



# Standard Operating Procedures for Creating Grids and Graticules with ArcMap 10.3

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## PURPOSE

Grids and graticules provide essential reference for a geologic map, and while it is simple to add one in ArcMap the default settings rarely provide the appropriate layout. The guidance provided in this SOP is based on Federal Geographic Data Committee (FGDC) symbology standards as well as previous USGS geologic map publications. Authors should choose a style that fits the scale and content of their mapping area, and ensure grids or graticules are easy to read without being obstructive.

### Required systems/software for this SOP

ArcGIS Desktop 10.0 or higher

### Basic ArcGIS features used in this SOP

Going between data and layout views

Page layouts

### WALK-THROUGH

1) To add a reference grid to a map the project must be in Layout view; it will not be visible in Data view. It is important to set up the map size and orientation to fit the map scale because resetting the layout will delete many map elements saved in the map document.



2) In Table of Contents window, right-click *Data Frame* (default name is Layers) > "Properties..." > Grids tab – this is where all grids are managed. Select "New Grid..." to open the Grid and Graticule Wizard dialog box.

| Feature Cache   | Annotation Grou    | ps Extent Indicators       | Frame Size and Position |
|-----------------|--------------------|----------------------------|-------------------------|
| General         | Data Frame         | Coordinate System          | Illumination Grids      |
| Reference grids | are drawn on top o | of the data frame in Layou | t view only.            |
|                 |                    |                            | Remove Grid             |
|                 |                    |                            | Style                   |
|                 |                    |                            | Properties              |
|                 |                    |                            | Convert To Graphics     |
|                 |                    |                            |                         |
|                 |                    |                            |                         |

The Data Frame Properties dialog box.

3) Select the type of reference you wish to create. Graticules use medians and parallels to partition the map while grids use map units – graticules are the standard practice.

| Grids and Graticules Wizard | 22  |
|-----------------------------|---|
| 80°00'W 60°00'W 40°00'W     | Which do you want to create?                          |
|                             | Graticule: divides map by meridians and parallels     |
| 00                          | O Measured Grid: divides map into a grid of map units |
| 0.2-<br>0.2-                | Reference Grid: divides map into a grid for indexing  |
| 003-                        |   |
|                             | Grid name: HP_DTM1_Grid                               |
|                             |   |
|                             | < Back Next > Cancel                                  |

The Grid and Graticule Wizard dialog box – it is helpful to save each with a unique name. The title of this dialog box will change as you progress through the wizard depending on what step you are on.



4) The second step in the wizard is to define the basic layout of the graticule, both the interval of lines and appearance of them. All of these parameters can be changed after it is created so best-guess estimates are fine. For maps with lots of content, tick marks may be preferred to lines. The FGDC standard symbology is a 0.25 millimeter black line for the Graticule and labels style.

| Create a graticule |  |          |           |          | 23        |
|--------------------|--|----------|-----------|----------|-----------|
|                    | Appearance<br>C Labels only<br>Tick marks and labels<br>Graticule and labels | els      | [         | Style:   | -         |
|                    | Intervals  | _        |           |          |           |
|                    | Place parallels every  | Deg<br>0 | Min<br>10 | Sec<br>0 | latitude  |
|                    | Place meridians every  | 0        | 0         | 30       | longitude |
|                    |  |          |           |          |           |
|                    | Rack   |          | Nexts     |          | Cancel    |
|                    | < Back   |          | Next >    |          | Cancel    |

It is common practice to use the same intervals for parallels and meridians, except in polar stereographic projections.

5) Next, the axes and label properties are set. It is recommended to match tick line styles to the previous step. Again, the style and number of ticks per major division can be adjusted later.

| Axes and labels | 22   |
|-----------------|--|
|                 | Axes          Image: Axes       Line style:         Image: Axes       Line style:< |
|                 | Labeling<br>Text style: AsBoCe.<br>< Back Next > Cancel  |



6) The final step is to set the border style and decide whether to save the graticule output format as a static graphic or as a dynamic map element (graphics are only recommended if the graticule has been finalized).

| Create a graticule | X  |
|--------------------|--|
|                    | Graticule Border <ul> <li>Place a simple border at edge of graticule</li> <li>Place a calibrated border at edge of graticule</li> <li>Properties</li> </ul> Neatline Place a border outside the grid |
| <b>E</b> .         | Graticule Properties <ul> <li>Store as a static graphic that can be edited</li> <li>Store as a fixed grid that updates with changes to the data frame</li> </ul>                                     |
|                    | < Back Finish Cancel   |

Border style and graticule properties - the output format for the graticule is the only thing that cannot be changed later.



7) Once the graticule is created it can be modified through the data frame Properties window. Map symbols used in the Axes, Labels, and Hatching tabs can be changed by clicking the "Symbol:" button > "Edit Symbol..." to open the Symbol Property Editor dialog box.

|                        | Data Frame Properties                                   | 23                  |                          |                  |
|------------------------|---|---------------------|--------------------------|------------------|
|                        | Feature Cache Annotation Groups Extent Indicators Frame | Size and Position   |                          |                  |
|                        | Reference System Properties                             | 23                  |                          |                  |
|                        | Axes Interior Labels Labels Lines Hatching Intervals    |                     |                          |                  |
|                        | Display Properties                                      |                     |                          |                  |
|                        | Show as a grid of lines                                 | Symbol Selector     |                          |                  |
|                        | Show as a grid of ticks                                 | Type here to search | ▼ 🥘 🔊 🗄 マ                | Current Symbol   |
|                        | Do not show lines or ticks                              | Search: () All St   | yles 🔘 Referenced Styles |                  |
|                        | Symbol:   | ESRI                | A                        |                  |
|                        |   | 23                  |                          |                  |
| Symbol Property Editor |   |                     | Ramp Expressway          |                  |
| Preview                | Properties:   |                     |                          | Color:           |
|                        | Type: Simple Line Symbol   Units:                       | Millimeters -       |                          | Width: 0.71      |
|                        | Simple Line   |                     | Road Arterial Street     | Edit Sumbol      |
|                        | olur 🗖  |                     |                          |                  |
|                        |   |                     | - +-+                    | Save As Reset    |
|                        | Style: Solid 🔹  |                     | ential Railroad          |                  |
|                        | Width: 0.2500   |                     | rel                      |                  |
| Layers                 |   |                     | -                        |                  |
|                        |   |                     | lary, Boundary,          |                  |
|                        |   |                     |                          | Style References |
|                        |   |                     |                          | OK Cancel        |
|                        |   |                     |                          |                  |
| + × ↑ ↓                |   |                     |                          |                  |
| 🖹 🖹 🖉                  |   |                     |                          |                  |
|                        |   |                     |                          |                  |
|                        |   | UN                  |                          |                  |

The Symbol Property Editor dialog box allows advanced customization of map elements.

NOTE: ArcMap uses points to define symbol size based on reference scale, but units can be changed to millimeters in the Symbol Property Editor dialog box and Arc will automatically convert it to points. For example, at 1:24,000-scale a 0.25 millimeter wide line is equivalent to 0.71 points.



8) To clip the graticule (and other layers) to a map boundary polygon navigate to the Data
Frame tab in the Data Frame Properties dialog box. Under "Clip Options" select "Clip to shape"
"Specify Shape..." > "Outline of Features" radio button > your map boundary under "Layer:" > OK. Then ensure the "Clip Grids and Graticules" box is checked.

| eature Cache  | Annotation Group   | Extent Indicators                | Frame    | Size | and Positio |
|---|--|----------------------------------|----------|------|-------------|
| General   | Data Frame   | Coordinate System                | Illumina | tion | Grids       |
| Extent  |  |                                  |          |      |             |
| Automatic   |  | -                                |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
|   |  |                                  |          |      |             |
| Extent Used E   | By Full Extent Comma   | nd                               |          |      |             |
| Extent Used E   | 3y Full Extent Comma<br>data in all layers (De                 | nd<br>ault)                      |          |      |             |
| Extent Used E  Extent of e  | By Full Extent Comma<br>data in all layers (De                 | nd<br>iault)                     |          |      |             |
| Extent Used E<br>Extent of a<br>Other:  | By Full Extent Comma<br>data in all layers (De                 | nd<br>ault)                      |          |      |             |
| Extent Used E<br>Extent of a<br>Other:<br>Specify   | By Full Extent Comma<br>data in all layers (De<br>Extent       | nd<br>iault)                     |          |      |             |
| Extent Used E  Extent of of Other: Specify Clip Options   | By Full Extent Comma<br>data in all layers (De<br>Extent       | nd<br>ault)                      |          |      |             |
| Extent Used E  Extent of of Other: Specify Clip Options Clip to shape                           | By Full Extent Comma<br>data in all layers (De<br>Extent       | nd<br>iault)                     | fv Shape |      |             |
| Extent Used E<br>Extent of a<br>Other:<br>Specify<br>Clip Options<br>Clip to shap               | By Full Extent Comma<br>data in all layers (De<br>Extent       | nd<br>iault)                     | fy Shape |      |             |
| Extent Used E<br>Extent of a<br>Other:<br>Specify<br>Clip Options<br>Clip to shap<br>Exclude La | By Full Extent Comma<br>data in all layers (De<br>Extent<br>re | nd<br>iault)<br>Speci<br>Border: | fy Shape |      |             |
| Extent Used E<br>Extent of a<br>Other:<br>Specify<br>Clip Options<br>Clip to shap<br>Exclude La | By Full Extent Comma<br>data in all layers (De<br>Extent<br>Re | nd<br>iault)<br>Speci<br>Border: | fy Shape |      |             |

Grids, graticules, and other layers can be clipped to a map boundary polygon or to a specified extent.

NOTE: This should only be enabled when ready to export or print the map since clipping to shape significantly reduces drawing time in Data view, especially when streaming.

Please direct any questions, comments or improvements to:

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