



# **Production Line Tool Set**

## **TLM Production Procedures Using MPS 3.1 and ArcGIS 8.3**

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Environmental Systems Research Institute, Inc.  
380 New York Street  
Redlands, California 92373-8100

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## Introduction

This document provides guidance, steps and procedures for creating 1:50,000 scale Topographic Line Maps (TLM50s) with the MPS 3.1 software solution. The steps can, and should be, used as reference for any map sheets generated with MPS 3.1.

The first section covers System Setup. This section covers items that should be addressed prior to producing any TLMs with MPS. The required fonts are covered, as well as, information as to how to acquire those fonts. The PMC and its many relationships to MPS are also discussed in this section. This includes how to add missing map sheets indexes to the lists of available map sheets on the Create Map Sheet Menu.

The MPS Margin and Surround Elements section is devoted to creating and editing the various surround elements used in TLM production. Specific step-by-step instructions concerning the surround elements are not provided in this document, as this can be found in the PLTS Help available in ArcMap. Rather reference information concerning the format and content of the elements is provided based upon current specifications. The Elevation Guide is one exception as there are instructions and guidelines that should be followed to successfully produce the Elevation Guide Box.

Grid systems are addressed in the next section. Steps for creating TLM50 grid systems, including Decimal Degree systems and MGRS are outlined. This includes steps for creating secondary grid systems for those map sheets that fall near a UTM zone split. Steps and important tips for converting these grids to feature classes or graphics are also discussed.

Output of TLM map sheets is covered in the next section. This includes output processes used in TLM production for generating hard copy plots, color separates, and E-Chart production.

The final section is devoted to Troubleshooting and FAQs.

# System Setup

## Fonts

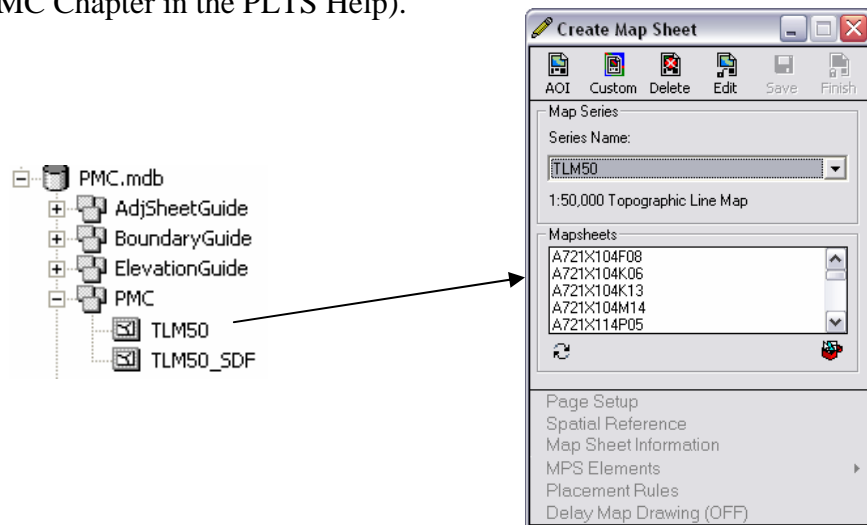
You must have the entire Zurich family of fonts installed on your system in order to generate any of the Defense Solution Map Series (i.e. TLM100, TLM50, JOG, etc.). The fonts can be purchased through BitStream, Inc. For more information on purchasing these fonts refer to [www.bitstream.com](http://www.bitstream.com).

## PMC and MPS

The Project and Mapsheet Catalog (PMC) is an integral part of the Map Production System. The PMC contains many important pieces of information, including:

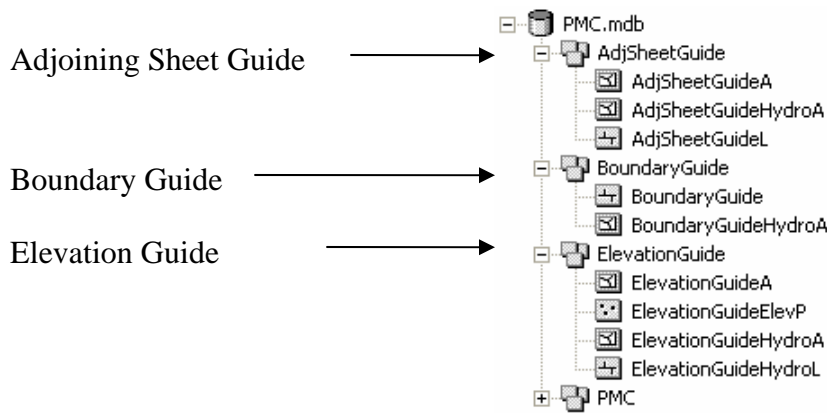
- All of the available Areas of Interest (AOI) for each map series
- All of the properties for the MPS Surround Elements
- All of the Placement Rule information
- Feature datasets and feature classes for the Boundary Guide, Adjoining Sheet Guide, and Elevation Guide
- Index of map sheets used in the generation of the Adjoining Sheet Guide

The PMC stores all of the available Areas of Interest (AOI) for each map series used during map production. Within the PMC geodatabase, there is a PMC feature dataset. This feature dataset contains polygon feature classes that represent the AOIs for each map sheet in a map series. Each of these feature classes has the same name as the map series they are associated with. When a user chooses a Map Series in the Create Map Sheet menu, all of the AOIs in the associated feature class are listed in the scrolling list of Mapsheets in this menu. For example, if a user selects the TLM50 Map Series, MPS then returns all of the features in the TLM50 feature class in the PMC feature dataset within the PMC geodatabase. It then lists the value in the MSNAME attribute in the scrolling list of Mapsheets. If you are creating a new map series, use the PMC Source Builder available in ArcMap to generate the required polygon feature classes within the PMC (See the PMC Chapter in the PLTS Help).



When an individual map sheet is selected from the list of available AOIs, either through clicking on mapsheet name, or visually selecting the mapsheet, the associated polygon feature is used to define the location and extent of the basemap.

In addition to the map sheet AOIs, the PMC also stores the information required to generate each map sheet in a series of database tables. This information includes all of the properties for each element on the map sheet and all placement rule settings. When you click on ‘Save’ in the Create Map Sheet menu, MPS saves all of the elements and the placement rule settings into these tables. Any surround element that has a data frame as one of its components (Adjoining Sheet Guide, Boundary Guide, and Elevation Guide) is also stored in a feature dataset and a series of feature classes. The feature datasets and feature classes are created by MPS when one of these elements is generated for the first time. The name of the feature dataset corresponds to the name of the element. These feature classes can then be opened and edited (generalizing the Elevation bands) in ArcMap.



The last piece of information being held within the PMC is used only for the Adjoining Sheet Guide. Within the PMC there is a Reference Data feature dataset. This feature dataset holds a feature class called TLM50\_Index. This feature class stores the index that is used to generate the information present in the Adjoining Sheet Guide element. If the Adjoining Sheet Guide is missing information, or not generating, this is the feature class that needs to be updated.

The PMC is an integral part of the MPS workflow. The PMC holds the information that defines the extent and location of the basemap in the PMC feature dataset. The feature classes in the PMC feature dataset can be updated with new sheets, updated extents, or sheet names. All of the placement rules and element properties are stored in unique tables within the PMC. In addition, the PMC holds all of the necessary feature classes for the generation of the Adjoining Sheet Guide, Boundary Guide, and Elevation Guide in separate feature datasets. The Adjoining Sheet guide also uses feature classes within the Reference Data feature dataset to generate the surrounding map sheet information.

## Updating Available Map Sheets

A PMC geodatabase is included on the PLTS installation CDs to use within MPS. Within this PMC the TLM50, TLM100 feature classes have been provided as complete as allowed by NGA. There are some areas that are not populated, and for some areas the map sheet extents may need to be updated. Either of these tasks can be easily accomplished using either ArcCatalog or ArcMap.

### Adding Map Sheets to the PMC

Map Sheets that are not available in the scrolling list provided in the Create Map Sheet menu can be imported a number of ways. If a single sheet needs to be added, the AOI button located on the Create Map Sheet menu can be used to generate the new map sheet. The extent of this map sheet can be entered manually through the interface, or imported from another format. See the PLTS Help, Map Production System>Map Sheets>Area of Interest(AOI) chapter for more information about this topic.

If multiple map sheets need to be added and these extents are present in another location and format (shapefile, coverage, feature class, etc.) the Simple Data Loader in ArcCatalog can be used to import the missing sheet boundaries directly into the feature class associated with the map series. As discussed earlier, this feature class can be found in the PMC feature dataset, and has the identical name as the map series. The MPS software uses the MSNAME attribute on this feature class as the unique identifier for storing and retrieving information about a map sheet. For that reason it is very important that this attribute is populated with an appropriate value. This can be accomplished during the loading process or after the load process in an ArcMap edit session. For more information on using the Simple Data Loader see the ArcGIS Help.

### Updating Existing Map Sheets

In some cases the boundaries of existing map sheets may need to be updated. Again, the map sheet boundaries are stored as features in a feature class. If the map sheet boundaries need to be updated, simply open the appropriate feature class (with the same name as the map series) in an ArcMap session and edit the boundaries.

### Adjoining Sheet Guide Information

If new map sheets are added or existing ones updated, it may be necessary to update the information used by the Adjoining Sheet Guide element. This information is stored as a feature class in the Reference Data feature dataset located within the PMC geodatabase. For the TLM products there are a TLM50\_Index and a TLM100\_Index feature. If new map sheets are added to the PMC feature dataset, verify that those map sheet extents also exist in this feature class/dataset as well.



In addition to the geometry of the map sheet, attribute information will also need to be populated in order for the Adjoining Sheet Guide to generate properly. The fields that must be populated are as follows:

- SERIES – This should be populated with the series that the map sheet belongs, i.e. A742
- ITEM – This should be populated with the map sheet number, i.e. 64462
  - For TLM50s the mapsheet number will end in 1, 2, 3, or 4. When the element is generated those numbers will be converted to roman numerals.
- NRN – This should be populated with the NGA Reference Number associated with the map sheet. Generally this is the SERIES concatenated with ITEM with ‘X’ between the two numbers i.e., A742X64462.
- GEOP – This should be populated with the country code that the map sheet lies.

## MPS: Margin and Surround Element Editing

The Map Production System has been designed to generate all of the required surround elements needed to meet the TLM50 Specifications. Once the elements are created, the Placement Rules will be used to position all of the surround elements in the proper location on the page layout. While the Placement Rules are a great help in storing and placing the elements in the proper location on the page, they require a lot of overhead if elements need to be edited beyond what is available on an element’s property page. It is for this reason that once **all** of the elements are generated and placed on the page, it is suggested that the map sheet be saved as an MXD. Once the map sheet is saved as a MXD, elements on the map sheet can be easily ungrouped for editing and re-grouped.

\*\*\*\*\*

**After the transition to a MXD, the map sheet will no longer be edited through the MPS software and the Create Map Sheet Menu.**

\*\*\*\*\*

Once the map sheet has been transitioned into an MXD the surround elements on the map sheet can be edited very easily. The MPS software generates two main types of surround elements on a map sheet. These two types are grouped graphic elements and grouped graphic elements with a data frame. The majority of the surround elements fall into the first category. These elements can be ungrouped and each graphic component (text, line and poly symbols) can be changed, edited, or updated. There are only three elements that fall into the second category: the Adjoining Sheet Guide, the Boundary Guide, and the Elevation Guide. These elements can also be ungrouped, and the graphic elements edited. In addition, the information in the data frame can be edited in a separate ArcMap session if required. Steps for completing these types of edits are outlined in the sections that follow.

## TLM Surround Elements - Generation

The TLM Specific elements listed below will be generated using the MPS software. All of the elements should be generated as completely as possible prior to saving the map sheet as an MXD. The elements are set up so that the default values will match the specifications described below. Refer to the PLTS Help for more information on generating each element. The steps required for successfully generating an Elevation Guide element are outlined in detail below.

### Adjoining Sheets

Add additional annotation for Country names if there are international borders in the adjoining sheets box. International boundaries and areas not within the series should be symbolized in accordance with the Style Guide. Also refer to Specification MIL-T-89301A, 3.11.10.

- ❑ Refer to the ReferenceData Feature Dataset for default values.
- ❑ TLM50 standard font is used
- ❑ Title - 9pt Zurich Bold Condensed CAPS MPSBlack
- ❑ Text/Sheet numbers – 6pt Zurich Condensed CAPS MPSBlack
- ❑ Bottom text – 5pt Zurich Light Condensed U/L MPSBlack
- ❑ Right text – 4pt Zurich Light Condensed U/L MPSBlack

### Boundary Guide

Add boundary administrative name (and arrows if necessary) to customize Boundaries guide. Refer to Style Guide and Specification MIL-T-89301A, 3.11.19 and 3.11.20.

- ❑ Title - 9pt Bold Condensed CAPS MPSBlack
- ❑ Country Name - 6pt Condensed CAPS MPSBlack
- ❑ First Order Administrative Boundaries - 5pt Condensed CAPS MPSBlack
- ❑ Second Order Administrative Boundaries – 5pt Condensed U/L MPSBlack
- ❑ Disclaimer - 6pt Light Condensed U/L MPSBlack

### Contour Interval Note

Refer to Style Guide and Specification MIL-T-89301A, 3.11.15 for content. Only include supplementary text if supplementary contours exist.

- ❑ Contour Interval - 9pt Bold Condensed CAPS MPSBlack
- ❑ Supplementary Contours - 6pt Bold Condensed CAPS MPSBlack

### Conversion Graph

No customization should be necessary. Verify that the graph was generated properly. Refer to Style Guide and Specification MIL-T-89301A, 3.11.23.

### Coordinate Conversion Note

Refer to Style Guide and Specification MIL-T-89301A, 3.11.31 and Coordinate Conversion document in NGA source.

- ❑ First line - 6pt Condensed CAPS MPSBlack
- ❑ Following lines - 6pt Condensed U/L MPSBlack

## Copyright Note

Refer to Style Guide, Specification MIL-T-89301A, 3.11.32 and General Notes document in NGA source for content.

- Title (main text) - 7pt Condensed CAPS MPSBlack
- Supplemental text - 5pt Condensed CAPS MPSBlack

## Country Name Note

Country Name appears twice on the mapsheet – Top left corner with additional scale (1:50,000) text following and bottom left. Refer to Style Guide, Specification MIL-T-89301A 3.11.4 and Geographic Name Guidance document in NGA source for content.

- Name - 16pt Bold Condensed CAPS MPSBlack

## Datum Note

Datum appears twice on the mapsheet – Top left corner and bottom right corner under Red-light Readable note. Refer to Geodetic Report document in NGA source for content.

- Text - 20pt Bold Condensed CAPS MPSRedBrown

## Edition Note

Edition appears twice on the mapsheet – Top right corner with supplemental text and bottom left corner. Refer to Style Guide, Specification MIL-T-89301A, 3.11.6 and Series, Sheet, Edition document in NGA source for content.

- Text - 16pt Bold Condensed CAPS MPSBlack
- Supplementary text (top) – 9pt Condensed CAPS MPSBlack

## Elevation Guide

Follow the procedures below for generating the Elevation Guide Box. You will need to edit elevation zones, add drains, add spot heights, and add spot height values (discussed in the TLM Surround Elements – Editing). Also, refer to MIL-STD-89301A, section 3.11.18 for additional guidance.

Prior to generating the elevation guide

- Go to Tools > Options... in the ArcMap main menu. In the window that appears select the Application Tab and uncheck the option for New Layer Visibility – Make newly added layers visible by default. Close the Options window.
- Add the DTED for your map sheet as a layer.

**\*\*\*\* Do NOT Turn the DTED Layer On \*\*\*\***

**A visible DTED layer will stop you from generating the EGB because of the map sheet's projection properties. If the DTED is turned on you will not see it in the map sheet! If the DTED is turned on you must remove the DTED Layer from the map sheet, re-add the DTED and re-generate the Elevation Guide Box.**

Generating the Elevation Guide Element

- Select MPS Elements > TLM > Elevation Guide Box
- Select the Elevation Classes Tab on the Elevation Guide Box Property Page

- ❑ For DTED Source Layer: Confirm correct DTED is listed.
- ❑ Output Path Name: Confirm that is pointing to the PMC for the map-sheet.
- ❑ Elevation Bands/Class Breaks: Confirm that this set to the correct contour interval for the map sheet.
- ❑ Click on the Calculate button to calculate the elevation band ranges. This may take a few seconds.
- ❑ Select the Hydrographic Inclusions Tab.
- ❑ Turn ALL check marks OFF for hydrographic lines and areas. You will import the necessary streams once the elevations bands are generated.
- ❑ Select the GeoProcessing Tab
- ❑ In the section – ‘Step 2 Minimal Area (Optional)’ enter 250,000 for the Remove Areas below option. Increase this number in order to remove additional small polygons.
- ❑ Click on Apply.
- ❑ Save the Map Sheet by Selecting Save on the Create Map Sheet menu.
- ❑ Once the save is complete, use the placement rules to position the Elevation Guide Box in the proper location.
- ❑ Once the element is in the correct location, again save the Map Sheet through the Create Map Sheet Menu.

## Glossary

This element is generated while in MPS using the general Glossary terms from Geographic Names Guidance in NGA source (Generic Name and Feature Designation Name). Customize Glossary terms (delete or adding terms that are sheet specific) and add diacritics where necessary once the map sheet has been converted to an MXD. Refer to Style Guide and Specification MIL-T-89301A, 3.11.12.

- ❑ Title - 9pt Bold Condensed CAPS MPSBlack
- ❑ Term text – 6pt Light Condensed U/L MPSBlack

## Legend

Customize Legend to contain sheet specific symbols and text where necessary – Area Name, Spot Elevation high and low. Refer to Style Guide and Specification MIL-T-89301A, 3.11.11.

- ❑ Title - 9pt Bold Condensed CAPS MPSBlack
- ❑ Feature text – 6pt Condensed CAPS MPSBlack
- ❑ Additional text – 6pt Light Condensed U/L MPSBlack (what is this “Additional” text)

## Limited Distribution Note

Limited Distribution note appears beneath Slope Guide or North Arrow. Refer to Style Guide, Specification MIL-T-89301A, 3.11.30 and General Notes document in NGA source for content.

- ❑ Title - 14pt Bold Condensed CAPS MPSRedBrown
- ❑ Note text– 6pt Condensed U/L MPSRedBrown

### **Map Information Note (Currency notes)**

Map Information note appears in the bottom left corner following Logo. Refer to Style Guide, Specification MIL-T-89301A, 3.11.21 and Map Info Date document in NGA source for content – this should contain the latest source date.

- Text - 7pt Condensed CAPS MPSBlack

### **Map Sheet Notes**

Note appears in the bottom left corner beside Legend. Refer to Style Guide, Specification MIL-T-89301A, 3.11.22 and Notes document in NGA source for content.

- Title - 9pt Bold Condensed CAPS MPSBlack
- Text – 6pt Condensed CAPS MPSBlack

### **Map Specification Note**

No customization should be necessary - verify generated properly. Refer to Style Guide, Specification MIL-T-89301A, 3.11.16 and MIL-T-89301A, 3.11.17 and MIL-T-89301A, 3.11.27 and Geodetic Report in NGA source when creating in PMC.

- Text - 6pt Condensed CAPS MPSBlack

### **Meter Reference Guide**

No customization should be necessary - verify that the guide generated properly. Refer to Style Guide, Specification MIL-T-89301A, 3.11.23 and Tab Run (100,000 Meter Grid Square Identification) in NGA source when creating in PMC.

### **North Arrow**

No customization should be necessary - verify generated properly. Refer to Style Guide and Tab Run (Declination Data) in NGA source when creating in PMC.

- Text - 6pt Condensed CAPS MPSBlack

### **Prepared and Published Note**

Prepared and Published note appears in the bottom left corner following Logo. Refer to Style Guide and Specification MIL-T-89301A, 3.11.26.

- Text - 8pt Condensed U/L MPSBlack

### **Red-light Readable Note**

Red-light Readable note appears in the bottom right corner. Refer to Style Guide and Specification MIL-T-89301A, 3.11.25 for content.

- Text - 8pt Bold Condensed CAPS MPSRedBrown

### **Road Destinations text and arrow**

Road destinations are not generated by MPS, but are considered surround elements. The road destination elements consist of a destination arrow and text describing the next population center and the distance in 1/10 km increments for those under 10 kilometers and whole numbers for those destinations greater than 10 kilometers away along the transportation feature. These elements are delineated where necessary along the outside edge of a map sheet. Arrows should follow the same orientation of the transportation

feature – rotate accordingly. Refer to Style Guide and Specification MIL-T-89301A, 3.12.9. The text components should follow these spacing requirements:

- 1mm from grid values
- 6mm from the grid (8mm on the south edge)

The symbols used for the road destination arrows are as follows:

- Text - 5pt Condensed MPSBlack e.g. REDLANDS 5km.
- Destination Arrow is a Point Graphic symbol ‘Destination Arrow (arrowhead)’ and ‘Destination Arrow (arrowhead an tail)’ available in the TLM50, and TLM50\_highres styles.

### **Scale Bar**

No customization should be necessary - verify generated properly. Refer to Style Guide and Tab Run (Declination Data) in NGA source when reviewing.

### **Seconds of Lat/Long Notes**

Seconds of lat/long notes appear four times – center north, south, east, and west portions on the mapsheet. Refer to Style Guide and Tab Run in NGA source for content.

- Title - 6pt Light Condensed Italic U/L MPSBlue

### **Series Note**

Series appears twice on the mapsheet – Top right corner with sup text and bottom left corner. Refer to Style Guide, Specification MIL-T-89301A, 3.11.5 and Geodetic Report or Series, Sheet, Edition document in NGA source for content.

- Text - 16pt Bold Condensed CAPS MPSBlack
- Supplementary text (top) – 9pt Condensed CAPS MPSBlack

### **Sheet Name Note**

Sheet Name appears twice on the mapsheet – Top Center (24pt) and bottom left (16pt). Refer to Style Guide, Specification MIL-T-89301A, 3.11.7 and Geographic Name Guidance document in NGA source for content.

- Name (top)- 24pt Bold Condensed CAPS MPSBlack
- Name (bottom) - 16pt Bold Condensed CAPS MPSBlack

### **Sheet Number Note**

Sheet Number appears twice on the mapsheet – Top right corner with sup text and bottom left corner. Refer to Style Guide, Specification MIL-T-89301A, 3.11.8 and Series, Sheet, Edition document in NGA source for content.

- Text - 16pt Bold Condensed CAPS MPSBlack
- Supplementary text (top) – 9pt Condensed CAPS MPSBlack

### **Slope Guide Element**

The Slope Guide element appears in the lower right corner of the map sheet. The actual placement of this element can vary based upon the available space. The scale and contour interval for the map sheet are the only parameters need to generate the slope guide element. Refer to Style Guide and Specification MIL-T-89301A, 3.11.8 for content.

### Unit of Elevation Note

Unit of Elevation note appears in the bottom center. Refer to Style Guide and Specification MIL-T-89301A, 3.11.14 for content.

- Text - 10pt Condensed CAPS MPSRedBrown

### Users Note

Users note appears in the bottom center. Refer to Style Guide and Specification MIL-T-89301A, 3.11.29 and General Notes in NGA source for content.

- Text - 6pt Light Condensed CAPS MPSBlack

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## TLM Surround Elements - Editing

Once all of the surround elements have been generated they can be edited beyond what the element's property pages allow. While these edits can be performed within MPS, there are some extra steps that need to be followed. These extra steps are a direct result of one of MPS biggest assets, the Placement Rules. An alternative to performing the edits in MPS is to save the map sheet as an MXD. By doing so, all of the surround elements become simple grouped graphics that can be ungrouped, edited, and re-grouped easily. The drawback is that the element property pages and generation tools are not available and any changes made in the MXD are not stored into the PMC. It is suggested that the surround element edits be performed in and MXD rather than in MPS.

Once **all** of the surround elements are generated, save the map sheet as an MXD. The MXD will be used from this point forward in the production process (all of the following steps assume that the map sheet has been saved as an MXD and is referenced as 'mapsheet.mxd' in the steps).

Editing the surround elements will consist of either editing the graphic elements that make a particular surround element, or the feature classes that are being displayed in the element's data frame. Graphic edits can be completed easily using the tools available on the ArcMap Draw toolbar. Individual text, line, polygons, and point graphic elements can be created and edited using this toolbar. All graphic elements have properties that are unique to that particular type of element. Select a graphic element, right-click, and select 'Properties' to access these unique property settings. Some elements, as mentioned earlier, contain a data frame. Data frames contain layers, which are pointers to feature classes. These feature classes can be edited in a separate ArcMap session and the edits will be reflected in your map sheet (either MPS or MXD).

## General Editing of Surround Elements - MPS

If the map sheet has not been saved as an MXD, all of the edits mentioned here can be performed within MPS and the Create Map Sheet Edit Session. There are a few extra steps that must be followed when performing any ungrouping / re-grouping of the surround elements as a result of the Placement Rules. The Placement Rules use a surround element's name as an identifier for each element. When an element is ungrouped, the name is lost. Any placement rule that was using that element name is then lost as well.

- Select the Surround Element that will be ungrouped.
- Right-click and select Ungroup.
- Perform the required edits to the graphic elements (Don't save yet!)
- Select all of the graphic elements
- Right-click and select Group
- Save through the Create Map Sheet Menu
- Open the Placement Rules Dialog
- Scroll to the bottom of the elements list and select the 'Group1' element
- Click on 'Name' and name the element, then click OK.
- Click and drag the element's position to the proper location in the draw order.
- Set the placement rules for that element.
- Re-set the placement rules for any other surround element that was using the original surround element in its rules to the new element (The element name in the Dependent XX box will be <None>).
- Click OK
- Save the map sheet through the Create Map Sheet Menu.

## Customizing the Elevation Guide

The Elevation guide requires the most editing after being generated by the MPS software. All of the edits for the elevation guide can be performed while editing the map sheet in MPS or as an MXD – as none of the edits require ungrouping the Elevation Guide element. As discussed above, any surround element that contains a data frame also contains feature classes. These feature classes can be edited in a separate ArcMap session. Once the edits are complete, and the changes saved, a refresh of the map sheet will incorporate the changes into the element.

### Editing contents of the Elevation Guide Box

- ❑ After EGB generation open up a new ArcMap session.
- ❑ Add all Elevation Guide Layers
  - The Layers are located in the PMC geodatabase, under the ElevationGuide Feature Dataset
- ❑ Set up Definition Query to edit the Elevation Guide features for your map sheet
  - Select the ElevationGuideA feature layer
  - Right-Click and select Properties



- Select the Definition Query Tab
- Click on the 'Query Builder...' button
- In the Fields list – double click on the 'MSNAME' attribute
- For the operator, select '='.
- Either Find the MSNAME in the Unique List on the right of the window and double click on it, or enter in the name of the mapsheet surrounded by single quotes – i.e., 'V795X64462'
- When the Query is set Click Verify, click OK
- If the expression passed, Click OK on the Query Window, and OK on the Properties window
- Zoom to the visible features.
- Create Map Topology for shared editing
  - Select More Editing Tools > Topology
  - Click on the Map Topology Button
  - Include only the ElevationGuideA feature class in the topology, accept all other defaults
- Use the shared edit tool and the Reshape Selected Topology Edge button on the PLTS Editing toolbar to generalize the elevation bands
- Remove any small tops.
- Save edits.

### Adding Drains to the EGB

- Add/copy streams from WatercrsL / WatercrsA that help describe the elevation change on the sheet. Add both perennial and intermittent if necessary, as well as canals/ditches if appropriate.
  - Add the WatrcrsL / WatrcrsA feature classes from the production GDB
  - Select a representative pattern to be included in the EGB.
  - Start an Edit session and set the Target layer to either ElevationGuideHydroL or ElavtionGuideHydroA depending on what you have selected.
  - Perform a Copy/Paste to copy the features in the selected Target Layer
  - Calc the 'F\_CODE', 'HYC', 'MSNAME', and 'PRNAME' attributes for the new features.
- Generalize stream shapes. It helps to unsplit the drains using the 'HYC' attribute.
  - Click on Select by Attributes (located on the PLTS Editing Environment Toolbar)
  - Set the Query to look for HYC = 8
  - Click on the Unsplit, located on the PLTS Advanced Editing Toolbar
  - Choose to unsplit the selected features and click OK.
  - Repeat for HYC = 6
- Edit turnbacks of elevation zones where needed.
- Save Edits

## Adding Spot Heights to the EGB

- ❑ Add the ElevP feature class from the production database to your data frame.
- ❑ Select a representative pattern of 10 spot heights - including the highest, the lowest, and 8 other spot heights that describe the elevation on the sheet. The spot heights included on the elevation guide must be represented on the basemap.
- ❑ Set the Target Layer to the ElevationGuideElevP feature class.
- ❑ Perform a Copy/Paste to copy the selected features into the target layer
- ❑ Select the ElevP layer, right-click and select Properties
  - Click on the Labels Tab
  - Check on the option to Label features in this layer
  - For the Label Field, select ZV2
  - Click OK to close the property page
- ❑ Open the Set Selectable Layers dialog
  - Make ElevP unselectable
- ❑ Select each of the 10 spots that were copied into ElevationGuideElevP
- ❑ For each spot update the ZV2 and the MSNAME attribute to the correct value – using the labels as a guide.
- ❑ Save edits.
- ❑ Stop Editing
- ❑ Save and close the Elevation Guide MXD.

## Adding Spot Height Values to the EGB

- ❑ Open the mapsheet.mxd
- ❑ Locate the ElevationGuide Box data frame in the TOC.
- ❑ Select the ElevationGuideElevP, right click and select properties
  - Click on the Labels Tab
  - Check on the option to label features in this layer
  - For the Label Field, select ZV2
  - Click OK to close the property page.
- ❑ Zoom to the Elevation Guide surround element on the page layout.
- ❑ Add graphic elements for the spot elevations. Use the labels as a guide.
  - Select the New Text tool on the Draw toolbar
  - Click on the location in the map to add the spot elevation text
  - Enter the value of the spot elevation – use the labels as a guide. Preferred placement is lower right of the spot. Place labels avoiding black lines where possible
    - High value – 8pt Bold Condensed
    - Other values – 6pt Condensed
- ❑ When done turn off the labels for the ElevationGuideElevP layer.
- ❑ Save the mapsheet.mxd

## Changing EGB Gridline Color if necessary

- ❑ Select the Elevation Guide data frame.
- ❑ Right-click and select Properties > Grid Tab.
- ❑ Highlight the Grid, and select Properties.
- ❑ Select the Lines Tab and set the Line Symbol to the appropriate color.
- ❑ Click OK once, then a second time to close out all property pages.

## Customizing the Boundary Guide

The Boundary Guide is similar to the Elevation Guide in that it is a grouped element with a data frame. That means that there are feature classes that can be edited. Those feature classes, as discussed earlier, are located in the PMC geodatabase, in the BoundaryGuide feature dataset. Primarily, the edits you will be performing are to generalize the boundary features represented in this element. The basic procedures are the same as those followed when editing the Elevation Guide.

### Editing contents of the Boundary Guide

- ❑ After Boundary Guide generation open up a new ArcMap session.
- ❑ Add all Boundary Guide Layers
  - The Layers are located in the PMC geodatabase, under the BoundaryGuide Feature Dataset
- ❑ Set up Definition Query to edit the Boundary Guide features for your map sheet
  - Select the BoundaryGuide feature layer
  - Right-Click and select Properties
  - Select the Definition Query Tab
  - Click on the 'Query Builder...' button
  - In the Fields list – double click on the 'MSNAME' attribute
  - For the operator, select '='.
  - Either Find the MSNAME in the Unique List on the right of the window and double click on it, or enter in the name of the mapsheet surrounded by single quotes – i.e., 'V795X64462'
  - When the Query is set Click Verify, click OK
  - If the expression passed, Click OK on the Query Window, and OK on the Properties window
  - Repeat these steps for the BoundaryGuideHydroA feature layer.
- ❑ Zoom to the visible features.
- ❑ Using the editing tools available, Reshape and Modify, generalize the boundary features
- ❑ Save edits. Close and save the mxd
- ❑ Switch to the mapsheet.mxd
- ❑ Zoom the location of the Boundary Guide, and verify that your edits are reflected in the element.

## Grid Systems

The procedures outlined below are specifically for creating a grid system for TLM50 map sheets. This general outline can be followed for any reference system associated with a data frame in ArcMap:

- Create the reference system
- Convert to the reference system to graphics or features (converting to features is only available if PLTS is installed)
- Edit graphic elements or features as desired

A data frame can have multiple grid systems displayed at one time. More complex reference systems may require that components of the system are present in two different reference systems (tick marks in one system, labels or grid lines in another) to meet product specifications. **When converting any grid system to graphics or features it is extremely important that the zoom level for the page layout is set to at least 800%. Not doing so could introduce inaccuracy into the converted components.**

## DD Grid Reference System – TLM50s

Verify that the following properties are set for the ‘DD Grid’ system associated with your TLM50 map sheet prior to beginning any conversion process.

- ❑ Open the property page of the Layers Dataframe
- ❑ Select the Grids Tab
- ❑ Highlight the ‘DD Grid’ and select Properties
- ❑ Select the Intervals Tab
  - Interval
    - The X Axis Interval should be 0.083333333333
    - The Y Axis Interval should also be 0.083333333333
  - Origin
    - Select the option to Define your own origin
    - The X Origin should be -180
    - The Y Origin should be -90

## Converting the DD Grid

The most complicated part of working with the grid systems is keeping track of which elements have been converted from the data frame grid to either a graphic element or a feature class. When a grid is converted, either to graphics or a feature class, only those components of the grid that are visible on the screen will be included in the conversion process. Keeping this in mind you can selectively choose which elements from a grid system are converted. In addition, you can convert one part of a grid system, labels for example, to a graphic, and not convert the tic marks.

The only components of the ‘DD Grid’ that will be converted are the labels. Once they are converted you will have control over the placement of the individual labels.

- ❑ Open the Property Page of the basemap Data Frame, Select the Grids Tab
- ❑ Select the 'DD Grid' and click on Properties
- ❑ Select the Axes Tab and un-check all of the options for:
  - Top, Right, Left, Bottom placement for the Major Division
  - Top, Right, Left, Bottom placement for the Subdivision
- ❑ Select the Border Symbol Options, and set the color to No Color (this will keep the neatline from being converted to a graphic)
- ❑ Select the Lines tab
- ❑ Choose the option to not show lines or tics
- ❑ Click OK to Close the Grid property page.
- ❑ Click OK to Close the Data Frame Property Page

At this point the only component of the 'DD grid' system that should be visible are the 5 minute labels along the edge of the mapsheet. Now you can convert just those elements to graphics.

- ❑ Zoom to the Lower Left corner of the basemap Data Frame
- ❑ Open the property page of the basemap Data Frame
- ❑ Select the Grids Tab
- ❑ Highlight the 'DD Grid' and select Convert To Graphics
- ❑ When the process is completed, ArcMap automatically turns off the visibility of the entire 'DD Grid' (notice the check box next to the grid) reference system
- ❑ Click Properties - Now you will turn on the items that were not converted, and turn off those items that were converted
- ❑ Click on the Axes Tab
- ❑ Check-on the options for
  - Top, Left, Right, Bottom placement for the Major Division
  - Top, Left, Right, Bottom placement for the Subdivision
- ❑ Select the Border Symbol Options, and set the Color to Black
- ❑ Select the Lines Tab
- ❑ Choose the option to Show as grid of tics
  - The symbol should be the DD Crosshair symbol, if not select it using the symbol selector
  - The Buffer distance should be 20 pts
- ❑ Select the Labels Tab
- ❑ Uncheck the Label Axes options for the Top, Right, Left, and Bottom
- ❑ Turn on the Visibility of the 'DD Grid'
- ❑ Click OK to Close the Grid Property Page
- ❑ Click OK to Close the DataFrame Property Page

All of the components of the 'DD Grid' system should now be visible in your mapsheet. Remember the labels are now graphics. ArcMap still automatically generates the neatline, tic marks, and crosshairs. When the labels were converted to graphics, they were converted into a grouped graphic element. In order to edit the placement of each label, select and ungroup this graphic element.

- ❑ Select one of the labels, notice the selection box goes around the entire mapsheet
- ❑ Right-Click and select Ungroup
- ❑ Select all of the labels again
- ❑ Right-click and select Ungroup one more time.

## MGRS Reference System – TLM50s

Generating the MGRS is a little different than the process followed for the DD grid system as the lines and ladder values are converted to features. Before you begin, one change has to be made to the properties of the MGRS Grid System:

- ❑ Open the Property Page for the Layers (Basemap) Data Frame
- ❑ Select the DataFrame tab
- ❑ Verify that the Enable clip to shape option is un-checked.
- ❑ Select the Grids Tab
- ❑ Highlight the MGRS Grid and select Properties
- ❑ Select the MGRS Tab
  - Un-check the option to Show grid zone square identification labels
- ❑ Click OK to close the grid Property Page
- ❑ Click OK to close the Data Frame Property Page

## Converting the MGRS to Feature Classes

The conversion to feature classes works similar to the conversion to graphics used for the DD Grid reference system. Only those features visible will be converted to features in a geodatabase. The components of the MGRS that we want converted to features are the grid ladder values and the grid lines. These are converted so that they can be edited and adjusted to avoid overprinting.

### ***\*\*\*Before Converting Grid Lines to Feature Classes\*\*\****

***To ensure that the Grid lines are converted to feature classes in the most accurate position it is extremely important that your page layout zoom level is greater than 800% before completing the following steps!***

- ❑ Open the basemap Data Frame Property Page
- ❑ Select the Grids Tab
- ❑ Highlight the MGRS Grid and click Properties
- ❑ Select the Axes Tab and un-check all of the options for:
  - Top, Right, Left, Bottom placement for the Major Division
  - Top, Right, Left, Bottom placement for the Subdivision
- ❑ Select the Labels tab and un-check the Top, Right, Left and Bottom placement options
- ❑ Click OK to Close the Grid Property Page
- ❑ Click OK to close the Data Frame Property Page
- ❑ Zoom to the lower left corner of the basemap to at least 800%. This will ensure that the grid lines are converted accurately.

Add the Convert Map to Feature Class tool if it is not already present in ArcMap. There are instructions for doing that in the latest TLM Production procedures located in the PLTS Online Help under Map Production System > MPS Enhanced Grid Properties > Converting Map Grid to a Feature Class.

- ❑ Once the Tool is loaded, go ahead and run it
  - Convert only the MGRS Grid into your carto GDB
- ❑ After the conversion process is completed, open the property page for the basemap data frame
- ❑ Select the Grids Tab
- ❑ Select the MGRS Grid and click Properties
- ❑ Click on the MGRS Tab
  - Un-check the option to Show Ladder Values
- ❑ Click on the Labels Tab
  - Check on the options to place labels along the Top, Left, Right, and Bottom
- ❑ Click on the Lines tab
  - Select the option to not show as grid or ticks
- ❑ Click OK on the Grid Property Page
- ❑ Click OK on the Data Frame Property Page

Add the MGRS\_Grid\_Line and MGRS\_Grid\_Anno feature classes to your basemap data frame. You should now have all of the components of the MGRS present on your mapsheet. The lines and annotation can be edited using the same tools as the used when editing the other features within the basemap. There is one extra step that is required to get the MGRS to match specifications. Every 10th grid line (0, 10, 20, 30, 40, etc.) needs to be a heavier line weight than the others.

- ❑ Start an edit session
- ❑ Select every tenth grid line (lines associated with 10, 20, 30, 40, etc ladder values), these are the major grid lines.
- ❑ Calc the 'SYMBOL\_SIZE' attribute to 10 for each of these lines
- ❑ Save edits made to the grid line attributes
- ❑ Open the Property page for the MGRS\_Grid\_Lines layer and symbolize the lines using the SYMBOL\_SIZE attribute.
- ❑ Assign the symbol sizes as follows:
  - Major Grid Lines, mpsblack .25mm
  - Minor Grid Lines, mpsblack .1mm

The MGRS labels can be converted to graphics to improve the label placement and correct overprints. To do so, follow the same general procedures outlined for the DD Grid Reference System. Keep in mind that only those that are visible on the map sheet will be converted to graphics.

## Secondary Grid Systems – TLM50s

Some maps will require a secondary grid system because of the sheet's geographic location in relationship to UTM Zones. The TLM50 map series and TLM50 style contain two reference systems, the Labels – 2<sup>nd</sup> Grid, and the Tics – 2<sup>nd</sup> Grid for generating the secondary grid system. The properties for each of these reference systems will need to be updated and edited for each map sheet.

### Adding the Secondary Grids

- ❑ Select Tools > Options... from the ArcMap main menu
- ❑ Click on the Application Tab
  - Un-check the option under the Wizard Mode Section
  - Click OK to close the Options Dialog
- ❑ Open the Basemap Data Frame Properties Page
- ❑ Select the Grids Tab
- ❑ Click On 'New Grid'
  - Click on 'More Styles'
  - If the latest style has been copied to your arcgis\arcexe83\bin\styles then:
    - Make sure the TLM50 style is checked
  - If the latest style has NOT been copied to this location
    - Click 'Add...' and navigate to the location of the latest TLM50.style
  - Scroll Down through the list and Select the 'Labels – 2<sup>nd</sup> Grid'
  - Click OK
- ❑ In the list of the Grid systems, change the name of the 'Measured Grid' to 'Labels – 2<sup>nd</sup> Grid'
  - Click once on the existing name to change it
- ❑ With the 'Labels – 2<sup>nd</sup> Grid' highlighted, click 'Properties'
  - Select the 'System' Tab
  - Choose the Option for another Coordinate System and click on 'Properties'
  - Click on the 'Select...' button
  - In the dialog, select the Secondary/Minor grid system – ProjectedCoordinateSystem/UTM/WGS84/[*ProperUTMZone*]
  - Click 'Add' then 'OK' on the Spatial Reference Window
  - Select the Intervals Tab
  - Verify that the Units are set to 'Meters' if not change it.
  - Set the X-Axis and the Y-Axis to 10000
  - For the Origin Section
    - Choose the Define your own Origin option
    - Set the X-Origin and the Y-Origin to 0
  - Click OK to Close the Reference System Property Page
- ❑ Click on 'New Grid'
  - Click on 'More Styles'
  - Scroll Down through the list and Select the 'Tics– 2<sup>nd</sup> Grid'



- Click OK
- In the list of the Grid systems, change the name of the 'Measured Grid' to 'Tics – 2<sup>nd</sup> Grid'
  - Click once on the existing name to change it
- With the 'Tics – 2<sup>nd</sup> Grid' highlighted, click 'Properties'
  - Select the 'System' Tab
  - Choose the Option for another Coordinate System and click on 'Properties'
  - Click on the 'Select...' button
  - In the dialog, select the Secondary/Minor grid system – ProjectedCoordinateSystem/UTM/WGS84/[*ProperUTMZone*]
  - Click 'Add' then 'OK' on the Spatial Reference Window
  - Select the Intervals Tab
  - Verify that the Units are set to 'Meters' if not change it.
  - Set the X-Axis and the Y-Axis to 10000
  - For the Origin Section
    - Choose the Define your own Origin option
    - Set the X-Origin and the Y-Origin to 0
  - Click OK to Close the Reference System Property Page

That's number two set up. Now you will have to convert the tics marks reference system to graphics in order to align the tic marks with the neatline. This is an inherited problem from ArcMap. These grids are made from the ArcMap Measured Grid systems. Unfortunately, this type of grid system does not honor the clip to shape property that we use for TLM production. The Tic marks align very nicely with the data frame, but not the actual edge of our map sheet. Therefore they have to be converted to graphics and adjusted to the edge of the neatline.

**\*\*\*Before Converting Tics – 2<sup>nd</sup> to Graphics\*\*\***

***To ensure that the tick marks are converted graphics in the most accurate position it is extremely important that your page layout zoom level is greater than 800% before completing the following steps!***

### **Converting the Ticks – 2<sup>nd</sup> Reference System**

- Zoom to the lower left corner of the basemap to at least 800%. This will ensure that the grid lines are converted accurately.
- If the Data Frame Property page is not open, go ahead and open it.
- Select the Grids Tab.
- Highlight the 'Tics – 2<sup>nd</sup> Grid' Reference System
- Click on the Convert To Graphics Button
- Click OK to close the Data Frame Property Page

The 'Tics – 2<sup>nd</sup> Grid' is now a grouped graphic element on you map sheet. To work with the individual Tics, select this grouped element, right-click and select Ungroup.

The labels should be converted in the same way. Open the data frame property page, and convert the 'Labels – 2<sup>nd</sup> Grid' to graphics and adjust them accordingly.

**\*\*\*\* Before Adjusting Tics associated with the 2<sup>nd</sup> Reference System \*\*\*\***

**It is extremely important that you display the grid lines for the 2<sup>nd</sup> reference system prior to adjusting any of the tic marks!**

- ❑ Open the Basemap Data Frame Property page.
- ❑ Select the Grids Tab
- ❑ Highlight the 'Tics – 2<sup>nd</sup> Grid' Reference System
- ❑ Click 'Properties'
- ❑ Select the 'Intervals' Tab
  - Change both the X and Y Intervals to 1000
  - Verify that the origin is set to 0, 0
- ❑ Select the 'Lines' Tab
  - Choose the option to 'Show as a grid of lines'
  - Select a line color that will be easy to see. These lines do not have to match any specifications – they are for your reference only.
- ❑ Select the 'Labels' Tab
  - Turn off the labels on all four sides
- ❑ Select the 'Axis' Tab
  - Turn off all of the Major Division Tic Marks
  - Turn off all of the Minor Division Tic Marks
- ❑ Click OK to close the Grid Property page
- ❑ Click OK again to close the Data Frame Property Page

Start adjusting the secondary grid tic marks to align with the neatline of the basemap. Use the grid lines that you just set up as guides to ensure the accuracy of the tic marks as you move the coincident with the neatline. The grid lines can be turned off when completed. However, they should be turned on again and verified prior to producing any output.

## Creating Annotation

This section outlines the general steps required for converting labels to annotation feature classes. Prior to beginning any of the conversion check that all of the appropriate fonts are loaded on the system. The steps outlined below assume that a Geoname shapefile or feature class is being used to generate the annotation. See the FAQ section for help with generating a Geoname shapefile or feature class.

Annotation characteristics follow MIL-STD 2402 of 21-April, 1995 and MIL-T-89306, section 3.19 of 28-February, 1995.

### Create an Annotation Dataset

- ❑ Open Arc Catalog and navigate to the production geodatabase.

- ❑ Confirm that there is an annotation feature dataset. (If not, you must create one.)
  - Go to File in the Arc Catalog Menu
  - Add new Feature Dataset
  - Name it appropriately
  - Click on the Edit button
  - Click on the Import Button on Coordinate System Tab
  - Navigate to a feature class in the production database.
  - Click OK once then a second time.
- ❑ Close ArcCatalog

## Labeling Features

- ❑ Add the Geoname shapefile/feature class to the mapsheet.mxd.
- ❑ Right click on the Geoname layer and Select properties
- ❑ Click on the Labels Tab
- ❑ Click “Label Features in this Layer”
- ❑ If the data will be labeled the same, do the following:
  - Method: “Label all feature the same way”
  - Proceed to the Text Symbol Button instruction below
- ❑ If your data will be labeled in more than one way, do the following:
  - Method: “Define classes of features and label each class differently”
  - Class: Default, check off “Label Features in this Class”
  - Click Add Class button and give the class a name
  - Click “Label Features in this Class” box for your named Class
  - Click on SQL query: Query for the fields you require (see below)
  - Text String Label Field: Create a label string as you require
- ❑ Click on Text Symbol Button.
- ❑ Select the appropriate color, font, size, & style for text. Adjustments for various feature font sizes can be made later in the data.
- ❑ Click on Label Placement Properties
- ❑ In the Placement Properties, Placement box, click on “Change Location” button
- ❑ Select an appropriate label position and accept all defaults in this window.
- ❑ Click the Conflict Detection Tab, Click “Place Overlapping Labels Button”
- ❑ Accept all other defaults.
- ❑ Click OK.

## Converting Labels to Annotation

- ❑ In the layout view, zoom to full extent of map sheet
- Right Click in the Data Frame for the Properties
- ❑ Click on Data Frame Tab and change extent to Fixed at 1:50,000.
- ❑ Click on the General Tab and set the Reference Scale to 1:50000.
- ❑ Exit the Data Frame Properties.
- ❑ ENSURE THAT ONLY ONE FEATURE LAYER IS VISBLE AT ALL TIMES
- ❑ Right-click on the feature layer and select Convert Labels to Annotation
- ❑ In the Convert Labels to Annotation dialog, uncheck and un-highlight all labels. Check and highlight a single set of labels to be converted.

**It is Important that only one label class is highlighted and has been checked on to convert. Not doing so will cause your labels to be converted to graphics within the map sheet. Do not try to convert the labels to annotation in batch!!**

- ❑ Create Annotation For: “Features Displayed in the Current Extent”
- ❑ Check on “Create overlapping labels for all layers”
- ❑ Un-check the option to “Display Overlapping Labels in Overflow Window”
- ❑ Confirm that Reference Scale is 1:50000
  - If it is not, close the Convert Labels to Annotation dialog
  - Open the Data Frame Property Page
  - Select the Data Frame Tab
  - Set the extent to Fixed at a scale of 1:50000
  - Click OK to close the property page
  - Go back up to the step marked with a ‘➤’ and proceed from there.
- ❑ Storage Options: In a Database.
- ❑ Navigate to the Anno50K and click add
- ❑ Name the annotation class you are about to create:
- ❑ Click OK
- ❑ Repeat this process until ALL feature layers are annotated.
- ❑ For the sake of clarity, you may want to add annotation from multiple feature layers which have similar themes into one annotation subclass
- ❑ An example of some naming conventions for annotation feature classes and associated queries are:
  - Hydrography – hydro\_anno – Query: FC = ‘H’
  - Population – pop\_anno – Query: FC = ‘P’
  - Locality/Area – area\_anno – Query: FC = ‘L’
  - Spot elevations – spot\_anno
  - Hypsography – hypso\_anno – Query: FC = ‘S’
  - Transportation – trans\_anno – Query: FC = ‘T’
  - Contours – contour\_anno

Feature Destination Codes used in Geonames are available on-line at:

<http://gnpswww.nima.mil/geonames/GNS/index.jsp>

## Output

This section will discuss the most common output formats for TLM map sheets. They are printing, color separation, and PDF or EChart format. The general procedure for each of these types is outlined below. In addition, the Clip-to-Shape property is discussed. The Clip to Shape property sets up the proper boundary for the map sheet, and should be set prior to producing any output.

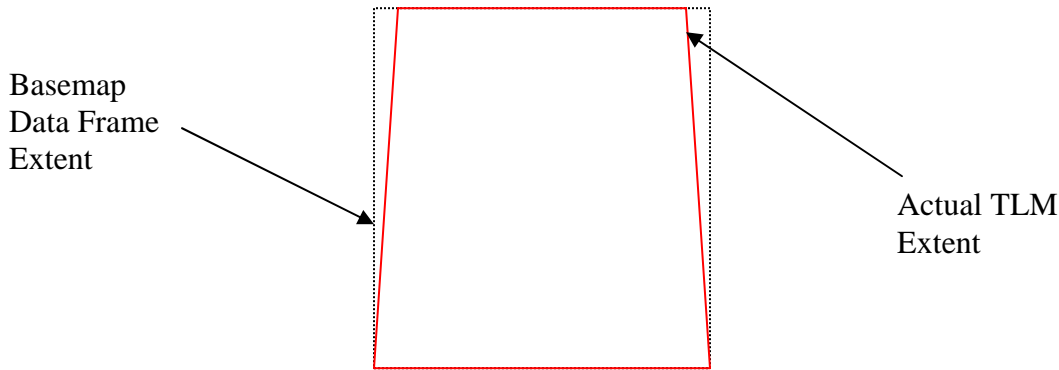
There are a few things to keep in mind before producing any output from the map sheet. By far the most important is that all polygon layers with stipple fill patterns (Scrub, Intermittent/Dry Streams) must be exported to a coverage w/regions prior to any attempt of the output procedures. Undesired results can appear if these layers are not exported such as incomplete printouts and ArcMap crashing during color separation.

Once the layers are exported to a coverage with regions, the regions must be added back into the basemap. Because the coverages are not part of the geodatabase and outside the control of the VVTs, they will have to be rendered manually. The steps for completing this are outlined in the section on plotting.

The next most important item to keep in mind is to visually check the neatline of the map sheet before producing output. The data frame in ArcMap will shift around slightly on the page. This shifting can cause misalignment between the neatline and any graphic elements placed coincident with the neatline. The best way to avoid this is to save your map sheet at a zoomed in level – anything greater than 800%. This will greatly minimize the shifting of the data frame on the page layout.

## Setting up the Data Frame with Clip to Shape

The basemaps on TLM map sheets are not rectangular. They can either be longer on the bottom than the top (in the northern hemisphere) or longer on the top than the bottom (in the southern hemisphere). However, data frames in ArcMap – which is what the basemap is contained in – can only be a rectangle.



In order to resolve this difference in shapes, the clip to shape property is used. This property uses the extent of an entire feature class, or a single polygon, and clips the features in the data frame to the selected extent. All features, and some of the grid systems (DD and MGRS are clipped, while measured grid systems like the one used for the secondary grid system are not) are clipped at the defined extent. For TLM production the clip to shape is set to use the extent of a single polygon feature that defines the size of the basemap.

Setting up the clip to shape property on a map sheet entails two steps. The first step is to add the polygon feature to the basemap that represents the extent of the TLM. This polygon feature can either be a shapefile or a feature class. If this is not available, the index provided in the PMC can be used to define the extent of the clip to shape polygon. Once this polygon feature is added to the basemap, the clip to shape property needs to be enabled. The clip to shape is a property of the data frame and is accessed through its property page.

**This property should be set prior to producing any output. The clip to shape property only needs to be set once during the production of the map sheet.**

### Setting up the Clip to Shape Property

As mentioned previously, the polygon feature that represents the extent of the basemap must be added as a layer to the basemap. This polygon feature can be in the format of a shapefile or a feature class. The shapefile or feature class could contain a single feature (map sheet extent), or multiple features (multiple map sheet extents). If the shapefile or feature class contains multiple features, then a separate step will be required once the information is loaded as a layer into the basemap. This extra step sets up a definition query so that only the feature that represents the current map sheet is visible. One source

for the map sheet extents is the PMC. In this geodatabase there is the PMC feature dataset that contains the TLM50 feature class, which in turn, holds all of the map sheet extents for TLM50s. The steps outlined below will use this feature class as the source for the map sheet extents. If a shapefile or feature class is used that contains a single feature representing the extent of the map sheet, then the steps associated with setting up a definition query should be ignored.

- ❑ Zoom out to the full extent of the map sheet.
- ❑ Add the TLM50 feature class located in the PMC geodatabase, PMC feature dataset.
- ❑ Set up the Definition Query so that the only feature visible is the one representing the map sheet being edited.
  - Select the TLM50 layer in the TOC
  - Right-click and select Properties
  - Select the 'Definition Query' tab
  - Click on 'Query Builder'
  - Build the Query to look for MSNAME = 'The Name of your mapsheet'
  - Click OK on the Query window, and OK on the Layer Property page.

Now the only feature that is visible in the TLM50 layer is the polygon associated with the map sheet being edited.

- ❑ In the TOC, select the basemap data frame, right-click and select 'Properties'
- ❑ Click on the Data Frame Tab. The bottom of this property page holds the Clip to Shape controls
- ❑ Verify that there is no border symbol for the Clip to Shape.
- ❑ Click on the 'Specify Shape' button, this will open another window.
- ❑ In the Data Frame Clipping Window:
  - Set the Layer option to the layer containing the polygon that represents the extent of the basemap (in this example it would be TLM50)
  - Set the Features option to Visible. This will clip the features at the extent of the visible feature.
  - Click on the Outline of Features radio button – even though it is already set.
  - Click OK to close the Data Frame Clipping window.
- ❑ Check-on the option to Enable the Clip to Shape
- ❑ Click OK to close the data frame property page.

## ArcMap Plotting Procedure

Plotting procedures will vary from printer to printer. Variations in paper size, print quality options, and printer engines may be required to successfully plot from other plotters.

### Export all Layers with Stipple Patterns

- ❑ Open ArcCatalog and navigate to the location of the production geodatabase.
- ❑ Select the feature class to be exported.
- ❑ Right-Click and select Export > Geodatabase to Coverage

- ❑ The defaults are usually OK at this point. Verify the location of the output coverage and that the Output Feature Class is set to Region.
- ❑ Once the conversion is complete, open the map sheet mxd.
- ❑ Add the new region classes to your basemap dataframe.
  - Be sure to add the region class and not the polygon class to the TOC.
- ❑ Symbolize the region coverage with the appropriate stipple pattern.
- ❑ In the TOC, make sure all polygon data is below point and line features.

### Printing the Map Sheet

- ❑ Activate ArcPress (ArcMap\Tools\Extensions...)
- ❑ Open the ArcMap Print window (File/Print)
- ❑ Click Setup...
- ❑ Select appropriate printer
- ❑ Change Printer Engine to Windows Printer
- ❑ Verify Page Orientation is set to “Portrait”
- ❑ Uncheck “Scale map elements proportionally...”
- ❑ Uncheck Map Size “Same as Printer”
- ❑ Move Output Image Quality slider to Best
- ❑ OK
- ❑ Click Printer Engine Properties (Windows)
- ❑ Select Paper Quality Tab, click Advanced, and set Page Size to “ANSI E”
- ❑ OK
- ❑ Select Device Options Tab, set Print Quality to “Max Quality”
- ❑ OK
- ❑ Click Setup...
- ❑ Change Printer Engine to ArcPress Printer
- ❑ OK
- ❑ Click Printer Engine Properties (ArcPress)
- ❑ Select General Tab, set Driver to “HP RTL Device Dithered (RGB)”
- ❑ Set Resolution to 600
- ❑ OK
- ❑ Cancel the Print window
- ❑ Click Print

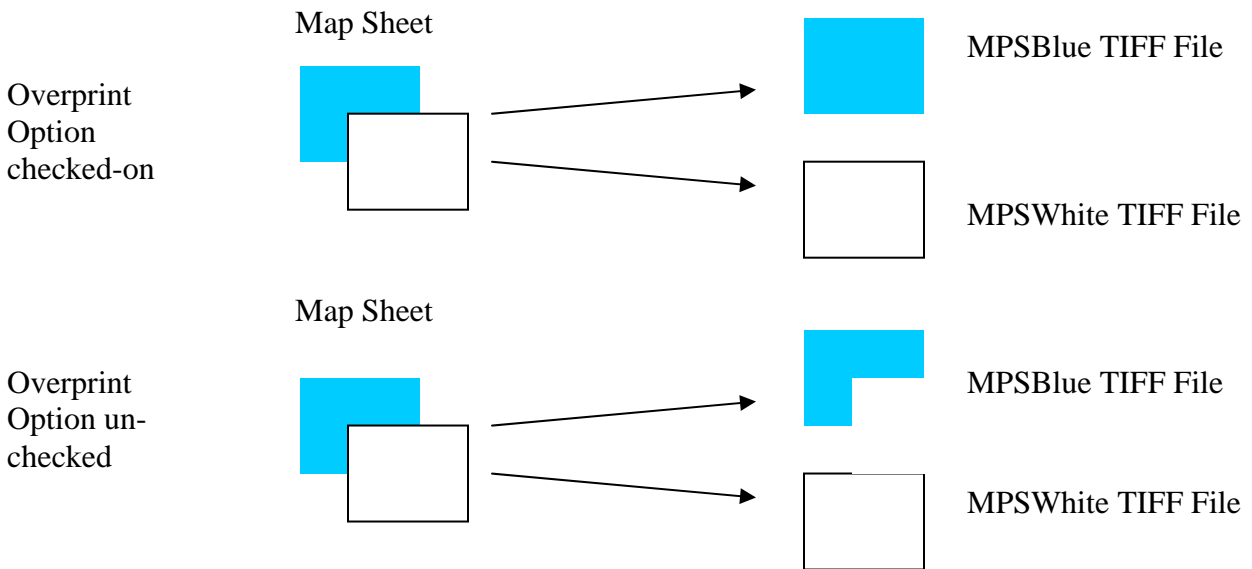
### Color Separation

The required output format of TLMs are 1-bit 1200 dpi color separated TIFFs. As a general note regarding color separation, only CMYK output is possible using ArcMap. PLTS and MPS enables maps to be exported to the required output of 1-bit TIFF format color separate files. In order to produce maps that will color separate to valid TLM specifications it is required that only colors predefined in the TLM50.style or TLM50\_high\_res.style are used throughout the map sheet. The PLTS Renderer will assign the appropriate colors and symbols for the all of the feature layers in the TOC.



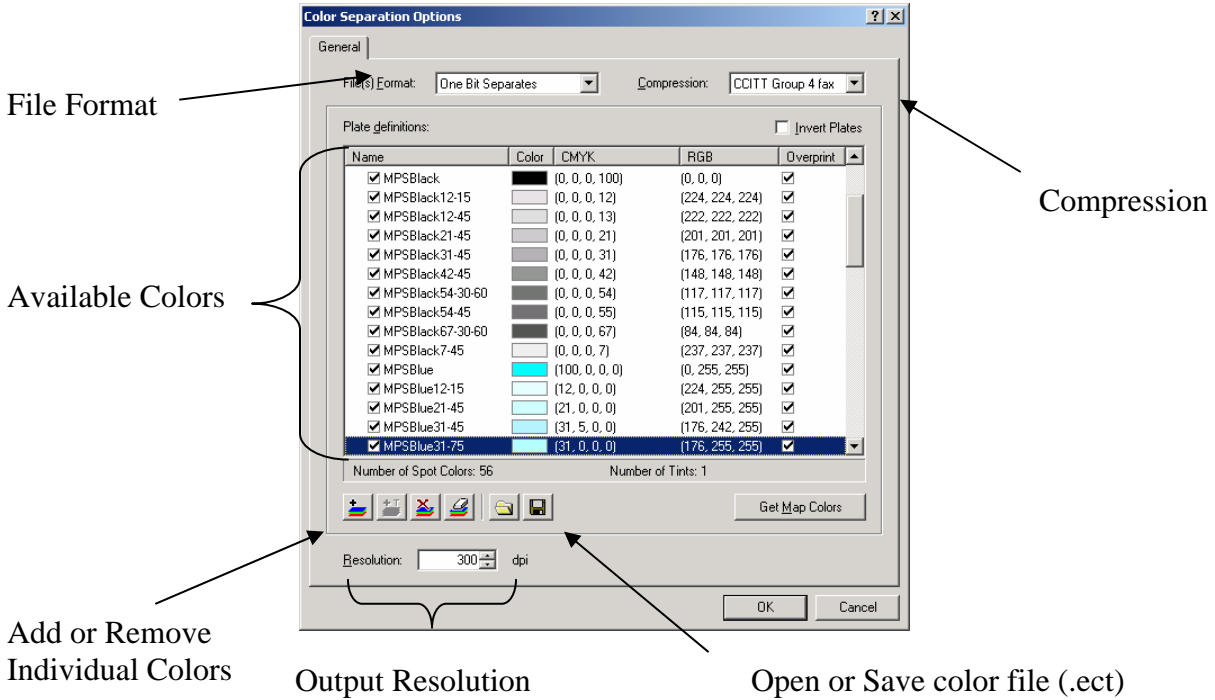
The NIMA TIFF Separator is used to color separate a map sheet. This exporter can be accessed by going to File > Export in the ArcMap main menu. In the Export window select NIMA TIFF Separator as the 'Save as Type'. This exporter is only available with PLTS.

There are various options that can be set prior to separating the map sheet. Those options can be accessed by click on the 'Options...' button on the Exporter dialog. The options dialog for the separator contains choices for the colors to separate, the format and resolution of the TIFF files. For each color listed in the Plate Definition list there are two options; 1) include the color in the separation process; 2) will a color overprint colors and symbols beneath it in the draw order. The first option is triggered by checking on or off the box next to the name of a specific color. The second option is controlled by the check box in the Overprint column of the plate definition window. If the Overprint option is unchecked, than that color will act as knockout and remove all of the symbols and colors drawn underneath of it in the map sheet. If the Overprint option is checked on than the color will not knockout symbols or colors drawn underneath of it on the map sheet. Using the overprinting option allows the cartographer to 'erase' anomalies on the map sheet by placing a graphic element on the page with the MPSWhite color.



The defined colors and their parameters can be setup and exported to an .ect file. This .ect file can then be loaded by any system using the NIMA TIFF Separator. In this way a color definition file can be setup for a project area by the project manager. This color file could then be distributed to the production staff for use during the color separation process. To help with this process, there are a series of buttons along the bottom of the dialog to load and save color files.

In addition to controlling the overprinting, the options dialog provides control over the format and resolution of the outputted TIFF files.



**Pre-Separation**

- ❑ Open the mapsheet.mxd
- ❑ In the table of contents, verify that all of the stipple pattern area feature classes have been converted to coverages
  - If not do so now (see procedures for plotting)
- ❑ Remove all styles from style manager except tlm50\_high\_res
- ❑ Verify that the Clip to Shape option in the map's data frame properties is enabled
  - Select the basemap data frame
  - Right-click and select Properties
  - Select the Data Frame Tab and verify the Clip to Shape is enabled.
  - If it is not, it must be set prior to color separation
    - Zoom to the full extent of the mapsheet
    - Check-on the option to Enable
    - Click on the Specify Shape
    - Select Outline of Features
    - Select a polygon layer that represents the exact boundary of the map sheet – usually PolbndA or the TLM50 polygon feature from PMC that represents the map sheet extents
    - Choose the 'Visible' features option
    - Close the Data Frame Clipping Window
    - Close the Data Frame Properties Window
- ❑ If the Clip to Shape option is enabled, cancel out of the data frame properties dialogue box and do not reapply this function.
- ❑ Zoom to the full extent of the map sheet in the layout view and let the data redraw completely.

- ❑ If there are area feature classes in the map that have been converted to line feature classes for the purpose of blocking out sections of a black outline (ruins areas are a common example), insure that they are all mpsblack.
- ❑ Starting at one corner of the map, pan around the neatline and align graphics in the following manner:
  - ❑ Corner cropmarks to corners
    - Verify that the symbol for the cropmarks contains all of the necessary MPS colors.
  - ❑ North Arrow to neatline and appropriate meridian
  - ❑ Road destination arrows to roads and neatline
  - ❑ Verify that all white knockout boxes completely cover the features that they are knocking out and are not overlapping the neatline
  - ❑ When complete, zoom in to a corner at least 800%

### Performing the Color Separation

- ❑ Remain zoomed in to the same corner as above.
- ❑ From the file pull down, select the *Export Map...* option
- ❑ From the *save file type as* pull down, select the NIMA Tiff Separator
- ❑ Choose to place the tiffs in either the 600 or 1200 folder, depending on the resolution of the tiffs that are being generated
- ❑ Click on the *Options* tab and using the *Load from file* button, navigate to and open the milspec.ect file (located in the PLTS Install Location/bin/styles folder)
- ❑ Select the appropriate DPI resolution (600 or 1200)
- ❑ Click OK
- ❑ Name the output appropriately
  - The name that is entered will be appended with the color of the TIFF File
- ❑ Click OK
- ❑ When complete, save and close the mxd while zoomed in to a corner.

### Separation QC

After the separation process has completed a QC of the TIFF files should be preformed. ArcMap can be used to accomplish the QC. The process involves loading the individual TIFF files, symbolizing them, and plotting the composited TIFF files.

Once the following steps are completed, save the MXD. All of the properties for the layers and the data frame will be preserved. For subsequent map sheets, open this MXD and change the source for each of the layers to the location of the new map sheet's color separation files.

- ❑ Open ArcMap
- ❑ Add each of the TIFF files to the ArcMap session.
- ❑ From the ArcMap main menu select Tools > Style References
  - Select the TLM50 style
  - Click OK

- The next series of steps, down to the step with the '➤' should be repeated for each of the TIFF files present.
  - Select the MPSBlack TIFF layer
  - Right-click and select Properties
  - Select the Symbology Tab
  - Choose the 'Unique Values' option
  - Click on 'Add All Values'
    - There should be two options – 1 for areas without data, and 0 for areas with data
  - Highlight the symbol value of 1 and select 'Remove'
  - Double-click on the symbol for values of '0'
  - Set the color to match the name of the TIFF File, in this case MPSBlack
  - Click OK to close the layer property window.
- Now that the layers are set up, the data frame needs to be set.
- Select the data frame in the TOC, right-click and select Properties
- Select the 'General' Tab
  - Change the Map Units to Inches
  - Change the Display Units to Centimeters
  - Set the Reference Scale to 1:1
- Select the Data Frame Tab
  - Select the Fixed Scale option at a scale of 1:1
- Click OK to close the Property page
- Switch to the Layout View
- Change the page size to something more appropriate – ANSI E
- Resize the data frame so that the entire map sheet is visible.
- Ensure that the TIFFs are listed in the TOC in the order listed below, and that each file is assigned the appropriate MPS color.
  - MPSBlack
  - MPSRedBrown67-30-60
  - MPSAeroblue
  - MPSBlue
  - MPSRedBrown
  - MPSRedBrown (Knockout)
  - MPSRedBrown54-60
  - MPSBlue31-45
  - MPSBlack7-45
  - MPSBlack54-45
  - MPSBlack31-45
  - MPSBlack42-45
  - MPSBlack21-45
  - MPSBlack12-45
  - MPSGreen
  - MPSGreen31-45
  - MPSRedBrown7-45

### *Plotting*

Refer to the ArcMap Plotting Procedure for plotting guidance.

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## E-Chart Production

NGA's newest format of TLM50s are E-Charts. Currently, an E-Chart is simply a PDF of a finished mapsheet. The PDF format allows for quicker dissemination of the final product to the customers in the field. The E-Chart also allows for paperless QC, as the PDF files can be marked up with graphic edit calls. Customers can also quickly query a map sheet for any text located on the face of the basemap. In the future, it is envisioned that the E-Chart will be delivered in a geo-referenced format, allowing the customer to perform basic spatial queries directly on the digital map sheet.

E-Chart production through ArcGIS is a two-step process. The first step is to convert the completed map sheet to an EPS file. Once the EPS file is created, Adobe Acrobat Distiller is used to convert the EPS file to a PDF format.

### Generating an E-Chart

- Open the completed mapsheet.mxd.
- From the ArcMap Main Menu, select File > Export
- In the Export window, Change File Type to EPS
- Select an appropriate name and location for the outputted file
- Open Adobe Acrobat Distiller
- Select the EPS file and name the PDF file
- QC the PDF file to ensure all features converted successfully.

## Troubleshooting - FAQs

### **How can I edit the Elevation Guide or Boundary Guide contents in one ArcMap session, and view the changes in another?**

The ability to edit feature classes in one ArcMap session and view those edits within another ArcMap session running concurrently is because of feature layers. Any feature layer in the Table of Contents is a pointer to a feature class, not the actual feature class. Because they are only pointers, the underlying feature classes can be edited outside of the mapsheet.mxd, or any other mxd for that matter. Edits can be performed on the feature classes in the second ArcMap session. After saving these edits, the mapsheet.mxd is refreshed, and the feature layers (pointers), still pointing the same feature class (edited), are updated with edits.

### **I keep getting an error when I attempt to generate the Elevation Guide Element.**

- Do you have a DTED present in the Table of Contents?
- Are there any broken layers in the TOC (signified by a '!')?
  - If so, re-source those layers with the broken sources
- Before loading the DTED was the option to 'Make newly added layers visible' by default disabled?
  - If not, remove the current DTED layer, and refer the steps for generating the elevation guide.
- Is the DTED layer checked on as visible in the TOC?
  - If it is, remove the DTED and refer to the steps for generating the elevation guide.

If the elevation guide will still not generate, contact PLTS support:

<http://support.esri.com/index.cfm?fa=software.filteredGateway&PID=34>

### **I keep getting an error when I attempt to generate the Boundary Guide Element.**

- Is there a POLBNDA or POLBNDL layer present in the TOC?
  - If not, add one and generate the Boundary Guide.
- Is there a WATRCRSA or WATRCRSL layer present in the TOC?
  - If not, add on and generate the Boundary Guide.
- Are there any broken layers in the TOC (signified by a '!')?
  - If so, re-source the layers with the broken sources

If the Boundary Guide will still not generate, contact PLTS Support.

<http://support.esri.com/index.cfm?fa=software.filteredGateway&PID=34>

### **What if I have saved my map sheet as an MXD but I need to regenerate an MPS surround element like the Elevation Guide?**

The easiest way to do this is to copy and paste the missing element, in this case the Elevation Guide, from the map sheet opened through MPS to the MXD. To accomplish this:

- Open the map sheet through MPS, using the Create Map Sheet Menu
- Generate the missing element using the MPS software
- Place the element in the proper location on the map sheet
- Save the map sheet
- Select the element to copy into your MXD.
- Zoom the page layout to 1:1 (using the Layout toolbar)
- In a separate ArcMap session, open the map sheet MXD
- Pan to the location of the missing element in the MXD
- Zoom the page layout to 1:1 (using the layout toolbar)
- In the MPS Map Sheet, select Copy
- In the MXD, select paste.

The element and all of its components will be copied from the MPS map sheet to the MXD. It is very important that both the MPS and MXD map sheets be zoomed to the 1:1 level – if not the element will be copied with the incorrect size.

### **The data frame keeps shifting around when I open and close my MXD, how do I keep it from doing this?**

The best way to eliminate the data frame shifting is to save your map sheet MXD at a zoomed in location, preferably around one of the corners of the base map. Zoom into location on the page layout to anything greater than 800%, then save the map sheet. Each time you save the map sheet make sure that you are zoomed into at least this level on the page layout.

### **When I convert my labels to annotation they are converted into graphic elements in my data frame not features in the annotation feature class I selected?**

When converting labels to annotation there are two things that must be completed within the Convert Labels to Annotation dialog:

- Make sure that the label class you want to convert is checked-on
- Make sure that the label class you want to convert is highlighted as well

If either of these steps is not followed, the labels will be converted to graphic elements in your data view and not features in your annotation feature class.

Labels cannot be converted to annotation in a batch mode.

### **Why are there two neatlines on my map sheet?**

There could be a couple of reasons for multiple neatlines to appear on your map sheet.

The DD Grid system is generating the required neatline for your basemap. Check to make sure that none of the other grid systems have an associated border. Open the property page for each of the other grids systems and verifying that the border is turned off.

- Through the data frame property page, open the grid system's property page.
- Select the Axes tab
- Select the Properties button for Border
- Verify that the color is set to 'No Color'
- Close all property pages

The neatline may have been converted to a graphic element when converting other portions of the grid system. Select the neatline that was converted to graphics and delete it using the select elements tool on the Draw toolbar.

This may be a little confusing because of overlapping elements (i.e. Trim Guide, Data Frame, Crop Marks, etc.), so make sure that you have actually selected the graphic element representing the neatline prior to deleting anything. To check this:

- Select the second neatline, right click and select properties.
- If the symbol selector dialog appears with a black outlined polygon symbol then you have selected the neatline go ahead and delete it.
- If not you have either selected the trim guide, or the data frame. Close the property page, and with the element selected, right-click and select Order > Send to Back
- Unselect the element (ESC Key) and select the neatline again. Check the property page again to make sure you have the neatline. If so, go ahead and delete it.
- In some cases there may be more than one graphic neatline, make sure each one is deleted so that when you are finished, there is a single neatline that is coincident with the features.

### **I ran the Bridge Renderer to generate my bridge symbology, but now every time I try to open the map sheet ArcMap crashes?**

This is because the ArcMap is attempting to generate the bridge symbology prior to activating the code used to generate the bridge symbology.

- Open an empty ArcMap session
- Make sure that the toolbar with the Bridge Renderer is present (PLTS Carto Tools toolbar).
- Select File > Open and select the MXD you are working on an open it



### **I have heard that the Grids in ArcMap are inaccurate, is this true?**

No, the grids generated in ArcMap are accurate. However, when a grid system is converted to either graphic elements or features, inaccuracies can be introduced if the proper steps are not followed. The most important of these is to zoom to at least 800% in the page layout prior to converting any grid system. By doing this you will eliminate any inaccuracies that could be introduced during the conversion process.

### **How do I symbolize my road features so that the Streets and Through Route features symbolize properly?**

To symbolize the Street and Through Route features properly (so the road casings are open at intersections), follow these steps:

- Add three new layers of RoadL
  - A rendered RoadL feature class should exist in the TOC
- Maintain the RoadL name for the original RoadL
  - Set up a definition query for this layer:  $TUC <> 6 \text{ AND } TUC <> 7$
- Rename the first new layer “Through Routes”
  - Set up a definition query for this layer:  $TUC = 7$
  - Set the symbol width to 0.3mm
  - Set symbol color to MPSRedbrown
- Rename the second new layer “Streets”
  - Set up a definition query for this layer:  $TUC = 6$
  - Set the symbol width to 0.3mm
  - Set the symbol color to MPSWhite
- Rename the third new layer “Casings”
  - Set up a definition query for this layer:  $TUC <> 4$
  - Symbolize on Unique Value, TUC
  - $TUC = 6$ , symbolize as 0.5mm, MPSBlack
  - $TUC = 7$ , symbolize as 0.5mm, MPSBlack

Once the layers are set up a symbolized properly, they can be saved as layer files and re-used for on any future map sheets. Refer to the ArcGIS help on creating and using Layer files.

### **I need to rotate some point symbols. How do I do this?**

Symbols associated with point features can be rotated based upon an attribute field. For most TLM products, this rotation field is the ‘AOO’ attribute field. However, the rotation field can be any set to any numeric attribute field on a feature class. Once this attribute is defined as the rotation field, simply updating the field with a new value will rotate the point symbol.

If there is a field present on the point feature class that holds the rotation angle then follow these steps to symbolize the features using the stored value

- Right-click on the layer and select Properties
- Select the Symbology Tab
- If you have used the PLTS Renderer to symbolize your features, select the PLTS Renderer option in the Show list
  - Click on the Rotation Button
  - In the dialog that appears, select the attribute field storing the rotation angle
  - Select the appropriate rotation style.
  - OK out of all the property windows
- If you have not used the PLTS Renderer, select the Features option in the Show list
  - Click on the Advanced button
  - Select Rotation
  - In the dialog that appears select the attribute field storing the rotation angle
  - Select the appropriate rotation style
  - OK out of all the property windows

Once a rotation field is set for the layer the point symbols will rotate based upon the value in this field. To change the symbol rotation, change the value in the rotation field, or use the rotate button located on the PLTS Advanced Editing Toolbar.

### **Adding a Rotation Field**

A rotation field is required in order to rotate point features for cartographic purposes. If it is not present it needs to be added to those point feature classes that will require rotating. The following outlines the steps required to add the missing field to a feature class. Once the field has been added, it can be utilized in ArcMap to store the rotation angle for an individual feature.

- Open ArcCatalog
- Navigate to the feature class that you want to add the rotation field
- Right click and select Properties
- Select the Field Tab

In the top half of the property page is a listing of all of the attribute fields for this feature class, as well as their type. Using the scroll bar to the right of this list, scroll to the bottom of the list.

- In the first empty box under the field name column, enter the name for the rotation attribute field
- In the data type column set the type to 'Long Integer'
- Click OK to close the property page
- Close ArcCatalog

**When I symbolize culverts and point bridges only half of the symbol appears. How do I get the complete symbol?**

Using the PLTS Renderer for culverts and point bridges will only create half of the required symbol. For bridge or culver a different spacing between symbols may be required based upon the symbol for the type of associated transportation feature. In order to generate the other half of the symbol, the point feature must be duplicated and offset, and rotated to display the proper symbology.

**How do I create a Geoname shapefile or feature class from the tab delimited text file?**

A geoname file is typically provided in a tab delimited text file, but in order to create annotation, the geonames need to be in either a shapefile or feature class format. To convert the geonames file into a shapefile, ArcMap is used. To generate a feature class from the geonames file ArcCatalog is used. Both methods are outlined below.

**Geoname to Shapefile**

- Open ArcMap
- From the ArcMap main menu select Tools > Add XY Data
- In the Add XY Data window:
  - Select the geonames
  - The X Field should be set to LONG
  - The Y Field should be set to LAT
  - For the Spatial Reference, Select Edit...
  - Click on Import, and select one of the feature datasets from the production geodatabase.
  - Click OK to close the Spatial Reference Dialog
  - Click OK to close the Add XY Data dialog.
- The geoname point features are now added as an Events layer. In order to convert labels to annotation, the Events layer must be converted into a shapefile
- Right-click the Geoname layer and select Data > Export Data...
  - Select Export All Features
  - Select the option to use the layer's spatial reference
  - Define a name and location for the shapefile
  - Click OK
- Click OK to add the exported shapefile as a layer.
- Remove the Geoname Event's layer from the TOC

**Geoname to Feature Class**

- Open ArcCatalog
- Add the PLTS Toolbar if it is not already available
  - From the ArcMap main menu select Tools > Customize

- Select the PLTS toolbar
- Close the Customize dialog
- Select the Import Ancillary Sources into GDB command from the PLTS toolbar
- Select the type of GDB to load the data into
- Select the appropriate source, in this case Geonames
- For the Source Input, click on the Browse button, navigate to and select the geonames file.
- Click on Next
- Choose to create the feature class in a new or existing geodatabase
- Based upon your choice of GDB, complete the Geodatabase location information.
- Click on Finish