when you close this group.

Starting a Complex Layout

Now we're going to create a fairly typical image map using a central large raster with a map grid and CAD overlays, a legend, scale bars, north arrow, company logo, and annotation text. Let's start the map with the largest group, which contains a raster and three CAD layers.

We'll add the map grid next since it will change the size of the group. The default projection for a map grid is obtained from the georeference selected in the Layer Controls for the first layer, which happens to be Universal Transverse Mercator (UTM) for the raster layer in this layout. We'll change this to Latitude / Longitude.



Unless the extents are as specified here, the neatline will not be at the raster's edge.

Keep this layout open until done with the exercise on p. 18, or save it, and use Open Layout under the Open icon to start again where you left off.

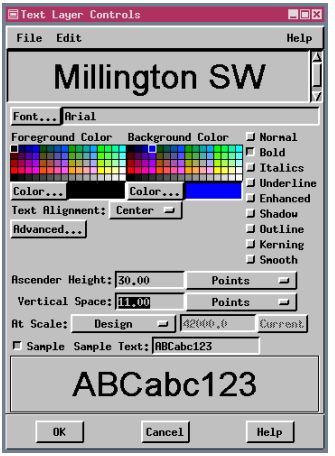
STEPS

- close the group from the last exercise (do not save changes) and the two layouts already made
- click on the New Hardcopy Layout icon 
- click on the Add Layer(s) icon and select COMPOSITE, BUFFERZONES, SHORELINE, and ROADSANDSTREAMS in the MILLNGTN Project File (in that order) 
- click on the Group Settings icon, then the Layout tab, and set the Layout Scale to 42000 
- click on the Add Map Grid icon 
- click on [Projection] on the Extents tabbed panel and select Latitude / Longitude
- set the North-South Range to N 39 15 00 to N 39 18 45, and the East - West Range to W 75 52 30 to W 75 48 45
- click on [Projection] on the Interval tabbed panel and select Latitude / Longitude, then set the Interval to 0 00 30 in both directions
- make the neatline width 1 mm and the color black (refer to p. 6)
- set the Label format to DD°MM'SS" and the Ascender Height to 7 Points
- click on [OK] in both windows
- click on Full View 

Add Heading Text and Reposition Groups

STEPS

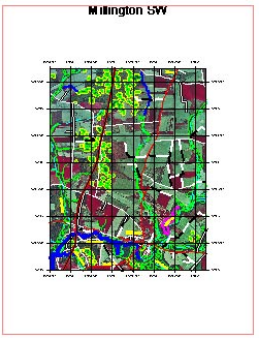
- click on the Add Text icon 
- check that the font is the same as selected on page 6, and click on the Bold toggle
- set the Ascender Height to 30 Points
- choose Design from the At Scale option menu
- click in the text box and type in *Millington SW*
- click [OK] in the Text Layer Controls window

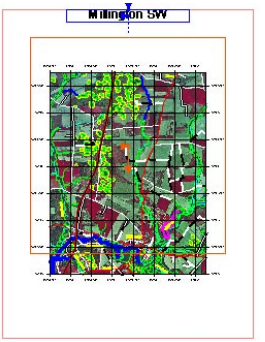


- in the Group Settings Layout panel, click on [To…] for Vertical Attachment, choose Margin, then choose Top to Top from the Vertical Attachment option menu; set the Horizontal Attachment to Group 1*
- click on Redraw 
- click on the Placement icon 
- position the mouse within the outline for Group 1 so that you have the left hand cursor, then click, after the cursor changes to the cross arrow, hold the left mouse button and drag the box upward closer to the heading text (keep the horizontal spacing at zero), then press <enter>

The icon for adding a text layer is on the main Layout Controls toolbar because text must be in a separate group for sizing and positioning. The best choice of group attachment options depends on a variety of factors such as whether you want the group to follow movements of another group and whether the layout will be used again at a different map scale. Not all printers have symmetrical margins, so horizontal centering is best achieved by attaching to the page. You can position objects at the edge of the printable area by attaching them to the margin.

An outline of the group extents appears when you switch to the Placement tool so you can drag a group to a new position on the page. The cursor is the cross arrows shape for repositioning. The cursor shapes (and functions) used for resizing elastic boxes are inactive while the Lock toggle next to the Relative Zoom field is on. This lock prevents inadvertent change of the group's map scale relative to the layout scale and other groups, so that the group prints at the map scale you expect.





* You could use the default horizontal attachments for this exercise, but this attachment is needed when you get to p. 35.

Using the Placement Tool

The Placement tool provides a graphic means of visualizing and changing the position and attachment of all groups in a layout. You can make a group the active group by clicking on it, as you did in the last exercise, which updates the information in the group settings window and makes the group eligible for changes in position and attachment. Use the Placement tool and the Group Settings window together to get the results you want.

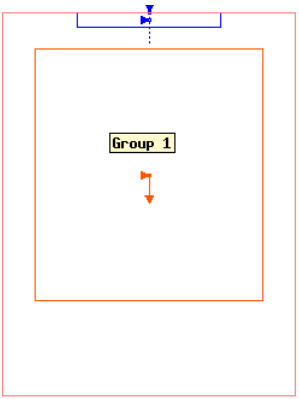
Changing group attachments works differently with the Placement tool than in the Group Settings window. If you change what a group is attached to in the Group Settings window, the values in the Spacing fields remain the same. If you change the attachment with the Placement tool, the group remains in the same position on the page and the spacing values are recalculated to reflect its distance from the new attachment group.

There are three viewing modes: normal, wireframe, and solid. In the normal mode, all layers are drawn and the Placement tool elements are added. Repositioning is easy in this mode, but it is sometimes difficult to see the attachment arrows. Drawing is faster in the wireframe and solid modes. You choose the viewing mode from the right mouse button menu, which also has a Lock Scale toggle if over a group.

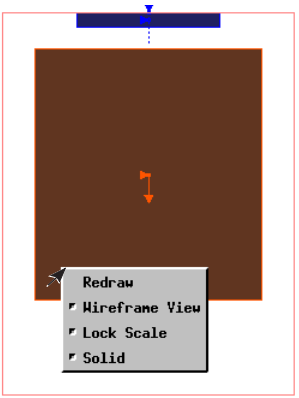
STEPS

- þ right click over the layout and choose Wireframe View
- þ right click over the layout again and choose Solid
- þ right click over the layout again and turn Solid off

- left hand cursor—you are over a group that is not the active group but will become the active group if you click
- cross arrows cursor—you are over the active group and will reposition the active group and everything attached to it if you click and drag
- ↔ double arrow cursor—you will grab an attachment arrow when you click
- left arrow cursor—no action associated with this cursor shape



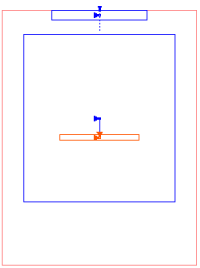
The group name is provided as a DataTip when the placement tool is active. Over links that are attached to the margin, the DataTip provides the spacing.



Adding a Scale Bar

STEPS

- click on the Add Scale Bar icon 
- change the units in the Map Units panel to miles then enter 2 for length
- set the Major and Minor Divisions to 4 and 5, respectively
- in the Size panel, set the Bar Width to 0.08 inches, the Text Size to 7 Points, and check that the At Scale entry is 42000
- confirm that the following three of six Style panel check buttons are on: Center Line, Show Units, and Show Ticks
- click on [Colors] to confirm that the colors for the border, text, and even and odd segments are black, black, red, and white, respectively
- click on [Text Style] to select the font you used for the map grid text
- click on [OK] in the Scale Bar Layer Controls

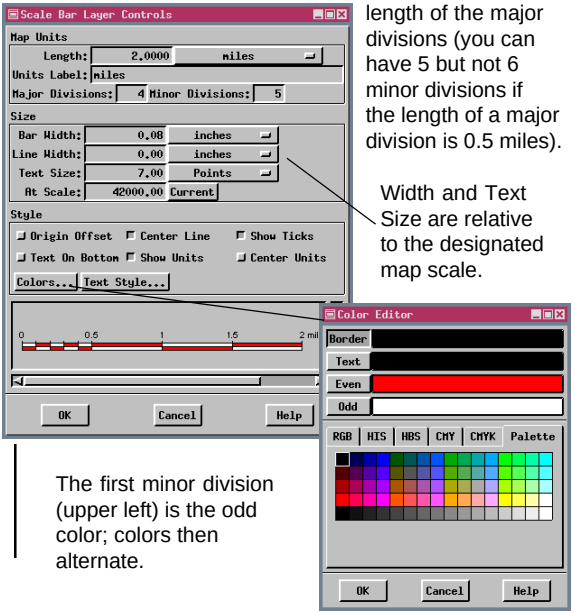


You now have a scale bar, which is the active group, centered on the page.

The vertical spacing for the final position of Group 1 will vary with your printer's printable area but will be a negative number. The group's position can also be adjusted by entering a number directly in the Spacing field for horizontal or vertical attachment. Pressing <enter> over the layout when the Placement tool is active initiates a redraw.

Maps often contain more than one scale bar to provide scale using different units. When multiple scale bars are included, they are generally stacked vertically with the longest scale bar at the top. The length of a scale bar is determined by the map scale of the layout and the relative zoom of the group. If you are providing scale for an enlarged inset, you need to be sure the relative zoom of the scale bar group is the same as that of the inset (see the later exercise on Relative Zoom). Because width is the dimension opposite to length, the width set is the thickness of the scale bar.

The number of minor divisions must divide evenly into the length of the major divisions (you can have 5 but not 6 minor divisions if the length of a major division is 0.5 miles).



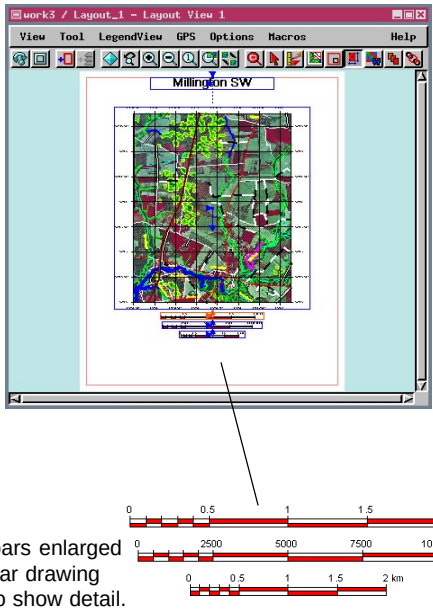
Width and Text Size are relative to the designated map scale.

The first minor division (upper left) is the odd color; colors then alternate.

Multiple Scale Bars and Positioning

Once you have added one scale bar, you just need to change the parameters in the Map Units panel, namely the units and length, to add other matching scale bars to the layout. Settings in other panels should remain the same.

Note that you can change group names before or after establishing attachments; the attachment information is updated whenever a name is changed. Attaching the scale bars to each other and then to the image map (Group 1) lets you establish uniform spacing between the scale bars, and sets it so subsequent adjustments to the image map position bring along the scale bars with the current spacing maintained. Thus, if you later decide you want to move the image closer to or further from the heading text, the scale bars will also move provided you make the position adjustments to Group 1. When you change to a different tool, such as the zoom box, the View is redrawn.



Scale bars enlarged in regular drawing mode to show detail.

STEPS

- click on the Add Scale Bar icon
- change the units in the Map Units panel to feet then set the length to 10000
- check that the font is still the font selected previously
- click on [OK] in the Scale Bar Display Controls
- repeat steps 1–4 except change the units to kilometers, enter 2 for the Length and change the Units Label to km
- for Vertical Attachment (Layout panel of the Group Settings window) with the km group active, click on [To] and choose *feet*, then Top to Bottom, with a Spacing of 0.1"; make the horizontal attachment also to *feet*, Center to Center
- select the *feet* group and attach it vertically Top to Bottom, with a Spacing of 0.1" to the *miles* group, and horizontally, Center to Center, also to the miles group
- select the *miles* group and attach it vertically to Group 1, Top to Bottom, with a 0.2" spacing and horizontally to Group 1, Center to Center
- right click and turn off Wireframe View
- click on Save Layout (name the layout if not yet saved)

Adding a Logo and North Arrow

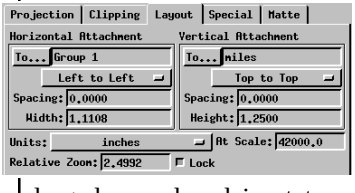
STEPS

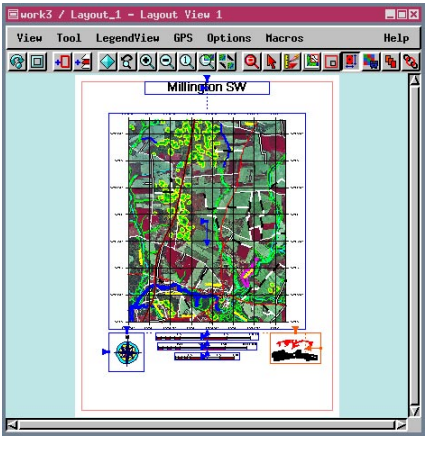
- click on the Add 2D Group icon 
- click on the Add CAD icon, choose Quick-Add CAD, and select the NORTH object from the LAYOUT Project File 
- change the Group Name to North Arrow in either the Group Settings or Layout Controls window
- set the Horizontal Attachment To Group 1 (Left to Left) and the Vertical Attachment To *miles* (Top to Top)
- set the Height to 1.25" (type directly in the Height field)
- click on the Add 2D Group icon, then on its Add CAD icon, choose Quick-Add CAD and select the MIGLOBE object from the LAYOUT Project File 
- change the Group Name to Logo
- set the Horizontal Attachment To Group 1 (Right to Right) with Spacing of -0.5 and the Vertical Attachment To *miles* (Top to Top)
- set the Height to 1.0"

- click on the Redraw icon 

Map layouts generally contain one or more components that are not georeferenced. In addition to annotation text and legends, which are sized relative to some map scale when added, there may be a north arrow and logo or other strictly graphic components. All such components must be placed in separate groups so they can be sized independently.

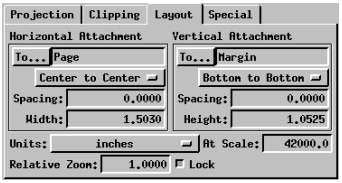
You usually have to change the relative zoom in order to get ungeoreferenced objects to display correctly with georeferenced objects. You do not want to make direct entries into the Width, Height, or Relative Zoom fields for georeferenced layers unless adding an enlarged or reduced inset to your layout (see later exercise on Relative Zoom). However, to make the size of an ungeoreferenced group reasonable in a layout, you can enter the desired number in any of these fields, and the other two will be automatically adjusted. Direct entry into one of these fields overrides the Lock toggle, which prevents accidental resizing while repositioning a group with the mouse.





Adding a Legend and Descriptive Text

A legend object has been prepared for your use in this layout. This legend includes only the water related line features; road lines are not included. You create your own vector and raster legends in later exercises. For more information on legends in general, see the reference manual.

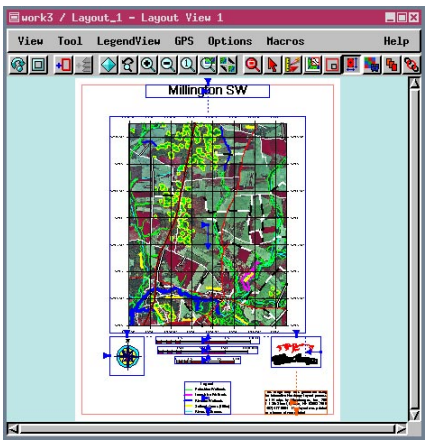


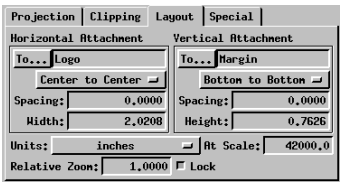
Text entered as part of a layout is saved in the layout description, which eliminates the need to keep track of the text separately. You can also open a text file to supply the text. You can edit text after it is entered by opening the layer controls and typing in the changes. You do not need to press <enter> at the end of a line when Word Wrap is turned on in the Advanced Options unless you want to force a line break at a particular location. You can elect to justify a text block if Word Wrap is turned on. If the width of the font you are using is significantly greater than Arial, the lines may be broken differently than shown.

This image map was generated using the interactive Hardcopy Layout process in TNTmips by MicroImages, Inc., 206 S. 13th Street, Lincoln, NE 68508-2010, (402)477-9554. The layout was printed on a (name of your printer).

STEPS

- click on the Add Legend icon (Layout Controls main toolbar), choose Quick-Add Legend, and select LINELEGEND from the LAYOUT Project File
- leave the Horizontal Attachment as is and set the Vertical Attachment To Margin (Bottom to Bottom)
- click on the Add Text icon, click on [Advanced], turn on the Word Wrap toggle, set the block width to 2.00 inches, click [OK], then set the Ascender Height to 8 Points with a Vertical Space of 9.5 Points with Normal style
  - type in the text at the left, and click on [OK]
- set the text group's Horizontal Attachment to Logo (Center to Center) and the Vertical Attachment To Margin (Bottom to Bottom)





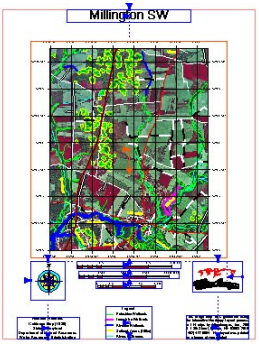
- click on the Redraw icon

Note: the icons to add objects automatically placed in separate groups, such as text, scale bars, and legends, are found on the main toolbar in the Layout Controls window. Object types that may exist with others in a group, such as rasters and vectors, are found in the Group icon row. If you want one of the latter objects to be in a separate group, you must first add a new group.

One More Text Block and Clipping

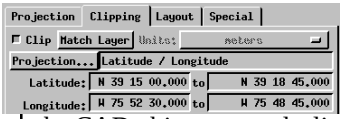
STEPS

- click on the Add Text icon and set the Text Alignment to Center and the Ascender Height to 9 Points with a Vertical Space of 11 Points
- type in the text at the right (press <enter> after each line), then click on [OK]
- set the Horizontal Attachment To North Arrow (Center to Center) and the Vertical Attachment To Margin (Bottom To Bottom)
- select Group 1 with the map grid as the active layer and click on the Clipping tab in the Group Settings window
- click on [Match Layer] and check that the Projection is Latitude / Longitude with Latitude from N 39 15 00 to N 39 18 45 and Longitude W 75 52 30 to W 75 48 45
- turn on the Clip toggle
- click on Redraw
- click on Save
- click on Print

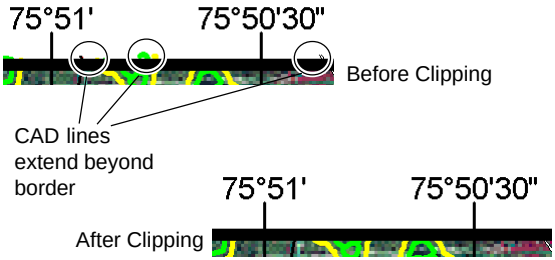


Each new text block has a default block width of four inches. In the case of centered text with a return at the end of each line, the block width makes no difference except in the wireframe shown with the Placement tool. You can change the block width to two inches if you want it to better fit the text. You can change text characteristics by setting them before you begin typing or by highlighting the text after typing and making the changes. TNTmips supports multiple text styles within a text block and shows the text as it will appear except that justified text appears as flush left in the Text Layer Controls window. If you choose Edit / Show Formatting Codes, the text will be uniform and the codes used for mixed formatting will be shown.

Nontidal Wetlands
Guidance Map (1989)
State of Maryland
Department of Natural Resources
Water Resources Administration



You may have noticed while working with this layout that the CAD objects extend a little beyond the edges of the raster. We will clip this group to the raster extents to give a neater appearance to the printed product. Be sure to turn on the Clip check button at the upper left of the Clipping Options panel or the clipping parameters you enter will not be applied.



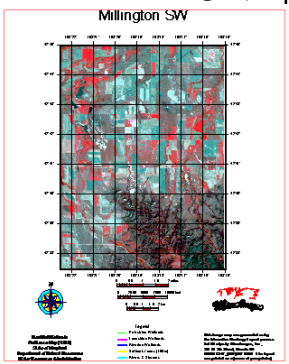
A completed version of this layout is also available on your TNT products CD-ROM (/data/maplo/layout.rvc/Millington).

Maps in a Series: Same Paper Size

You may be doing production work in which you want to make a series of maps that use roughly the same layout. The selections you make when setting text sizes and line widths determine how easy it is to reuse a layout. In general, the At Design Scale settings are best suited for a series of maps designed for the same paper size. Such maps may contain different depictions of the same ground area or may be of a different location at the same map scale. Templates can easily prompt you for replacement objects for such a map series (see the next two exercises). This exercise describes how to alter a layout for a different location at a different map scale because it is a somewhat more complex problem.

You can "reuse" a map grid from one layout to another that covers a different geographic area by opening the Map Grid Layer Controls and updating the extents of the map grid without altering other parameters. If the map scale is significantly different, you may also want to change the grid interval.

The width and text size for scale bars is always relative to a map scale, so you need to change this scale to the new layout scale to keep the same text size and width. The length automatically changes to be correct at the new layout scale, however, you may want to change the assigned length of the scale bars. You also need to select the groups containing the logo and north arrow and enter the desired height (or width).



The text groups may need to have the text changed to correctly identify the new map; Millington SW should be changed to Crow Butte in this example. Some text layers, such as the one at the lower right, may apply to all layouts without editing.

STEPS

- þ click on the Open icon, choose Open Layout, and select the Millington layout saved on p. 18 (if not open)
- þ click on the Save As icon and create a new object in the CIR_COMP Project File
- þ with Group 1 selected, turn off the Clip toggle on the Clipping panel and set the map scale to 86000 (Layout panel)
- þ remove the raster and three CAD layers (DO NOT remove the map grid layer)
- þ click on the Add Raster icon, choose Quick-Add Single, select COMPOSITE from the CIR_COMP Project File, and lower the raster
- þ open the Map Grid Layer Controls; change to N-S Range of N 42 37 30 to N 42 45 00 and E-W Range of W 103 22 30 to W 103 15 00
- þ on the Interval panel, change the Interval to 0 01 00 in both directions, and click [OK]
- þ open the layer controls for each of the scale bars and change the At Scale value to 86000
- þ set the Height for the North Arrow group to 1.25" and the Logo group to 1.0"
- þ click on the Redraw icon
- þ choose Layout / Close (saving is up to you)

Maps in a Series: Different Paper Sizes

STEPS

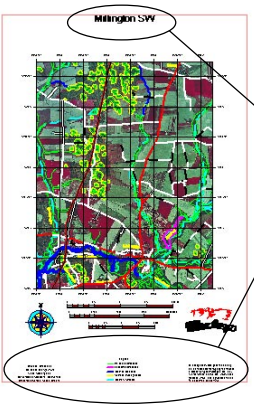
- click on the Open icon, choose Open Layout, and select the Millington layout saved on p. 18 (not p. 19)
- click on the Save As icon and create a new object in the same Project File
- choose Layout / Page Setup, click on [Model], and select a printer able to print to B size paper (11" x 17", such as the HP PaintJet XL)
- on the Size panel, set the Map Scale to 28000, change the Media Size to B, and click [OK]
- select each of the three text groups (Millington SW, This image m..., and Nontidal Wet...), open the layer controls for each, and change the Scale setting to User-Defined [42000] (recall that 42000 was the scale of the Millington map on A size paper)
- open the Layer Controls for the legend and set the scale to User-Defined Map Scale [42000] in the Sizes panel

- click on Redraw

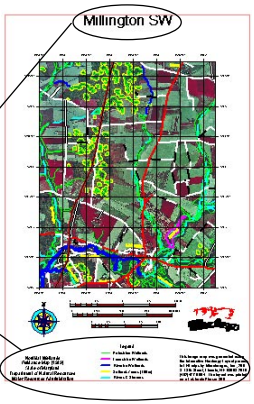
Note how much closer to the desired result you come when changing paper sizes if User-Defined at the original map scale is set. You would probably still want to increase the size of the heading and perhaps move the image map up a little on the page before printing this layout.

The maximum printable area in TNTlite is tabloid size (11" x 17"), which is sufficiently larger than letter size to illustrate the effect of changing paper size on a layout. You do not actually have to have the printer to select it (if choosing models with the Printer option toggled on).

Setting text and legend layers relative to some defined map scale means that they change size as the map scale changes, which is what you want to happen if you're also changing paper size when you change map scale. As mentioned on the previous page, scale bar size specifications (width and line thickness) can only be relative to a specified map scale. The text size can be relative to either a user-defined or the layout map scale. The length of scale bars always adjusts automatically when the map scale of the layout changes.



groups relative to Layout scale at new paper size and layout scale

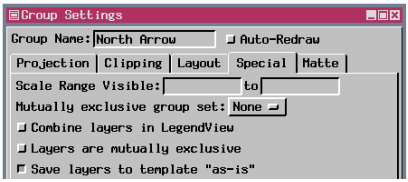


groups relative to User-Defined map scale at new paper size and layout scale

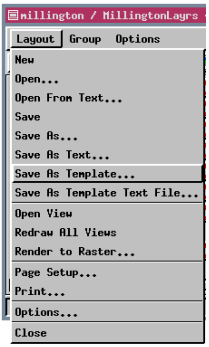
Maps in a Series: Setting Up Templates

Layout templates are designed for use with maps in a series at the same layout scale and the same paper size. You could, however, have used a template for the last exercise, but the goal is to teach you a variety of methods for modifying layouts.

You need to do some preparation work with your layout before saving it as a template or you will be prompted for the contents of all replaceable groups in the layout. There is a single control that determines whether or not you are prompted for new group contents when a template is opened. This control is located on the Special panel of the Group Settings window. You need to turn on this toggle for each group that will be a constant feature in your map series, such as the North arrow and logo.



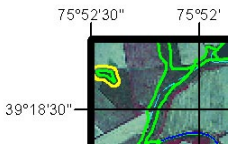
Scale bars are one layer type for which this toggle does not need to be set—they will simply be the same, unless you change the map scale, and then they are automatically adjusted. The same is true for legends. If the same legend does not apply to the new map, you will need to change the legend (see exercise on page 23). With multi-object legends, as long as the layer names remain the same, the legend will be updated to reflect the new objects. The layer name can be the file and object name, the object name, or the object's description. Whichever one you have selected needs to be consistent across objects if you want the legend to apply to the newly selected objects.



Groups with map grids are handled specially. Although you are prompted for replacement layers, the map grid remains and is automatically adjusted to the extents of the new group contents.

STEPS

- click on the Open icon, choose Open Layout, and select the Millington layout saved on p. 18
- click on the Group Settings icon for the North Arrow group
- click on the Special tab, then turn on the *Save layers to template "as-is"* toggle
- click on the Select icon for the Logo group
- turn on the *Save layers to template "as-is"* toggle
- click on the Select icon for the *This image m...* text group (lower right)
- turn on the *Save layers to template "as-is"* toggle
- click on the Select icon for the *Nontidal wet...* text group (lower left)
- choose Layout / Save As Template
- save the template with your Millington layout, and name it MARYLANDMAPS
- note the coordinates at the upper left of the map

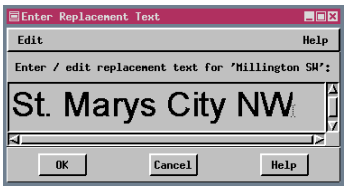


Maps in a Series: Using Templates

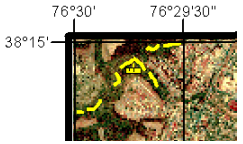
STEPS

- choose Layout / Close, and click [No] in the Verify prompt window
- click on the Open icon, choose Open Layout, and select the MARYLANDMAPS template

  MarylandMaps
- when prompted to select the spatial layers for Group 1 choose COMPOSITE (raster) and STMARY_NW (vector) both in the STMARYS Project File
- when prompted for group clip settings, turn off the clip toggle
- when prompted to enter replacement text for Millington SW, change the text to St. Marys City NW, and click [OK]



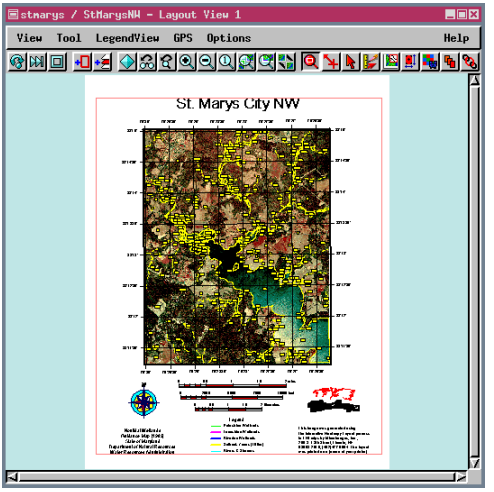
- zoom up on the upper left corner and note the map coordinates have been changed



Note: You can also create maps in a series using an SML script. This approach is described in the *Printing* booklet.

One of the features of templates is to prompt you for new group clipping extents if clipping was on in the layout from which the template was saved. If you recall, you had entered the extents for the Millington SW raster and applied clipping to Group 1. In the exercise on page 19 in which you manually update the layout, turning off clipping was included as one of the steps before the new layout was drawn. If clipping to the previous coordinates was still applied to the new Group 1, the image map would not be drawn since it is completely outside the clipping rectangle. Thus, if you are using a template to make a series of maps of the same ground area with different overlays clipped to specific extents, you will have to reset the extents for clipping the group when the template is loaded. The clipping extents at the time the template was saved are still listed on the clipping panel.

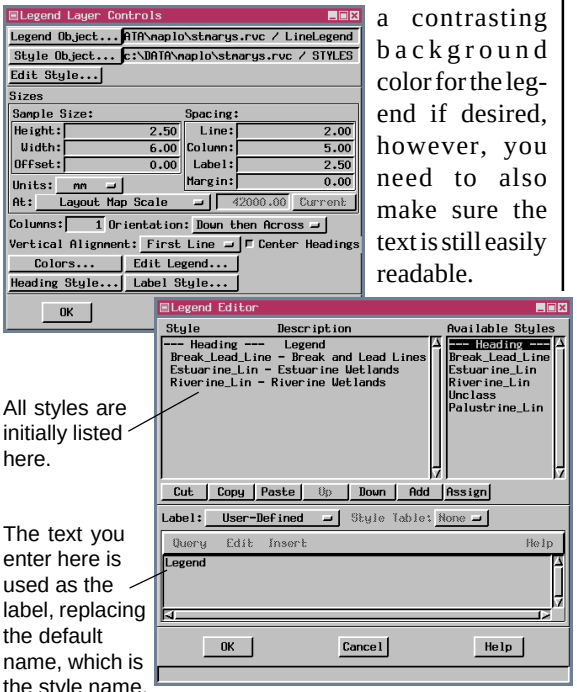
It is possible in a map series that the same legend would apply to all the maps, but that is not the case between the Millington and St. Marys City quarter quads. In the next exercise, you will learn how to make a new legend that does apply to this map.



Make a New Legend

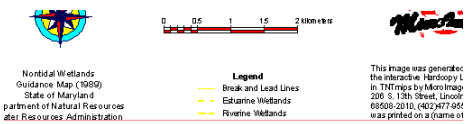
You use the legend already in the layout as the basis for the new legend in this exercise. Creating a new legend object in this fashion has advantages over clicking on the Add Legend icon on the toolbar: you retain the group's position and you retain any styles defined for the existing legend, such as heading styles. You also don't need to delete the legend that no longer applies.

Yellow does not generally show up well in a legend printed on paper, yet it is an excellent color for visibility on this particular map. You could specify a contrasting background color for the legend if desired, however, you need to also make sure the text is still easily readable.



All styles are initially listed here.

The text you enter here is used as the label, replacing the default name, which is the style name.



You might consider adding some space between the new legend and the margin because the new legend is not as tall as the original legend in the layout.

STEPS

- with the St. Marys layout open, click on the Legend icon in the LineLegend (or Millington w...)* group
- click on [Legend Object], navigate to your STMARYS Project File, click on the New Object icon, change *Millington* in the description to *St. Marys City NW*, and click [OK]
- click on [Style Object], navigate to the STMARYS Project File, and choose the STYLES object
- click on [Edit Legend], select Break_Lead_Line in the Style column, then edit the text in the field toward the bottom of the window to read *Break and Lead Lines*
- select Estuarine_Lin and change the text to *Estuarine Wetlands*; select Riverine_Lin and change the text to *Riverine Wetlands*
- select Unclass, click on [Cut], select Palustrine_Lin and click on [Cut]
- click on --Heading-- in the Available Styles column, then click on [Add]
- click in the text field toward the bottom of the window, type in Legend, and click [OK]
- click on Redraw
- click on the Save icon

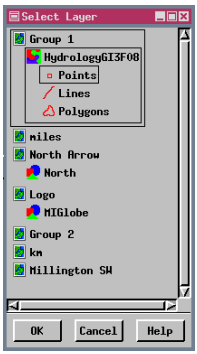
* The name of the group depends on whether you are viewing object names or descriptions for layers.

Interactive Legend Design

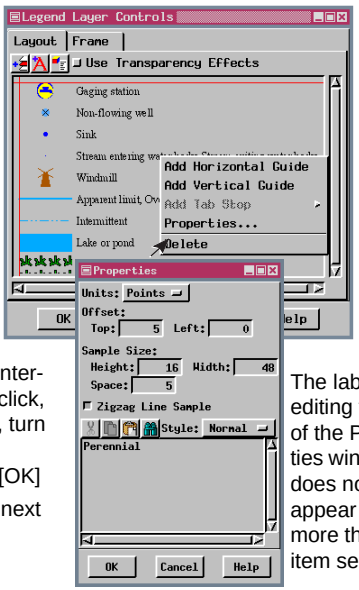
STEPS

- þ click on the Open icon, choose Open Layout, and select the HARLANFRANKLIN layout in the DLG_HYDR Project File
- þ click on the Add Legend icon, and choose Add Multi-Object Legend
- þ click on the Add from Layer icon on the Layout panel of the Legend Layer Controls
- þ click on Points for the hydrology layer, then click [OK]
- þ repeat steps 3 and 4, but choose Lines
- þ repeat steps 3 and 4, but choose Polygons
- þ right-click on the *Stream entering water body, Stream exiting water body...* entry and pick Delete from the menu
- þ right-click on the *Apparent limit, Overpassing...*, and choose Properties
- þ double-click in the text field to highlight the text, type Perennial, then click [OK]
- þ click on Perennial, shift-click on Intermittent, then right-click, choose Properties, turn on the Zigzag Line Sample, and click [OK]
- þ continue on to the next exercise

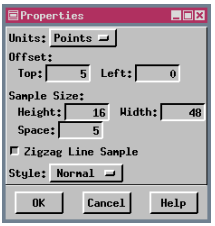
Multi-object legends let you combine legend information for multiple objects and/or multiple element types in a single legend. They also offer features not available in other legend types, such as interactive placement of legend components and the availability of frames and shadows. You will create a legend for the points, lines, and polygons from a single vector object. The method for adding additional element types or objects to the legend is exactly the same as that for adding the first. All new items in the legend are initially placed in a single column. Items are selected for moving or editing by clicking on them. Clicking on an item then shift-clicking on a second item will select the items you clicked on and all items in between. Holding the control key while clicking lets you make multiple, noncontinuous selections.



Another feature that distinguishes multi-object legends from the other legend types is they are stored as part of the layout, like scroll bars and text, rather than as separate objects. The legend is saved to the layout when you click on the OK button in the Legend Layer Controls. You can edit the legend by clicking on the group's legend icon.



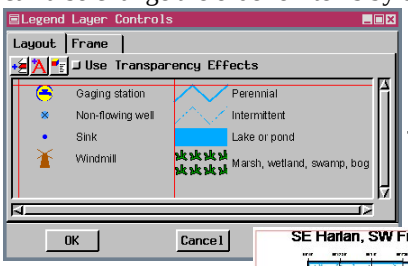
The label editing feature of the Properties window does not appear with more than one item selected.



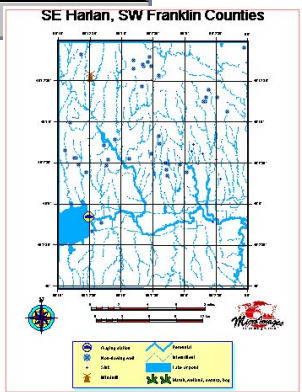
Finishing a Multi-Object Legend

Multi-object legends have two default text styles: Normal and Heading. Normal is used for labels and Heading is the default for added text. You can, however, change these assignments in the Properties window for the selected item. You can also change the font, size, and style of both text types using the Edit Text Style button at the top of the Legend Layer Controls. Additional text styles can be added for complex legends. A heading can be repositioned and edited like any other item in a legend.

You can control the amount of space between legend items using the Offset values in the Properties window. All items start out equally spaced, but this may be inadvertently changed while dragging. Simply select all items that you want to have the same spacing, right-click to open the Properties window and enter the desired value for the top and left offset. The top offset applies to the distance from the item or guide immediately above, so you may want a top offset of zero for the top item in each column. You can also change the order of items by dragging, and spacing will automatically be adjusted to accomodate the change.



If your printable area is smaller than that of the printer selected for the illustration, you may find that the legend is too large to fit in the remaining space. Just click on the Legend icon for the group and reduce the size of samples and text as needed. See the CartoScripts booklet for how to get CartoScript samples into legends.



STEPS

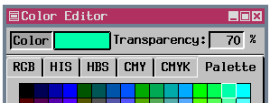
- right-click in the blank area of the window and choose Add Vertical Guide
- drag the new guide until it is about 1/4" right of the first legend item
- click on *Perennial*, shift-click on *Marsh, wetland, swamp, bog*, drag the group up and to the right until it is aligned with the top and new guides
- click on the Edit Text Style icon and change the font, size, or style for Normal text if desired
- click on the Frame tab, and turn on all three check boxes
- click on each of the color tiles and choose some color scheme you find pleasing (you should keep the backgound and drop shadow colors pale)
- click [OK], then click on the Placement Settings icon* for the Legend group
- set the Vertical Attachment to the Margin, Bottom to Bottom at a Spacing of 0.1"
- click on Redraw
- click on Print

* Groups that can have only one layer, such as legends, scale bars, and text, have limited functions available in the Group Settings window, and the icon that opens the Group Settings window is the Placement Settings icon.

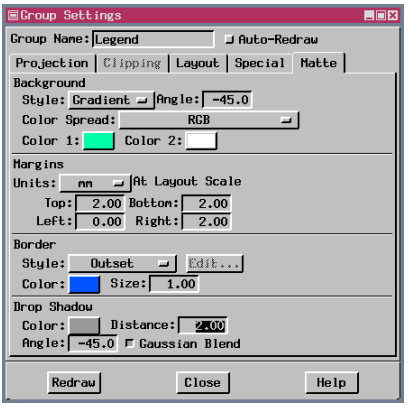
Mattes with Legends and Other Groups

STEPS

- click on the Legend icon to open the Legend Layer Controls, turn off the 3 toggles you turned on in step 5 on the previous page, and click [OK]
- with Legend as the active group, click on the Matte panel in the Group Settings window
- set the background style to Gradient, then click on the Color 1 tile and select medium bluegreen with 70% transparency

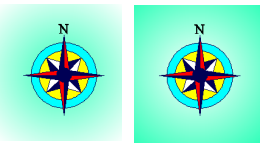


- leave the left margin at 0 mm, and set all others to 2.0
- set the Border Style to Outset, Color to blue, and Size to 1.0
- set the Drop Shadow Color to a medium gray, the Distance to 2.0, and turn on Gaussian Blend
- click on Redraw
- click on Print

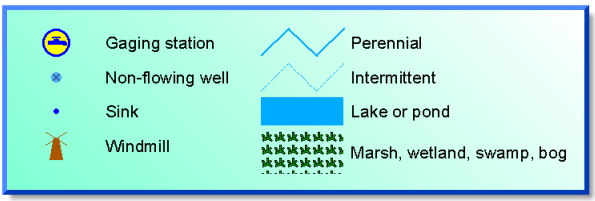


A legend frame is a simple example of a matte, or background layer, that can be used for decorative effect with legends or any other group type and for entire layouts as well. A legend frame is limited to a solid border with a solid fill and a solid color drop shadow. Instead of setting frame parameters for the legend layer, you can choose a matte for the legend group if you want more elaborate effects. Mattes provide gradient and radial fills using any two colors and the color spread type you specify, as well as solid fills. There are nine predefined border styles for mattes (solid, double, inset, outset, etched in, etched out, groove, ridge, and rounded), and CartoScripts can be used to create more ornate borders. You can choose a blended drop shadow for mattes in addition to the solid drop shadow available for frames.

Many solid colors are too dark for use as a matte background, but if you include transparency and the matte is over the white background of a hardcopy layout, it will lighten the color considerably. Remember that mattes can be used for any group and that not all components of a matte need to be used.



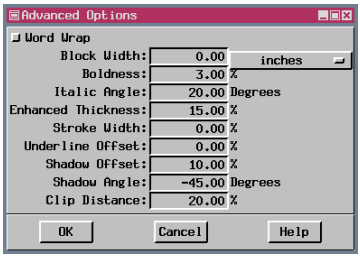
radial background only
(Colors 1 and 2 reversed)



drop shadow only

Advanced Text Features

The TNT products give you complete control over the text styles that appear in your legends and layout. You can adjust the boldness, italic angle, enhanced thickness, stroke width (outline text and underline), underline offset, shadow offset, and shadow angle. The two angle settings are expressed in degrees and all other settings as a percentage of the ascender height. Using a percentage of the height keeps the weight of the text constant as you zoom in and out or change point size (provides scalability).



Generally, you do not want to turn on Word Wrap for single lines of text, such as headings. With Word Wrap turned on, the text flows to the next line in the Text Layer Controls window, which will be different than the way the text flows on the page unless the window width is the same as the block width. When text is drawn at the block width specified in the layout, word wrap has to pick the best place to break a line regardless of the text alignment chosen. Using word wrap means you need to use the <return> or <enter> key only at the end of a paragraph. Word wrap will break a line at a space, tab, or hyphen. You can manually insert a hyphen if you think it would improve the appearance of a line.

All of the text settings and advanced options apply equally to text layers and legend text except that word wrap is always on in multi-object legends and the block width is not defined by a field, but by the position of a vertical guide.

STEPS

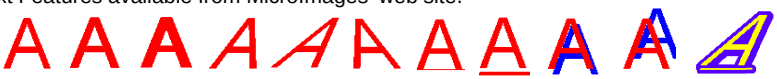
- þ click on the Text icon to open the Text Layer Controls for the SE Harlan, SW group
- þ highlight the text and change the style to Enhanced,change the Foreground Color to yellow and the Background Color to blue, click [OK], and redraw

- þ note the appearance and width of the text, repeat step 1, highlight the text, click on [Advanced], change the Enhanced Thickness to 10%, click [OK], redraw, and note the text's appearance and width

- þ repeat step 1 and try other text style modifications so you understand what the advanced options do

Note: Changes you make in the Advanced Options window are retained for the next time you add a text layer. The Clip Distance option applies to vectors with labeled elements that have the "clip under" option turned on. If you want to return to the initial default values, they are shown in the window above.

For information on all the text styles shown below, see the color plate entitled Advanced Text Features available from MicroImages' web site.

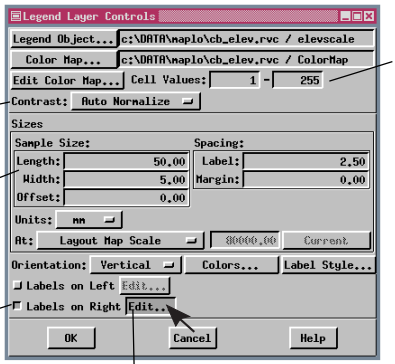


Creating a Color Scale Legend

STEPS

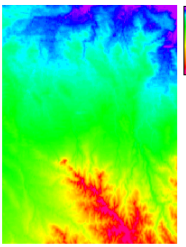
- click on New Hardcopy Layout
- click on the Add Raster icon, choose Add Single Raster, and select DEM_8BIT in the CB_ELEV Project File
- set the contrast to Auto Normalize, check that the ColorMap is selected, and click [OK]
- click on the Add Legend icon and choose Add Color Scale Legend
- create a new legend object (ELEVSCALE) in your CB_ELEV Project File
- when prompted for a color map, select the DEM_8BIT raster then its COLORMAP subobject
- set the Contrast option menu to Auto Normalize
- set the Sample Size Length to 50 and Width to 5 mm at the Layout Map Scale with a Label Spacing of 2.5 and Margin of 0 mm
- turn on the Labels on Right toggle button then click on [Edit] to its right
- enter the text at the right in the Legend Editor window and click [OK]
- in the Group Settings window, set the map scale to 80000, the Horizontal Attachment To Group 1 [Left to Right] with a Spacing of 0.18" and Vertical Attachment To Group 1 [Top to Top]
- click on Full View

We are going to create a layout with a color scale legend. This type of legend is most appropriate for quantitative data with a continuous spread color map. Because the color map value generally does not reflect the real world value it represents, you need to enter the color map values you want labeled and the label text you want. In this example, color map values 1–255 represent elevations from 1045 to 1376 feet. We are going to have five labels, but the color map values entered are not at exactly even intervals so that the elevations end in either a five or zero. If you want unmodified equal intervals, you can click on the Auto button and have the process automatically generate the cell values and associated real world values over the range you enter. You still have to enter units if you want them with the auto-generated values.



If you change the order of these values to 255–1, you will get the highest values at the top of the legend.

1: 1045 feet
62: 1125 feet
127: 1210 feet
189: 1290 feet
254: 1375 feet

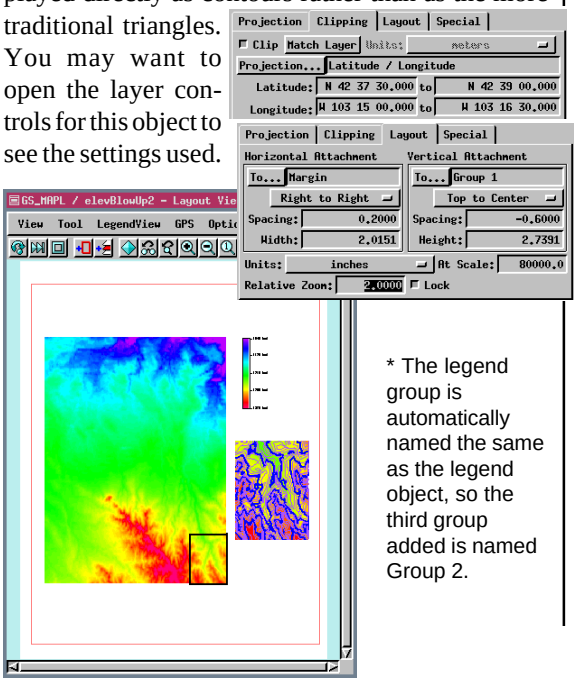


Relative Group Zoom

We are going to modify the layout just created to add a group that enlarges a portion of the raster already included. The Relative Zoom field in the Group Settings window should be used only to achieve this kind of effect or when mixing groups with and without georeferencing. The At Scale field in the lower right of the Group Settings window sets the map scale for relative sizing and printing. The map scale for printing can also be set in Page Setup.

You alter the group zoom when the placement tool is active if you use any resizing functions with the Relative Zoom Lock button off. Any scale bars in the layout then do not accurately portray the ground distance of objects in groups with a Relative Zoom other than 1.0 unless the Relative Zoom of the scale bar group has been changed to match.

Note that the TIN object in Group 2 is being displayed directly as contours rather than as the more traditional triangles. You may want to open the layer controls for this object to see the settings used.



* The legend group is automatically named the same as the legend object, so the third group added is named Group 2.

STEPS

- select Group 1 and change its Horizontal Attachment to be To Margin [Left to Left] with a Spacing of 0.1"
- click on the Add CAD icon for Group 1, choose Quick-Add CAD, and select the BLOWUPOUTLINE object from the CB_ELEV Project File
- click on the Add 2D Group icon
- click on the Add Layer(s) icon and select the DEM_8BIT and TIN_16 objects in the CB_ELEV Project File
- open the layer controls for DEM_8BIT and set the contrast to Auto Normalize and check that the ColorMap is selected
- on the Group Settings Clipping panel, turn on the Clip toggle for Group 2*, set the Projection to Latitude / Longitude, the Latitude range to N 42 37 30 to N 42 39 00 and the Longitude range to W 103 15 00 to W 103 16 30
- set the Horizontal Attachment to Margin [Right to Right] with a Spacing of 0.2" and the Vertical Attachment to Group 1 [Top to Center] with a Spacing of -0.6" (Layout panel)
- enter 2.0 in the Relative Zoom field
- click on Redraw
- click on the Save As icon and create a new layout object

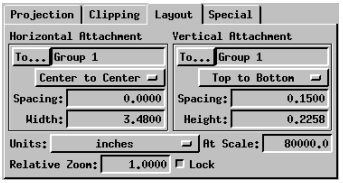
Scale Bars for Different Map Scales

STEPS

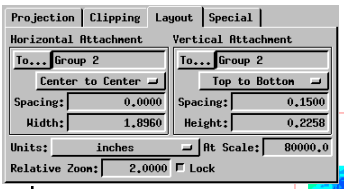
- click on the Add Scale Bar icon 
- change the Length to 4 miles
- check that the At Scale setting is 80000 (Bar Width should still be 0.08" and Text Size 7 Points)
- click on [Text Style] to check that the font is set as before
- in the Group Settings window, set the Horizontal Attachment To Group 1 [Center to Center] and Vertical Attachment to Group 1 [Top to Bottom] with a Spacing of 0.15"
- click on the Add Scale Bar icon 
- change the Length to 1.0
- change the At Scale field to 40000
- click on [Text Style] and change the At Scale selection to User-Defined (40000)
- in the Group Settings window, set the Horizontal Attachment To Group 2 [Center to Center] and Vertical Attachment to Group 2 [Top to Bottom] with a Spacing of 0.15"
- set the Relative Zoom to 2.0 (DO NOT change the At Scale setting here)
- click on the Redraw icon 
- click on the Save icon 
- click on Print 

When you have groups at different map scales on the same page, it is nice to provide a scale bar for each and perhaps text that identifies the map scale.

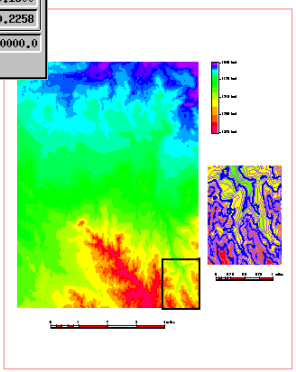
The area that is enlarged in this layout is identified with a box outline positioned in the larger image. Here it was added as a CAD object, but it can also be created in the Display process using the Sketch tool. Lines connecting the upper left and lower right corners of the box and its enlargement can also be added with the Sketch tool. Such cross-group connections in layouts work best when the groups are attached to the page with reference to an edge that will not be redefined by the addition of the sketch layer. (A sketch layer is added to the active group and obtains its georeference from that group.)



Just as you don't want to change a group's Relative Zoom unless you specifically intend to have groups at different scales on a page, you don't want to change the values in the Height and Width fields in the Group Settings window. Changing these fields also changes the Relative Zoom.

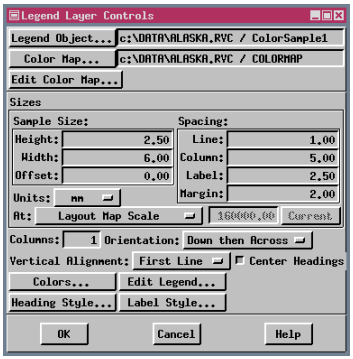


You could easily include text groups to provide the map scale of the two images ("Scale = 1:80000" for Group 1 and "Scale = 1:40000" for Group 2).



Other Legend Types

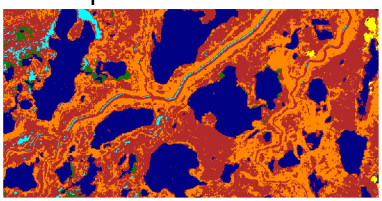
Map grids and text are saved as a part of the layout object so when you do a Save As and create a new layout object, the original is not affected by changes to text and map grids in the new layout. Legends, except for multi-object legends, cannot be altered in one layout and maintained in their original form in another because changes are saved to the legend object rather than as part of the layout object.



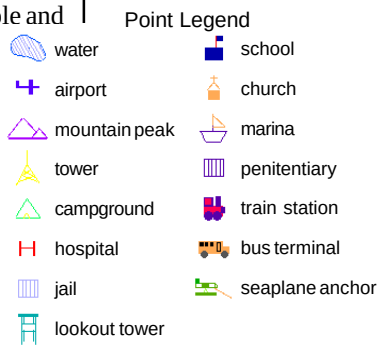
Color Sample
Legend Display Controls

The legends not yet discussed in this booklet are color sample, color scale range (available only in LegendView and as part of a multi-object legend), and separate point and polygon legends. The controls for all of these legend types are nearly the same as those already described.

Color sample legends are intended for raster objects that contain categorical data, such as Feature Mapping results. You get a legend entry for each active entry in the color map, which is identified by default by its cell value. The number of cells that have this value is also provided in parentheses on the same line as the color sample and cell value. You can of course edit these entries to replace the cell value with the class name or to convert the number of cells to ground area. Color scale range legends are a cross between continuous color scale and color sample legends. You specify the number of samples you want and discrete samples are provided to represent a range of values. Design elements for raster legends as part of a multi-object legend are found on the Legend panel of the Raster Layer Controls.



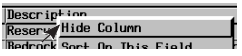
Feature Map with default
Color Sample legend



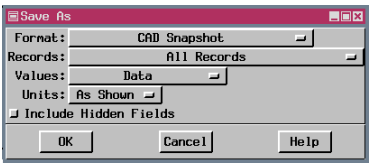
Like line legends, point and polygon legends use a style object to derive the samples and their labels. You can edit the default labels so you can include spaces and punctuation if desired.

CAD Snapshots of Database Tables

- click on Open, choose Open Layout, and select QUAKEHAZ in CADSNAP.RVC
- open the LIQSUSCEPTCLASS table in the polygon database of of the QUAKEHAZ / LIQMAP layer in Group 1
- right click on the Description field heading and choose Hide Column



- choose Table / Save As, and set the options as shown at the right, and click [OK]



- create a new object named LIQUEF, change the font for all three styles to Courier or another monospaced font, and check bold for the heading style only

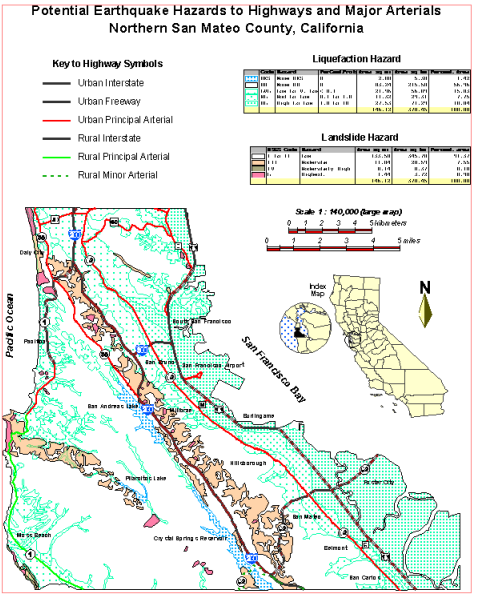
- click on the Polygon icon and set the fill color for BkgndEven and BkgndOdd to white

- click on the Line icon, set the HORZ_RULE color to white, then click [OK]

- open the LANDSLIDESUSCEP table in the polygon database of the QUAKEHAZ / LANSLMAP layer in Group 1
- right click on the Slope and Landslides field headings and choose Hide Column
- choose Table / Save As and repeat steps 4–7 except name the CAD object LANDSLIDE
- click on the Add CAD icon for Group 2 and choose LIQUEF
- click on the Add CAD icon for Group 3 and choose LANDSLIDE created in step 10, then redraw

Tabular database information can be included in layouts in the form of CAD snapshots. You can make these snapshots in the Database Editor, while displaying the associated object alone, or while building the layout. This snapshot can include all of a table's fields or selected fields can be hidden and not included. A CAD snapshot is not georeferenced, so it needs to be placed in a separate group with an adjusted relative scale. Groups with appropriate relative scale have already been created for you in this exercise.

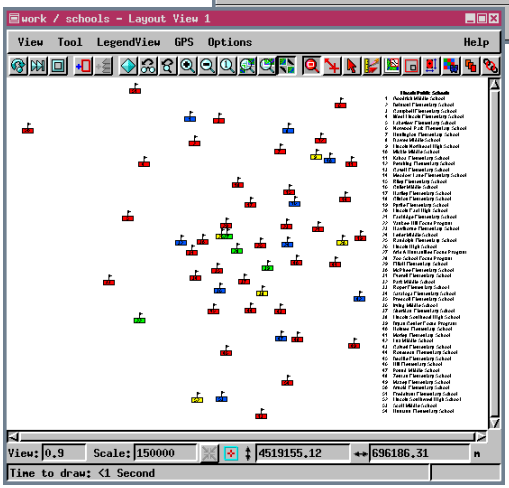
The headings that appear over the CAD snapshots once added to your layout are not visible in the initial layout because they are attached to empty groups, namely the groups that you add the snapshots to.



Other Legends from Database Tables

Virtual (computed and string expression) fields are a powerfull tool for many different applications. In this exercise, you are given a vector object that has a database table with an implied one-to-one attachment type and a single, computed field. Without any data entry, except the expression for the virtual field, you get a unique record associated with each element that supplies the information specified in the expression. You should look at the expression for this computed field.

The expression combines the values from three fields in other tables with the formatiing codes needed to get right aligned numbers that correspond to the numbers on the symbols and left aligned school names. You do not normally include formatting codes in a computed field because they do not affect the database display. However, the intent was for this table to provide a legend so the formatting may as well be generated by the expression rather than inserted one line at a time later. Note that the numbers are not part of the symbols—they are on-the-fly labels generated by attribute.



STEPS

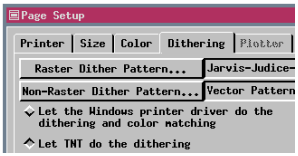
- open a new Display Layout
- click on Add Vector, choose Quick-Add Vector, and select the vector object in the LincolnPts Project File
- click on Show Details for the group and the vector
- click on Show Tables and View Table for the FOR_LEGEND table
- choose Table / Save As, change the Format to Tab Delimited, click OK and name the file SchoolPoints
- click on the Add Text icon, set the Text Alignment to Left, Ascender Height to 8 point, Vertical Space to 9.6, Foreground Color to black, and turn on the Normal toggle
- choose File / Open Text File, and select SchoolPoints.txt
- type Public Schools and <enter>, then highlight the typed text and turn on Bold
- click [OK] then [Yes]
- attach the SchoolPoints text group to Group 1 Left to Right with a Spacing of 0.5" and Top to Top, set At Scale to 80000 and Redraw

Printing to Files and Network Printers

STEPS

- if you have access to Windows printers, click on the Open icon, choose Open Layout and select any layout designed for A (8.5" x 11") or A4 sized paper
- choose Layout / Print from the Layout Controls
- click on the Use Windows Printer button

- click on the Dithering tab, and check that "Let TNT do the dithering" is selected



- click [Run], and collect your print once the Print process is finished
- choose Layout / Print, click on the Dithering tab and choose "Let the Windows printer driver do the dithering and color matching"
- click on [Run], collect your print when done, and compare

Note: the temporary raster for printing with the Windows driver requires six times the drive space needed by TNT (24-bit versus 4-bit).

TNTmips provides many different methods to print layouts. You can print immediately creating only a temporary raster, you can print to a raster object (4-bit dithered or 24-bit without dithering), or you can print to a print-file (no printfiles or 24-bit undithered in TNTlite). You need not have the layout open in a display process to print; printing from layouts, print rasters, and printfiles is available using the Support / Print From menu options, which use the saved objects or files without opening a View window. Print-rasters and print-files are more convenient than layouts when printing from a machine other than the one on which the layout was created because once you have a print-raster or print-file, the input objects are no longer necessary. (Almost invariably, some component of the layout is overlooked or placed in a file with a different name when the layout is copied.)

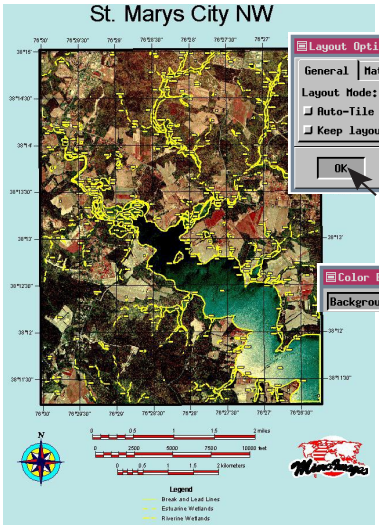
Print-raster objects can be viewed like any other raster object in TNTmips (but not in TNTlite, the print raster for an 8.5 x 11" page at 300 dots per inch is 2550 x 3300 cells). A print-file is not viewable; it contains the information required by the printer to print the page. A print-file is actually a pair of files, both with the name you assigned but one has a .p1 extension (large file) and the other has a .prf extension (small file). (When printing from TNTmips, not TNTlite, you can print over multiple pages, which gives you .p1, .p2, and so on, where the number corresponds to the page number. There is still just one .prf file.) Printfiles can be printed on machines without TNTmips installed by copying them to the printer port (see p. 11 of the *Printing* booklet for explicit instructions).

You can also print to any printer available on your Windows network when you print from TNTmips (follow the steps on this page). You have the option of letting Windows or TNTmips do the dithering. You should try both to see if you have a preference.

Using Map Layouts in Presentations

When preparing a layout for printing *and* for use in a presentation by projector (either directly in TNTmips or from a presentation software package, such as PowerPoint), new considerations come into play. White is generally not used as a presentation background color, but it is the background color for Hardcopy Layout. You do not want a black background either, or the text will "disappear." The methods used in this exercise presume that screen capture provides high enough resolution for your presentation purposes. If not, there are a number of other strategies* to make presentation materials but they generally are not available to TNTlite users since export is involved.

The small text groups are deleted from the layout to illustrate you need not keep all groups of the original map for the screen capture. There is relatively little work to change this layout from hardcopy to display with appropriate attachments because, starting on page 12, specific attachments are made to Group 1 rather than the default Page attachment. You choose the Select tool in the next to last step so the placement rectangle is not visible for screen capture.



* If you need details on screen capture and other strategies see the *Sharing Geodata with Other Popular Products* booklet.

STEPS

- click on the Open icon, choose Open Layout and select the St. Marys layout (p. 23)
- click on the Placement icon on the View window toolbar then on the legend group to select it
- change the Horizontal Attachment to the km group Center to Center and the Vertical Attachment to the km group Top to Bottom with a spacing of about 0.2"
- delete the text groups in the lower left (Non-tidal Wet...) and lower right (This image w...) of the layout
- change the heading text group to attach vertically to Group 1, Bottom to Top with 0.2" spacing
- choose Options from the Layout menu in the Layout Controls window, set the Layout Mode to Display and click [OK]
- click on the Legend icon for the legend group, click on [Colors] near the bottom, and turn on the Transparent toggle to the right of the background color, then click [OK] in the Color Editor and Legend Layer Controls
- click on Full and on the Select tool
- capture the screen*

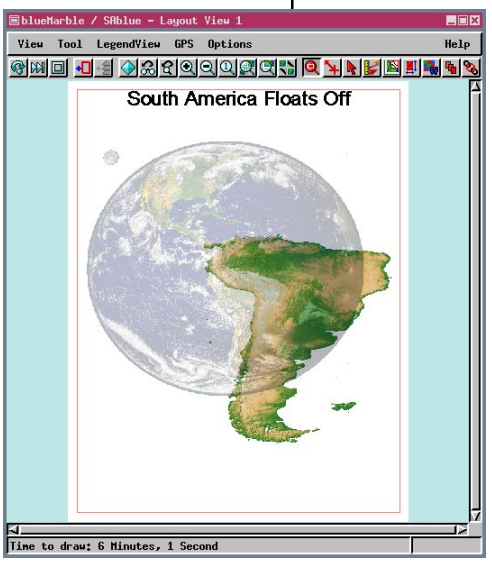
3D and Transparency in Layouts

STEPS

- click on Open, choose Open Layout and select TRANSPARENT 3D from the CB_ELEV Project File 
- click on Redraw 
- click on the Raster icon for the COMPOSITE layer in Group 1 
- click on [Mask], select DEM_8BIT from the CB_ELEV Project File, turn on the Mask toggle, click OK, then redraw
- repeat step 3, turn off the Mask toggle, click on the Options tab, enter 70 in the Transparency field, click [OK], and redraw
- note the difference in transparency between steps 4 and 5
- print after step 4 or 5 to confirm that transparency is used in printing

You can make use of both 2D and 3D groups when designing layouts for display or hardcopy. A tool is provided with the 3D Viewpoint Controls so you can select the area of the 3D view to include in the layout. You also have all the 3D Viewpoint controls that you use when working with a separate 3D group.

Transparency can be used with any layer type. Once transparency is set for viewing, there are no additional settings to get the transparency effects to print. Transparency is set for vector, CAD, and TIN layers as part of the polygon drawing style. Transparency can be set for rasters in a variety of ways. You can assign a percentage transparency to individual color map values; you can assign a percentage transparency to the raster as a whole (Options panel of the Raster Layer Controls); or you can select an 8-bit mask that provides transparency values for the raster displayed (0 is fully transparent, 255 is opaque).



without transparency

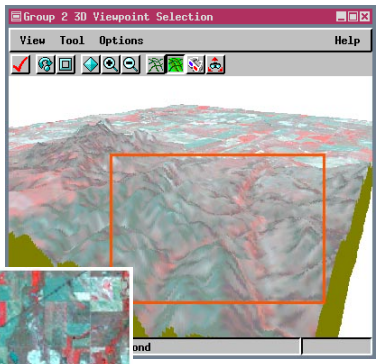
without 3D

More on 3D Groups in Layouts

3D groups in layouts have an associated 3D Viewpoint Selection window in addition to the Viewpoint Controls. This window lets you choose which part of the 3D rendering you want to include in the layout and also has an Apply Changes button to indicate you are ready to update the changes made in viewpoint and/or area selected to the 3D group in the layout.

You can add a new 3D group to a layout and set up the viewpoint and selected area, or you can add a previously saved 3D group to a layout. You can also save a 3D group that you have set up in a layout and the selected area, as well as the viewpoint, will be retained, as it is for the 3D group you add in this exercise.

You can resize and reposition the existing box or draw a new box in the 3D Viewpoint Selection window. The box functions like any other elastic box in the TNT products.



The combination of 3D and transparency in the group added, give the butte a more rugged appearance while blending well with the 2D image

STEPS

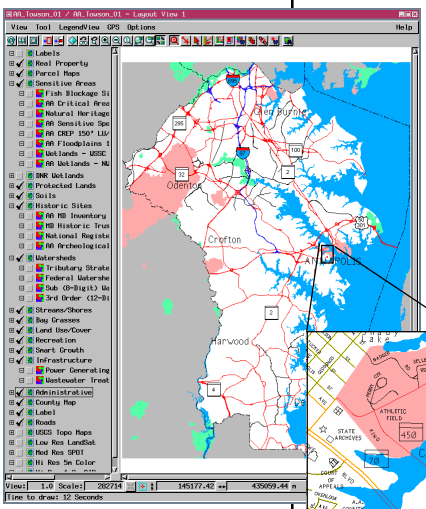
- with the layout still open from the previous exercise, set the transparency for the layer in Group 1 back to 0%
- click on the Remove icon for Group 2, and choose Remove Group
- click on the Group menu in the Layout Controls window, choose Add/ From Saved Object, and select _3DGROUP from the CB_ELEV Project File
- before clicking [OK], set the Add Group As option button to 3D

- click on the 3D Group icon and choose Viewpoint Controls

- note the features of the 3D Viewpoint selection window
- click on the 3D Group icon again and choose Placement Settings
- click on the Layout tab and attach Group 2 to the bottom right of Group 1(Horizontal Attachment: Right to Right, Vertical Attachment: Bottom to Bottom)
- click on Redraw

Other Layout Features

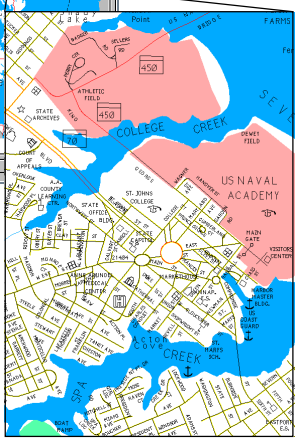
All groups in the layout below are geographically attached to the bottom group, which is attached to nothing (this is a display layout). This layout was developed by the Maryland Department of Natural (MDNR) Resources as part of the MERLIN (Maryland's Environmental Resources & Land Information Network) program.



If street names were shown in the full view map (above), they would be indecipherable and would obliterate the features of the full view map.

There are a number of quite important layout features that have not been described so far in this booklet, such as map scale controlled visibility and geographic attachment. These features are not discussed in detail in this booklet because they are not usually relevant for hardcopy maps; they are more commonly used for display layouts prepared for use with TNTmips or TNTatlas.

Geographic attachment provides another level of organization for complex layouts. The layout shown at the left has 24 groups with more than 100 layers in the Parcel Maps group alone. The hundreds of layers in this layout could be placed in a single group, since they are all georeferenced and cover some part of the geographic area shown in the overview map, but it would be very difficult to find any one layer to view further information or zoom to its extents. Instead, the various layers are arranged into logical groups, such as bay grasses (with one layer for each of 15 years), 1.2-meter color-infrared imagery (one layer per quarter map quadrangle), 5-meter natural color imagery (one layer per quad), and sensitive areas (one layer for each of eight different sensitive designations).



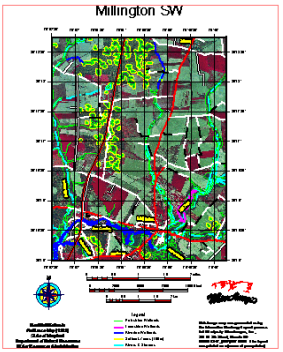
This layout also makes use of map scale controlled visibility, such that some layers are turned off and others are turned on as you zoom in and out. This feature could be used to provide different levels of detail when printing at different map scales.

In Summary and Detail

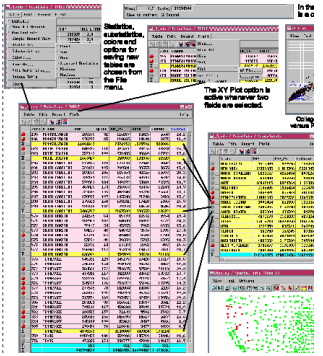
Think carefully before deleting groups in a layout. Have you established any attachments? Are you going to want some other layer in that position? If so, delete the unwanted layer(s), not the group.

If a layout is destined for reuse, pay attention to the relative scale settings. If you plan to print the same layout on a variety of paper sizes, set the scale for text and legends relative to a specified map scale for best results. If you want to use the same layout but replace the main image with another at a different map scale, set the scale relative to the layout scale.

Attach groups to the page if you want them to be centered. Attach groups to the margins if you want them to remain in a fixed position on or near one of the margins. Attach groups to other groups if you want them to move together.



Sketch layers are added to the active group and derive their georeference from that group. A sketch that extends beyond the other layers in a group changes the group extents. All of the sketched lines in the partial layout shown at right are in the same group as the large database table. The table didn't move when the sketch was drawn because it is attached to the left and bottom margins.



The partial layout above consists of a variety of screen captures tied together with a sketch layer and annotation text.

Non-printer Destinations

In addition to directly printing your hardcopy layouts, there are a number of other choices. One is to print to a TNTmips or Windows printfile, which can be printed from a computer not running TNTmips (see the *Printing* tutorial booklet for more information). You can also convert your layouts to a number of familiar file formats, such as TIFF, EPS (for Adobe Illustrator), PDF (for Adobe Acrobat), and SVG (Scalable Vector Graphics). SVG is particularly well suited for providing access to your layouts over the Internet. You cannot print to these file formats from TNTlite.

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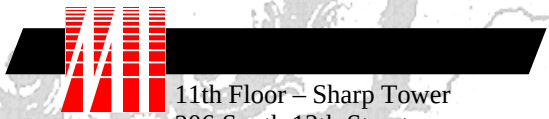

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