

MAPPING WITH ARC VIEW

Prepare Information for Digitizing (Plan Ahead)

1. Obtain a copy of the Betheden, MS 7.5 minute topographic quadrangle map and calculate the decimal degree coordinates to 6 decimal places for longitude (x) and latitude (y) of the four tic marks (used as registration points) that surround the parcel to be digitized. For the area around Section 16, T16N, R13E, the tics are the upper left corner of the map, the two lat/long tics on the borders to the right and below the upper left corner, and the tic mark in Section 27.
2. Write the x,y (long/lat) coordinates down (to 6 decimal places for longitude (x) and latitude (y)) as registration points 1-4. You will use these to register your map to the digitizer.
3. Decide how you want to organize the information on the map. The computer graphic elements that can represent geographic features are points, lines, and polygons.
 - a. Points can represent building locations,
 - b. Lines can represent roads, streams, or sides of a section,
 - c. Polygons can represent section boundaries, stand boundaries, lakes,etc.
4. Feature labels (i.e text) will be added in the map layout window prior to printing. Other map items such as map title, scale bar, north arrow will be added to the map layout so don't be concerned about putting these into the view window.
5. Hint/Warning: Always leave your map/view in decimal degrees when saving to disk. You will change the projection from decimal degrees (i.e lat/longs) to State Plane coordinates prior to printing, but it should not be saved to disk in any projection other than decimal degrees.

ArcView is organized by different types of windows that are used to create and examine geographic data. The way to view the graphic information of a map or GIS is the **View** window (see the column of icons on the left side of the project window). Tabular information about the graphics are viewed via the **Tables** window and graphic layouts of printed pages are generated by starting a **Layout** window.

Starting ArcView

6. Turn digitizer on prior to beginning ArcView
7. Under the Start Menu... Programs....ArcView GIS 3.2....ArcView GIS 3.2
Be patient... it takes a while to load the application. Don't touch/click anything!!!

Set the View Map Projection

8. Open a new view window; i.e touch OK when prompted to open with a new view..
9. Answer NO to Add Data to View. Do not request to add new data to the view. You will do this with the digitizer.
10. Enlarge both windows to full view by clicking on the small square in top right hand corner of EACH window.
11. Pull down the **Files tab** menu (top line, 1st item from left), then:
 - a. **Extensions**
 - 1) Put **Check** in the **Digitizer** square so system will load digitizer drivers.
12. Pull down the **View tab** menu (top line, 3rd item from left), then:
 - a. **Properties**
 - 1) set the Map Units to **decimal degrees**,
 - 2) set the Distance Unit to **feet**,

 - 3) click on the **Projection** button and set the

Category: **Projections of the World and**

Type: **Geographic.**

Follow through with O.K.'s to end this setup procedure.

These settings and subsequent digitizer set up will insure that you can convert your map themes to any other projection (e.g. State Plane, UTM).

b. Choose digitizer mode:

Pull down the **View Tab** and click on:

Digitizer as puck mode if you will be digitizing from the digitizing tablet.

Digitizer as mouse mode if you will be digitizing from the screen.

I.E. It toggles between puck and mouse mode; make sure the icon shows the opposite of the mode you want. I.E. It toggles between puck and mouse mode. If a puck is shown, then the mouse mode must have been initiated. Likewise if the mouse mode is shown then the puck mode must have been initiated. If you click on the mode depicted, the mode switches to the option you clicked on.

If you want to digitize from the screen rather than the digitizer board, skip the next section on “Register the Map to the Digitizer”; go to Page 4

Register the Map to the Digitizer

The next step is to register your map to the digitizer. This allows the software to convert from digitizer x,y inches to the coordinate units of the theme projection (in this case, decimal degrees of longitude (x) and latitude (y)).

13. Tape the map to the digitizer surface with drafting tape, or fold map and place securely under the plastic cover; do not fold more than 1 time.

14. Under the View Tab elect **Digitizer setup** to register your map. This will open a table that you will fill in with the control point information. You should set an error limit between 0.01 and 0.004" (it is difficult to achieve errors smaller than 0.005").

15. Use the top (yellow) puck button to locate each tic mark (1-4) on the quad sheet. As you click on each tic mark, the table fills in ID numbers 1-4. Hint: Do the tick marks in a clockwise manner so you will remember which one is which.

16. After you have clicked on all four tics, you can use the computer mouse to click inside the x,y boxes in the table and type in the decimal degree coordinates for each point.

a. West longitudes (X-coordinates) are keyed in as **negative** numbers; for example -89.00000 for 89.0000° West Longitude.

b. North latitudes (Y-coordinates) are positive numbers; i.e. 33.25000 for 33.250000° North Latitude.

17. When you have keyed in the last coordinate, the lower left part of the table will indicate a total error and if it is less than or equal to the set error rate, you will be able to click on the **Register** button. If total error is not below the set error rate:

- a. check for errors in the coordinate values (i.e. typo error) and/or
- b. re-digitize the locations of the registration points.

If there is only a small difference in registration error and error set, you can adjust the error threshold and go with the registration you have.

Save your coordinate registration values in the d:\tmp directory under a name you will remember... Leave the extension as .txt .

If you want to digitize from the screen, you should “Add a Theme” with the + icon and bring in “image data” i.e. a quad sheet in the proper data and coordinate system.

Prior to digitizing, decide whether you want to digitize the features as a graphic or a theme:

Option 1: Digitize the Features as a GRAPHIC (Continue below)

Option 2: Digitize the Features as a Theme (Go to Page 6)

Option 1: Digitize the Features as a GRAPHIC

At this point, your digitizer is ready to input the graphic features of your map.

18. Find the **Show Symbol Window** command under **Window** menu and use it to display the symbols that you can change for your graphic features. This window allows you to change point, line and polygon styles, colors, etc.

- a. On the ??? Palette View, click on the Pencil (i.e. Line)
- b. Select the first line type... solid line
Set the size to 2.
- c. On the ??? Palette View, click on the Paintbrush color palette
Choose a Bright Red Color

This palette view is where you first select the type of graphic you will be digitizing (i.e. point, line or polygon), then select the symbol type, color, and size you wish to use.

19. Next, touch the Edit button to select the graphic type, you want to digitize.

The Edit button is the 13th button from the left on the 2nd row of symbols... the one to the right of the big T (text) button. Click on the button and pull the menu down to select the straight line symbol... 2nd item below the single dot.

The **yellow (top) button** is used to select points and is also used to start a multiple-vertex line (polyline) or polygon boundary. The **green (right button)** serves the same function as a double mouse click and ends a polyline or closes a polygon. **Thus, the yellow button starts a line and the green button ends a line.**

20. Digitize the section boundary first by digitizing each side of the section as a single line beginning outside the section; i.e. when the section lines cross at each corner a “cross” should be formed. Later you will put a section number in each corner of the “cross”

The first time you begin digitizing, use the **Zoom to Extents** button (looks like a little stack of paper) to scale the boundary to your view screen. You can zoom in or out of the view with the little magnifier buttons (use by dragging a window). If your view gets messed up, simply zoom to extents.

21. Now, repeat steps 18a through 20 for each item you digitize; i.e.

- a. Pick **Point, Line, or Polygon** on the **???** Palette Menu
- b. Choose **Size**
- c. Choose **Color**
- d. Choose **Point, Line, or Polygon** on the **Button Menu** (Next to **T**)
- e. Digitize object... Yellow button begins... Blue button ends

To get the USGS symbols, on the **???** Palette menu, click on the right most symbol (palette?) then, Load: **J:\esri\av_gis30\arcview\symbols USGS.avp file.**

Editing Themes and Adding Text Annotation

Mistakes happen! You can select any of the graphic features by use of the arrow button (lower row on right) and click on the feature to edit. Then you can move the graphic (by click and drag) or delete (by the Edit / Cut graphic) commands. Worse case, you may find you'll need to delete and re-digitize the feature. The symbol style can be changed by selecting the feature and using the symbol window as described before.

The Vertex Edit button (third from left on second row) allows you to select and edit features. You can add, move or delete vertices of polygons or lines.

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Option 2: Digitize the Features as a Theme

At this point your digitizer is ready to input the new themes of your map.

18. Under the View tab, select New Theme

- a. Choose feature type as point, line, or polygon; check OK.
- b. Name the shape file; such as sectionline.shp, Specify the proper directory in which to store the file, and then click OK (Hint: use the d:temp or d:tmp directory.)

19. Your new theme will be named in the View Screen with a check mark in the square and a dashed line around the square... this means you are editing this particular theme.

- a. To modify/change the line type, color, etc.; double click the left mouse key on the line symbol to reveal the Legend Editor.
- b. Double click on the line symbol again to reveal the Pen Palette
- c. Click on the line type and then set line size on the bottom of the Pen Palette.
- d. Click on the paint brush (color palette) on the upper right side of the Pen Palette and choose the desired color.
- e. Click on the APPLY button on the lower right corner of the Legend Editor; close out the Legend Editor and the Color Palette.

20. Now you are ready to digitize the line feature you have named and specified color and size.

- a. Click on the Crooked line tab (under the Window tab)
- b. Your cursor becomes a + sign which means you are ready to digitize the line.
- c. Put the cross-hair of the Digitizer puck over the beginning of the line to be digitized, and press the Yellow (top) key on the puck. **Yellow button begins a line.** Press the yellow key at each turn in the line/road until you reach the end of the line. If the line is a straight line, go to the end of the line. Press the **Green button to end the line. Thus, the yellow button begins a line and the green button ends a line.** Continuous clicking of the yellow button allows you to follow a crooked line feature.
- d. Digitize all the lines that are part of the named Theme.
- e. To end the current theme, under the Theme tab, choose Stop Editing; then answer yes to save edits on the theme to the proper directory.

For each additional theme, start at Step 18 and repeat the process.

- a. Under View choose New theme; choose theme type, name it and choose directory.
- b. Edit the symbol for style, size, and color.
- c. Digitize the feature.
- d. Under Theme, Stop Editing and yes to store edits.

21. To Edit a theme,

- a. Make the theme active by clicking on the theme name...box shows around name.
- b. Under Theme tab, choose Start Editing; now you edit all features within the theme.

- c. Don't forget that you can click on the vertex edit key (hollow arrow, third from left) and then move/add the vertices of a line.
- d. When done editing, under the Theme tab, choose Stop Editing.

Put All Text/Annotations on View Screen

Add all text and annotations relating to the digitized image/object(s) on the View screen so that if you change to a new projection, everything stays in the proper location. The map title, graphic scale bar, equivalent scale, north arrow, etc. will be added on the Layout screen. As soon as all text/annotations are added for the digitized objects, save the project to disk so that it will be in decimal degrees.

Layouts and Printing

One very handy feature of ArcView is that once you have coded information in decimal degrees, you can re-project the data to some other system such as State Plane or Universal Transverse Mercator (UTM) coordinates. This is done by changing the views projection under **View / Properties**. For printing, you will need to change to a projection that accurately depicts your map in true cartesian perspective. To do this, you should change the view projection from Geographic to another projection such as State Plane (NAD 83).

22. In the Project window, select the **Layout** Icon and click on the **New** button to start a new page layout. You will see a new window open with the graphic equivalent of the printed page depicted. Use the **Layout / Properties** menu selection to change setting such as snap to grid. Graphic elements can be added in the same way they were added to views.

The layout window must be active to activate the layout button menu system.

23. To get the map graphics from your View to the Layout, click on the **tiny globe** symbol... 2nd symbol to right of big T symbol on 2nd row. Once you have clicked on the tiny globe, create box on the Layout area by clicking and holding the left mouse key and dragging the area boundary to create a rectangular region on your layout page.

24. You will be prompted to supply the View name. Pick the view that you want to insert into the layout box, then before you click O.K.:

Set the scale to **User Specified** (in this case 1" = 20 chains or 1:15840).

Now click O.K. and the view is put into the Layout Box.

CAUTION/WARNING: Once the view is inserted into the Layout Box, you can move it around by putting your mouse pointer in the center of the edit box, but **DO NOT** use the corner or side edit marks to change the size.... The scale was set when you specified it previously.... If you change size now, the scale is changed.

25. You can add a graphic scale in the same fashion. Click the globe item (drag region) that shows a scale bar.

26. A north arrow can be added in similar fashion to the scale bar (drag region) then select the arrow style you want.

27. To add text (for the title, equivalent scale, etc.), select the text "T" button, click where you want to insert it, then type the text you want in the layout and click OK.

Pull the ??? Palette View down from the Windows Tab and click on the A,B,C, (i.e. text button). Now you can set the size, color, font of text before you place it (i.e. touch the T button) and during the editing of text.

Parts of a Complete Map

Your map should/must contain:

- * Complete Title - what, where, how, who, when
- * Map body with proper cartographic symbols
- * North Arrow
- * Graphic scale bar with stated RF and equivalent scale.
- * A wide outside border and narrower line approximately 0.5 inches inside of outside border.

Hint: Use the rectangular polygon with a width of 3 or 4 for the outside border and the same with a width of 1 or 2 for the inside border.

Print Layout/Map

Once the layout is complete, you can send it to the printer by selecting **File / Print** on the project window. If you digitized in decimal degrees (i.e. lat/longs) then change the **View** projection to State Plane -83 then Mississippi- East so that the G.L.O. section will not be "squashed". DO NOT save in State Plane, save prior to re-projecting then print.

Saving Work

If you think you will want to come back to your map at some future time, you should save your work as a project file. With Views and Layouts closed, you can select **File / Save Project** from the project menu and save your work to disk. Check with the instructor on where you are allowed to save your files and/or use a virus-checked floppy disk.

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