Working with AutoCAD and ArcView Files

In GFLOW Groundwater Modeling

Sheldon L. Epstein[1]

26 DEC 2005

United States *Binary Base Maps*[2] (BBMs) are useful cartographic data sources for GFLOW™ groundwater modeling[3]; however, they are both coarse and sparse. A groundwater modeler may find it useful to incorporate custom georeferenced maps made with or for AutoCAD® or ArcView® software into the GFLOW model database to facilitate addition or placement of hydrologic elements. This paper describes one method of achieving this result.

BBMs are drawn using Universal Transverse Mercator (UTM) coordinates[4] that are dimensioned in meters. In order to merge custom maps with BBMs, it is necessary to dimension the custom maps in meters and then georeference them into a correct UTM zone. AutoCAD or other drawing software usually can convert English dimensions to metric dimension. Selection of the correct UTM zone may require study of maps such as those located on state official cartographer websites[5].

One procedure for adding a shape file to a database having BBMs comprises the following steps:

1. Convert the AutoCAD drawing from English dimensions to dimensions in metric dimensions.

2. Examine the BBMs in the model database for two fiducial points (e.g. NW and SE corners) and record coordinate values.

3. Export a shape file of a BBM map containing the fiducial points from the GFLOW model to disk.

4. Open ArcView GIS software[6] as a new map.

5. Right-click on *Layers* in *Table of Contents* and select *General Tab*.

6. Set *Units* for both *Map* and *Display* to *Meters*.

7. In ArcView software, add the shapefile just exported from the GFLOW model.

---

[1] Chief Engineer, Epstein Associates - K9APE and Managing Member of XPLORIX LLC, Shel@k9ape.com
[2] http://www.epa.gov/ceampubl/gwater/whaem/us.htm
[3] www.haitjema.com
[4] http://erg.usgs.gov/isb/pubs/factsheets/fs07701.html
[5] For example, see the State of Wisconsin Official Cartographer website at http://www.geography.wisc.edu/sco/pubs/wiscoord/regional.php#UTM
[6] This example was developed using ArcGIS Version 9.1 Geographic Information System software.

8. Using ArcCatalog® software, find the AutoCAD *.dwg file and drag it into ArcView software where it will appear as a set of layers.

9. Right-click on one of the *.dwg layers (e.g. polyline) and *Zoom To Layer*.

10. Record coordinates of the two fiducial points in the AutoCAD drawing layer that are the same points as those selected for BBM fiducial points (Step 2, above).

11. For the same layer, right-click and select *Properties*.

12. Once in the *Properties* dialog box, select *Transformations*.

13. Within *Transformations*, select *Enter Transformations* and select *Coordinates*.

14. Enter *x,y* coordinates for each of the two fiducial point sets (Steps 2 and 10, above) and left-click on *OK*.

15. If data were entered correctly, the AutoCAD drawing will now appear superimposed over the map exported from the GFLOW model. If it is not, then repeat Steps 2-14.

16. Right-click on *Layers* (at the top of *Table of Contents*) and select *Coordinate System*.

17. Select *Transformations*.

18. In the *Coordinate Systems* directory, select *Projected Coordinate Systems*.

19. Select *UTM* as this is the coordinate system for BBMs.

20. For Wisconsin, select *NAD 1927*. Otherwise, select an appropriate datum.

21. For Kenosha County, Select *NAD 1927 UTM Zone 16N.prj* and Click *Add*. Otherwise, select an appropriate UTM zone.

22. Click *OK*.

23. {These next steps may be unnecessary; but, may be used to georeference other layers in the *Table of Contents*}

    a. Open *ArcToolBox*.

    b. Select *Data Management Tools*.

    c. Select *Projections and Transformations*.

    d. Select *Define Projection*.

    e. Select one of the AutoCAD drawing layers (e.g. Polyline).

    f. For coordinate system, repeat Steps 17-22, above.

g. In *Table of Contents*, right-click on another layer and select *Properties*.

h. Select *Source* to determine whether *Coordinate System* has changed from *Unknown* – if may not and that may be acceptable.

i. Repeat Steps e-h for other layers.

24. Return to *ArcView Table of Contents* and right-click on an AutoCAD drawing layer (e.g. Polyline).

25. Select *Properties* and then *Drawing Layers*.

26. Select or Deselect appropriate layers to obtain just the drawing features that you need.

27. Left-click *OK*.

28. Return to *Table of* Contents and right-click on the AutoCAD drawing layer used for Step 24.

29. Select *Data* and *Export Data*.

30. Choose an appropriate directory (e.g. your GFLOW working model directory) and file name for saving your shape file (*.shp).

31. Under *Use the same coordinate system as* left-click on *the data frame* radio button.

32. Return to the GFLOW model and add the newly created shape file to the model maps.

If all was done correctly, you will see your new shape file map merged with the BBM maps in your GFLOW model.

Features shown by the shape file do not become hydrologic elements in the GFLOW groundwater model. Wells, linesinks, horizontal barriers and inhomogeneities must be added by hand to the GFLOW groundwater model database; however, this can easily and accurately be done by tracing features displayed by the new shapefile.