

Thematic Mapping for Engineers

Those in the civil engineering industry have long recognized the value of having GIS data at their fingertips. After all, GIS data can deliver to your desktop the information that once required a trip to a government building. Having such data at one's fingertips has truly revolutionized the way geospatial information is retrieved. Truth be known, limiting your use of GIS data to data retrieval is like using a Nextel Cup race car as a grocery-getter.

Metaphors aside, government municipalities have long utilized their GIS data to power countless thematic mapping applications. Thematic mapping taps into the old adage that a picture is worth a thousand words.

Arguably the most publicized use of thematic mapping has been in law enforcement. Countless television shows have illustrated the way law enforcement agencies can plot the location of certain types of crime on a map and ultimately begin recognizing trends. While civil engineers aren't necessarily in the business of investigating crime, they are often in the business of investigating and identifying trends in land development. Thematic mapping can aid in identifying a prime development zone for a client.

Until recently, true thematic mapping required the use of a software package such as the ESRI ArcGIS package. AutoCAD® Map 3D has long had the ability to import, manipulate, and export geospatial data in many popular formats such as the ESRI .shp file. The shortcoming to this process was that the data was never directly linked to the source file.

The release of Map 3D 2007 introduced the ability to directly reference (in real-time), among other formats, the popular ESRI .shp file. Additionally, Map 3D 2007 saw notable improvements in styling, or as it more commonly known, thematic mapping.

So just how does one directly reference GIS data and begin building a thematic map?

Making the connection

Be sure the Map 3D Task Pane is turned on by typing "MAPSPACE" at the com-



Figure 1: Creating a connection to SHP file data.

mand line. From the Display Manager tab within the Map 3D Task Pane, click the Data button (upper left corner) and select Connect to Data from the submenu that appears. This will bring up the Data Connect task pane where one can connect to a vast array of data sources. Because the majority of GIS data is provided

folder must be specified. Although you can establish a separate data connection for each .shp file you wish to reference in your drawing, it is more efficient to simply specify a folder.

Specifying a folder rather than a file will allow for additional GIS layers to be added with a single click. To browse for a folder (not file) to connect to, click the folder icon to the right side of the dialog box. To establish the connection click the Connect button.

Adding layers to a map

Now comes the fun part—actually adding GIS data to your AutoCAD drawing. Because we connected directly to the .shp files, this data will be live. Moreover, any changes or updates made to the .shp file will be reflected in the AutoCAD drawing.

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in the ESRI .shp format, we will select Add SHP Connection.

With Add SHP Connection selected, start by naming your connection. It is best to name this something logical such as the name of the locality. Next a source file or

This is a key difference over the older way of inserting GIS data into a drawing. Similar to the old way of importing GIS data, layers can be added in their entirety or in part as a queried segment.

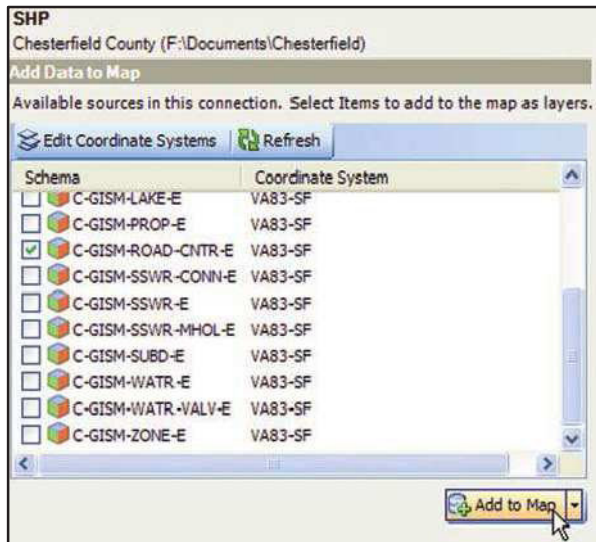


Figure 2: Select the layers you wish to include in your map.

The default option is to simply “Add to Map.” Although it is not necessarily explicit, this option will add the entire .shp file to your drawing. Thus, take care if you are working with a locality’s entire dataset, as adding the entire locality at once can

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bring even the most powerful machine to a crawl. For that reason we have a second option, which is accessible by clicking the down arrow on the Add to Map button. By clicking it, a second option called Add to Map with Query will be presented. Use the query option if, for instance, you are focusing on a specific site or area. The ba-

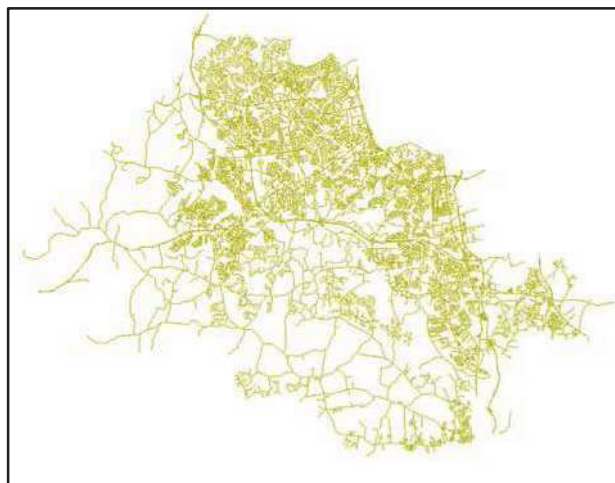


Figure 3: AutoCAD Map 3D assigns a random display style to each layer inserted.

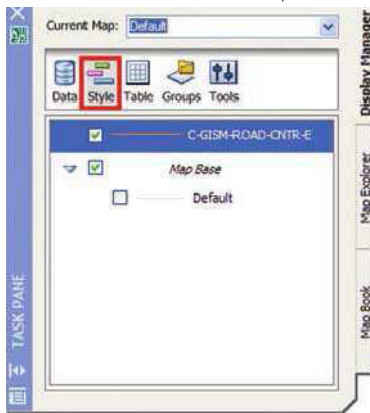


Figure 4: Access the style interface from the Map 3D Display Manager.

sic Add to Map option will add data to your drawing instantaneously, whereas the Add to Map with

Query option will require you to configure a query.

Styling a map

The real magic happens once you add data to your map. AutoCAD Map 3D will randomly assign your GIS layer a color upon insertion. While the default color AutoCAD selects is a great starting point, you’ll likely want to assign a more aesthetically pleasing color. To do this click the Style button from the Display Manager tab.

This will bring up the Style Editor task pane where numerous adjustments affecting a given GIS layer can be adjusted. In the same spirit as AutoCAD provides a “standard” style for items such as text, Map 3D provides a “default” style for each connected layer. If no additional styles exist for a given layer, then all entities on that layer will be displayed per the layer’s default style.

A common scenario where only one (default) style would be utilized is with water bodies. Most people associate a light blue color with bodies of water such as rivers and lakes. With thematic layers, multiple styles will need to be created for a single layer.

Configuring multiple styles for a given layer will allow for the layer’s data to be analyzed graphically. When planning out a

thematic map, it is important to first evaluate the way the map will be used. Will it be analyzed on the screen, a color plot, a black & white plot, or some other medium? Answering such questions as you begin will allow you to better tailor your thematic map to a specific medium.

Although each style can be generated manually, AutoCAD Map 3D has the ability to automatically generate a series of styles known as a theme. The Style Editor dialog has a button titled “New Theme.”

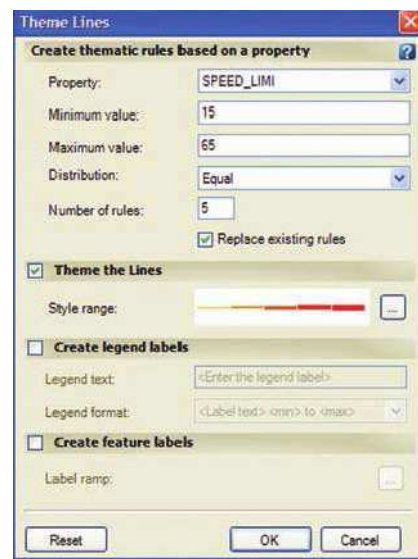


Figure 5: Theme Lines Interface.

New Theme can automatically generate a series of styles which ultimately make up a theme. Clicking the New Theme button will present a dialog which may seem small and insignificant at first. Yet if ever the expression “big things come in small packages” were true, it would be so with this dialog, as it affords us numerous options when defining a new theme.



Figure 6: Specify line weight or color transitions from the Style Lines dialog.

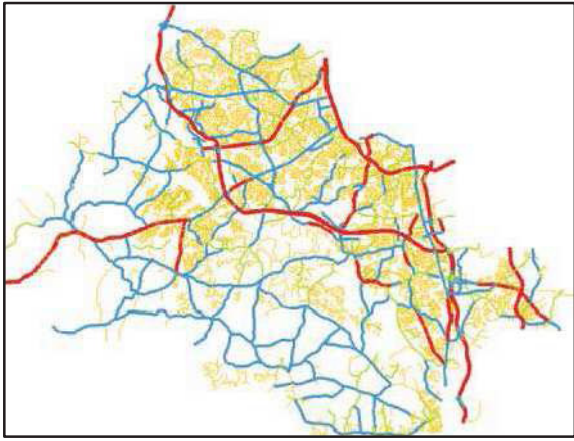


Figure 7: The final thematic map.

Start out in the “Theme Lines” dialog by defining the data field you wish to analyze. Common scenarios are zoning classifications, property values, and so on. In this article I will analyze the speed limits for the roads in my locality.

With any luck, a few speed traps will be uncovered (after all, radar detectors are illegal in Virginia). Checking the Theme the Lines checkbox and subsequently clicking the [...] button will allow for the configuration of a new or theme.

In the resulting dialog, you can specify transitions from a thin lineweight to a thicker one or even a light color to a darker color. Whatever you fancy—you can truly achieve an endless number of combinations by adjusting the values within this dialog.

When generating presentation maps, it is generally recognized as a good practice to stay away from absolute colors such as red (255,0,0) and blue (0,0,255). That said, finding the perfect color combination can often prove difficult.

One website that I have found handy when looking for trendier and aesthetically pleasing colors is Colour Lovers (<http://www.colourlovers.com>). Although it is geared to web developers, the site lists the RGB value for each featured color so it's easy to import it into AutoCAD.

Once you have established the perfect color combination, press the OK button and watch your data be transformed before your eyes. You will find the best maps are often created after trying numerous combinations. For that reason, be adventurous and try multiple combinations which ultimately yield a powerfully themed map.

Conclusion

Without question, the introduction of true thematic mapping within AutoCAD Map 3D has opened an entirely new series of doors.

Often, GIS data needs to first be analyzed and then displayed in an AutoCAD

drawing somehow, someway. Although there is no denying the power of the ESRI ArcGIS suite, there has never been a great way of making the two work together while preserving key graphical traits about a given map.

Now that AutoCAD Map 3D has the ability to natively generate true thematic maps, such limitations become moot. Recognizing that subtle enhancements were made in the interface between AutoCAD Map 3D 2007 and 2008 seems to suggest we can expect more new features in the coming releases. Regardless of what

future releases bring us, the thematic mapping functions within AutoCAD Map 3D are truly invaluable.



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