

# Creating Landmark Maps with GIS

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*ESRI - Redlands*

This presentation is about how you can use ArcGIS to create maps that have distinguishable landmarks on them. This work includes contributions from two of my colleagues at ESRI, David Barnes, one of the ArcMap Product Engineers, and Jaynya Richards another product engineer who is responsible for the ESRI styles and their symbols.

**ABSTRACT:** Landmark maps contain graphics that are easily identifiable as landmarks by the user. These maps are often used for navigation and trip planning. They are a common type of map used by visitors to popular tourist destinations, like Rome, The Washington DC Mall area, or Disneyland. They can span a range of scales, be produced in black and white or color, contain detailed or highly abstracted symbols, and can be large format or small, but all of them help the reader immediately identify important cultural features in the landscape. The best landmark maps have a clear and unambiguous association of the graphic mark on the page and the feature on the ground. Mimetic symbols, architectural elevations, and sketches have been used successfully on these types of maps. Such symbols often appear to be more artistic than symbols on other kinds of maps, and they often appear to be hand drawn. In this presentation, we demonstrate how these maps can be created using ArcGIS software and commonly available GIS data. We show how to add images (pictures, sketches or elevations) to the map, how to create mimetic symbols that have an abstract style, and how the 3D capabilities of the software can be used to capture landmark features.

# Agenda

- Introduction
- Demonstrations
- Discussion
- Conclusion

I'll start the talk with an introduction so you know what we mean by landmark maps, who their audience is and some of their design considerations. Then I'll demo how you can achieve some of the effects for these types of maps using ArcGIS. I'll end with a short discussion and some conclusions.

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Before we get started, I just want to point out that this presentation with all the notes about what I am saying will be posted on the Mapping Center web site – but give us a week or so to get it up there after we get back.

# Introduction

Landmark maps contain graphics easily identified as landmarks by the map reader

Examples



Let's start with a description of what we mean by landmark maps. These are maps that contain graphics that are easily identifiable as landmarks by the user. They are a common type of map used by visitors to popular tourist destinations, like Venice, as shown here, The Washington DC Mall area, or Disneyland.

Let's take a look at some examples.



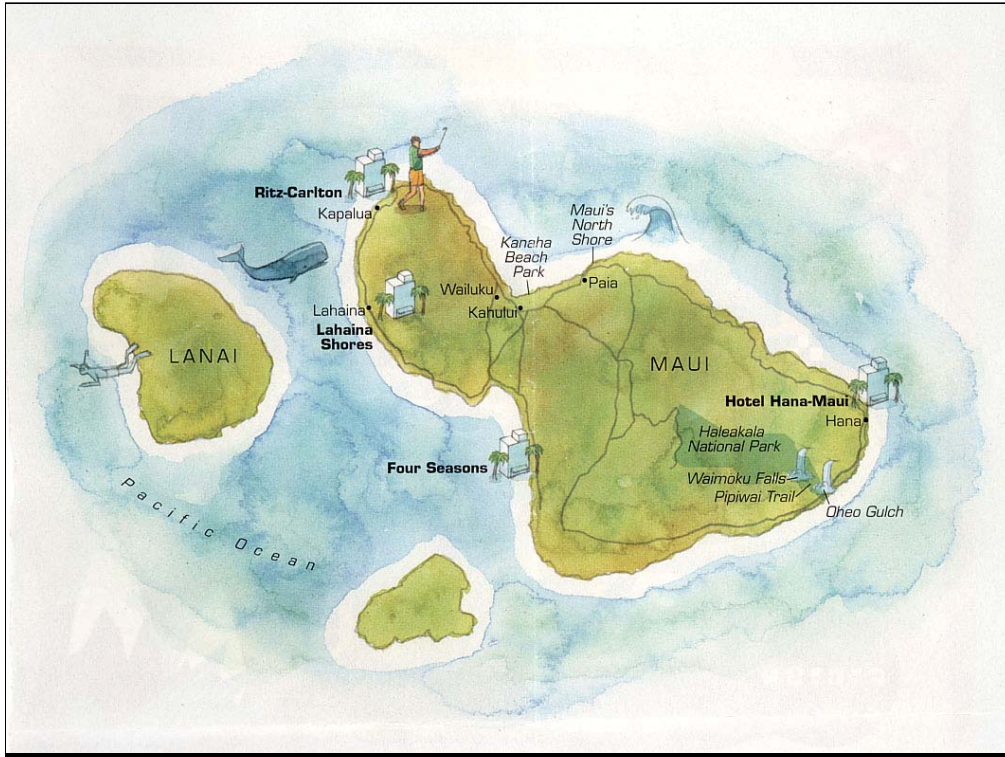
Here is the larger map of Venice – note the landmarks that are clearly distinguishable such as Plaza San Marco at the bottom left of the map.



In this map by the National Geographic, we see some of the buildings and monuments of interest in the DC Map area.



On this map of the Disney Epcot Center, we can again see important buildings and we can also see a number of other things that are important to visitors to this attraction, like restroom, telephones, and picture spots.



On this smaller scale magazine map of Maui (I found it in my airline magazine last week), we again see some buildings but we can also see some activities for tourists, like golfing and snorkeling.





At an even smaller scale, we can see buildings again, as well as attractions like horse races at Newmarket and the wildlife area at Wicken Fen.

## Design Considerations

- Selective in terms of what is shown
- Scale can be compromised
- Used by general public
- Can be at any scale
- Often look more artistic than realistic
- Black and white or color

From these examples and I hope you will also see this in the others I will show in this talk, these maps have some distinctive characteristics.

- They are selective in terms of what is shown – not all features in a single class are displayed with the same amount of detail.
- Scale can be compromised – this is because the maps are often used for relative rather than absolute positioning.
- They are used by general public – so they are designed to appeal to a variety of map users and may even be designed with the assumption that the users have very limited map reading skills.
- They can be at any scale – we saw a large scale map for an amusement park as well as a smaller scale map of a region of England – and they can be even smaller scale than that.
- They often look more artistic than realistic, and many times they appear to be hand drawn instead of compiled using computers.
- They can also be in black and white or color – have you ever arrived at a hotel and asked for a local area map? Many times, because of the sheer number of these that are distributed, they are printed in black and white and they are landmark maps!

## Purposes of Landmark Maps

- Practical use to find the way & visit places
- Trip planning & armchair tourism
- Promotion or advertisement
- Souvenirs

In order to understand this class of maps a little better, we should be able to examine the audience and purpose for which they were designed. I already suggested that they are designed for the general public and that no serious map reading capability is assumed. So what about the purpose? These maps have a few limited but important uses.

- They can have a very practical use to find the way & visit places.
- They can also be used for trip planning and armchair tourism.
- You will sometimes see them used for promotion or advertisement.
- And people will often tuck them away as souvenirs.

# Content

- Lay of the land
    - Hydrography, terrain, boundaries
  - Things helpful for navigation
    - Transportation
  - Things important to tourists
    - Services, amenities, attractions
  - Landmarks
    - Visible from a ground-based vantage point
  - Examples
- Basemap  
Data

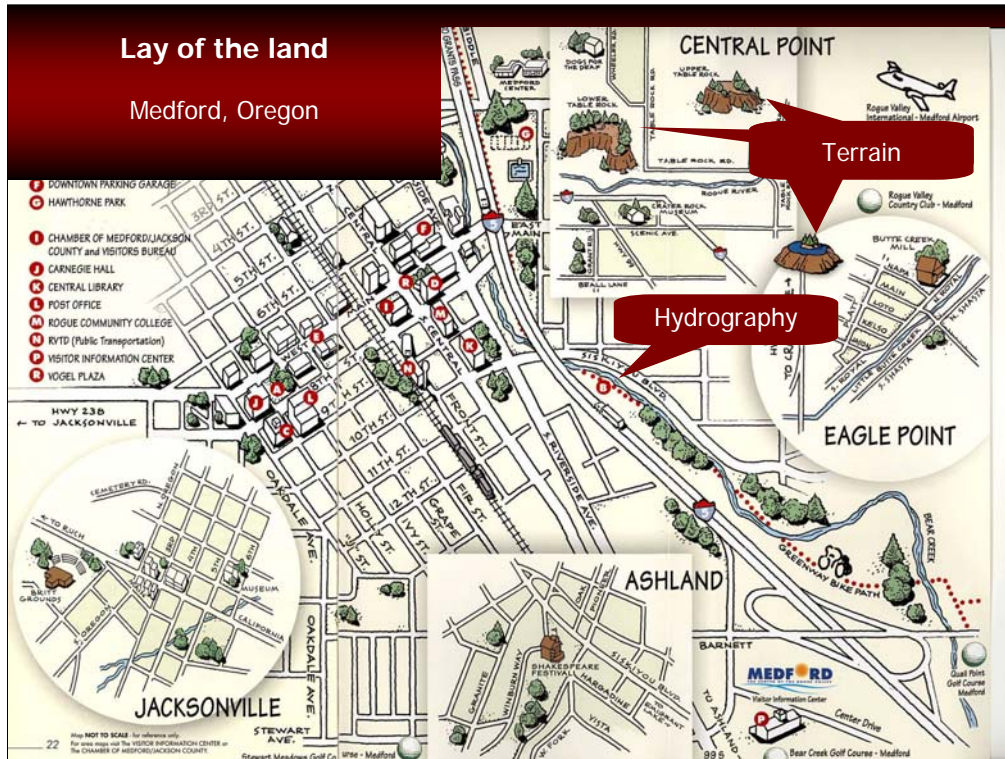
Finally, before we start designing a landmark map, we need an idea of what to include on it.

- First, they often contain information for the map reader about the “lay of the land”, so to speak – that is, the hydrography, terrain (if it is useful and relevant) and administrative or legal boundaries.
- Second, they include things that are helpful for navigation – as I noted earlier, one of the primary uses of these maps is to help people find their way and be able to visit places they want to see. So these maps need to include information about transportation – in whatever mode is relevant to the location and the situation.

Maybe we can categorize these two types of information as the basemap data for landmark maps.

- These maps also include things that are important to its audience – tourists. These include services, amenities, and attractions.
- And finally they include important landmarks – these are things that the map reader can see if they are on the ground in the area.

Let's look at some examples of this type of content on landmark maps.



On this map of Medford, Oregon, you can see some “lay of the land” features, including terrain and hydrography.

# Things helpful for navigation

Las Vegas, Nevada



On this map of the Las Vegas Strip, there is information about how tourists can get around by walking or driving on the roads or taking the monorail.

## Things important to tourists

Glen Ivy Hot Springs, CA

Cafe'

Guest Services

ATM

First Aid



On this map of Glen Ivy Hot Springs not far from us in Redlands, we can see examples of amenities and services important to its guests, including where to eat, get money and find first aid.

# Landmarks

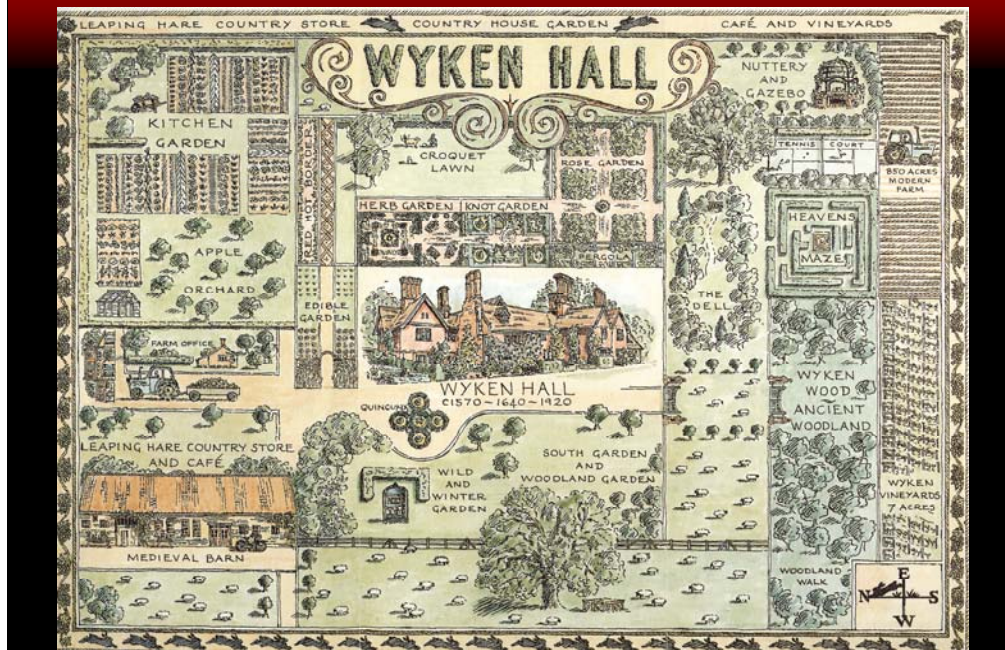
- Buildings and other built features
- Vegetation
- Physiographic features

Landmarks generally include three types of features:

- Buildings and other built features like bridges and monuments,
- Vegetation, and
- Physiographic features – if they are relevant and useful.



## Buildings and Other Built Features



This map of Wyken Hall gives us some good examples of buildings and other built features that are shown on landmark maps.

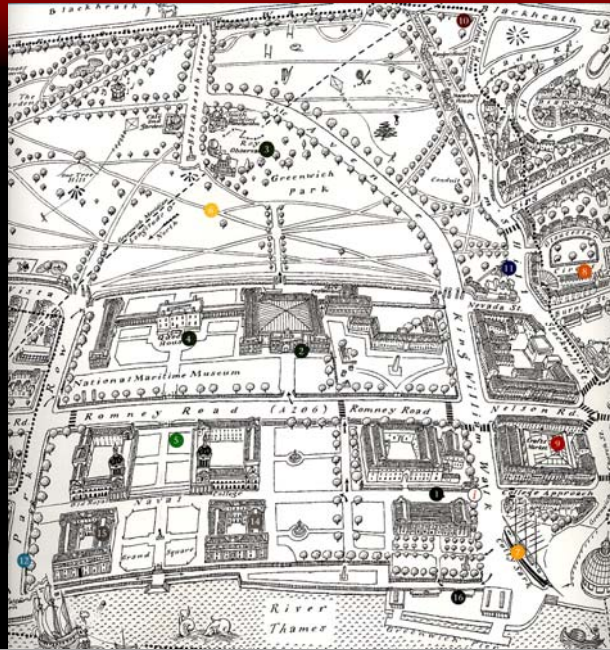
## Buildings and Other Built Features

- As can be seen from access points



If we take a closer look we can see a county store and café, a gazebo and Wyken Hall itself.

# Vegetation

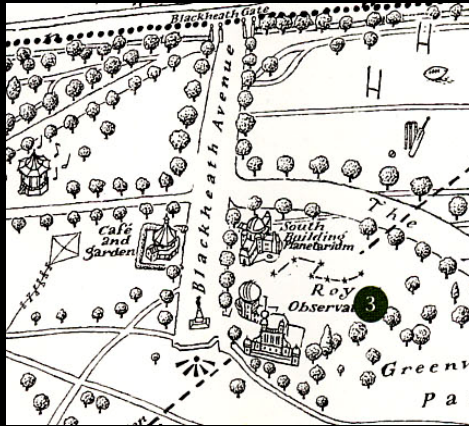


This map of the Greenwich Heritage Site outside London gives provides some good examples of vegetation.

# Vegetation

■ Regular pattern

■ Random pattern



In this case much of the vegetation is regularly spaced which will help map readers to know that they are following an intended path. On the Wyken Hall map, we can find an example of vegetation that is random – again, this information about the vegetation can help map readers to orient themselves.

# Physiographic Features



On this map of the Land of Oz, (sorry for the deviation from reality, but I couldn't resist), there are physiographic features that provide the reference for other features such as the Yellow Brick Road and the Emerald City.

# Physiographic Features

- That are used to identify location or are an attraction unto themselves

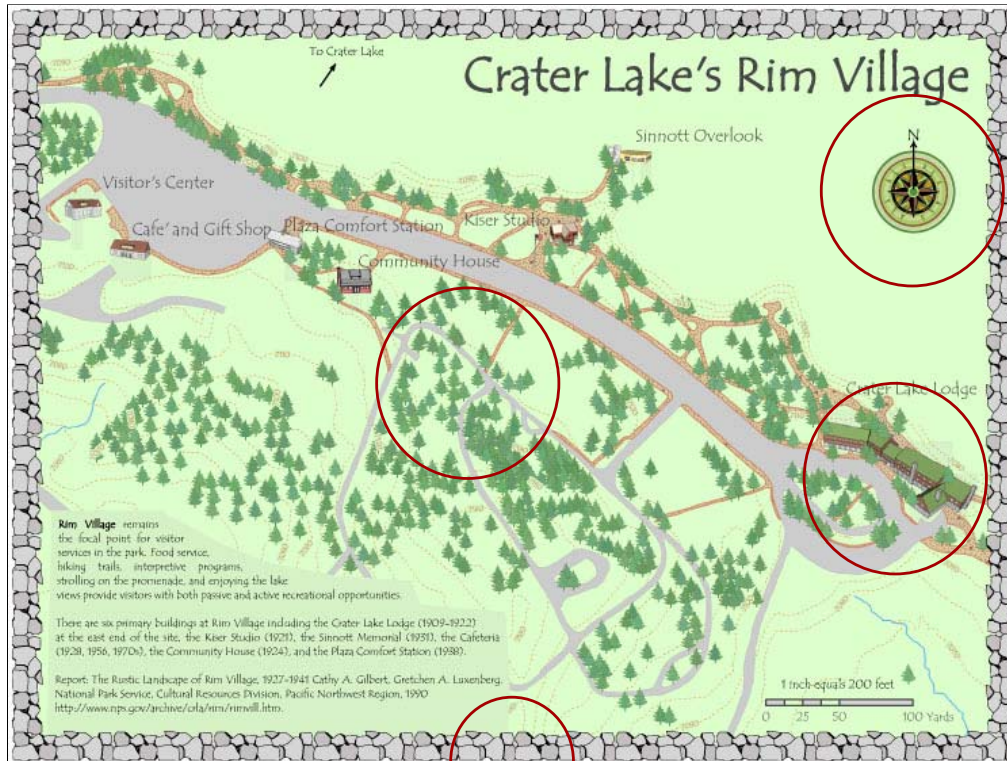


Physiographic features are only included on landmark maps when they themselves are landmarks or they provide information necessary to understanding the lay of the land.

# Demonstrations

- Rim Village map
  - Buildings
  - Vegetation
  - North arrow
  - Decorative border

Now that you know the types of maps we are talking about, their audience and purpose, and their design considerations, I want to show you a fairly simple map of Crater Lake's Rim Village that allowed us to test the capabilities of ArcGIS to create these types of maps.

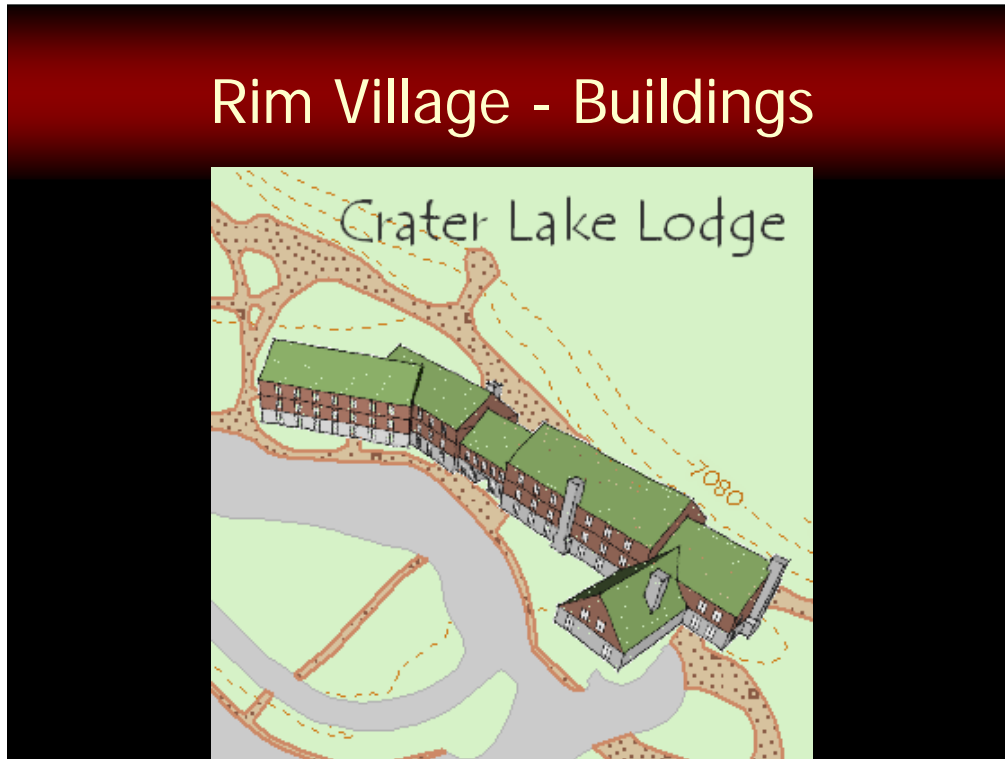


This is the map on which tried out a number of effects, including:

1. Adding sketches of the buildings to the layout,
2. Including some randomly placed vegetation,
3. Including a decorative north arrow, and
4. Adding a decorative border.



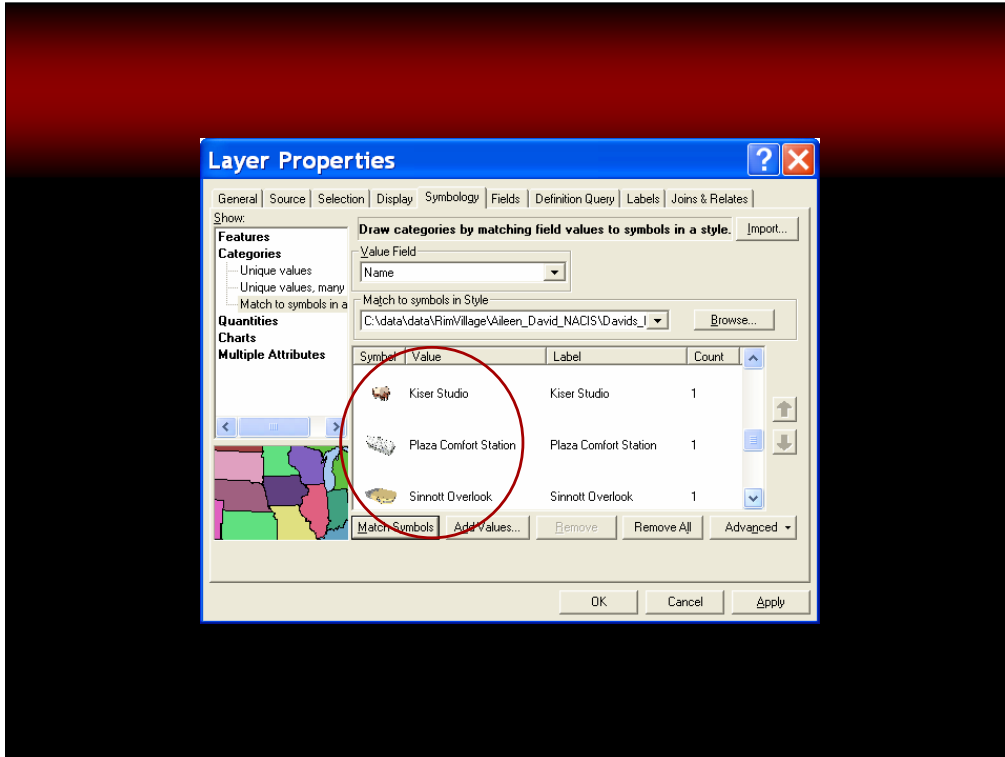
## Rim Village - Buildings



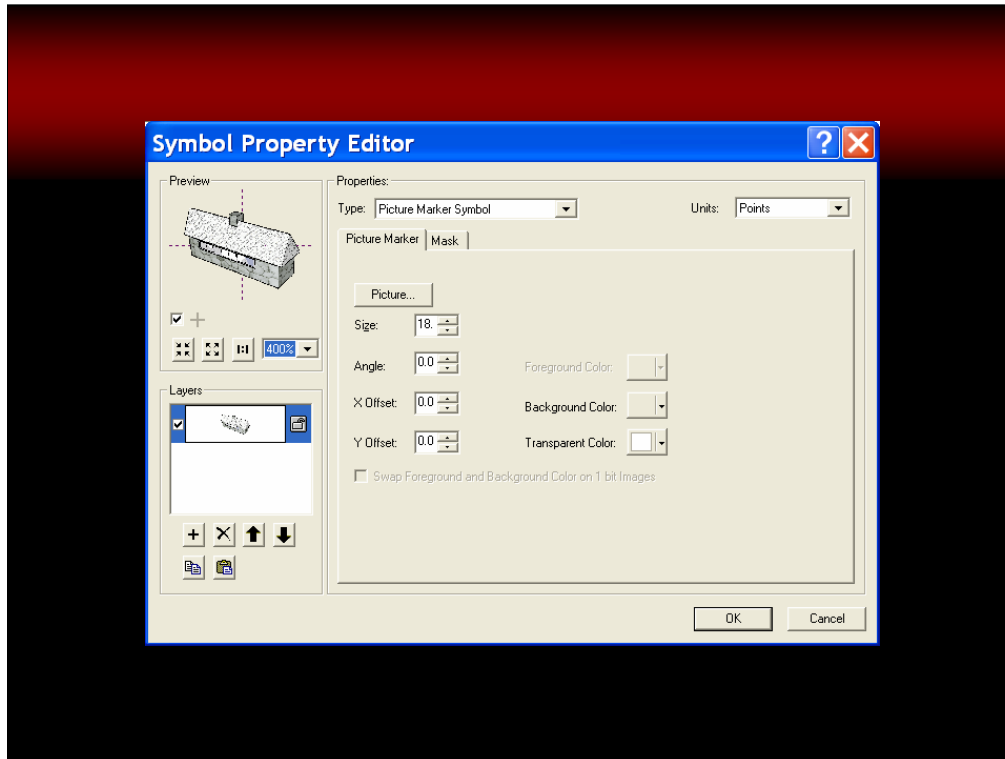
To get the Rim Village buildings on the map was really simple – to create them was a little trickier.

To create the buildings, we used Google Sketchup, but you could create them using any method that would allow you to sketch a small replica of the building and then save it in preferably .bmp format. The reason to use the .bmp file format is that you can set the transparency – that is, you can choose one color to be transparent – this is useful if you have a color like white in your symbol and you also have a background that you want to be transparent – the trick is to make the background color in the symbol something that you would definitely not use otherwise in that symbol – like magenta. Then you can easily define that as the color that will be transparent on the map.

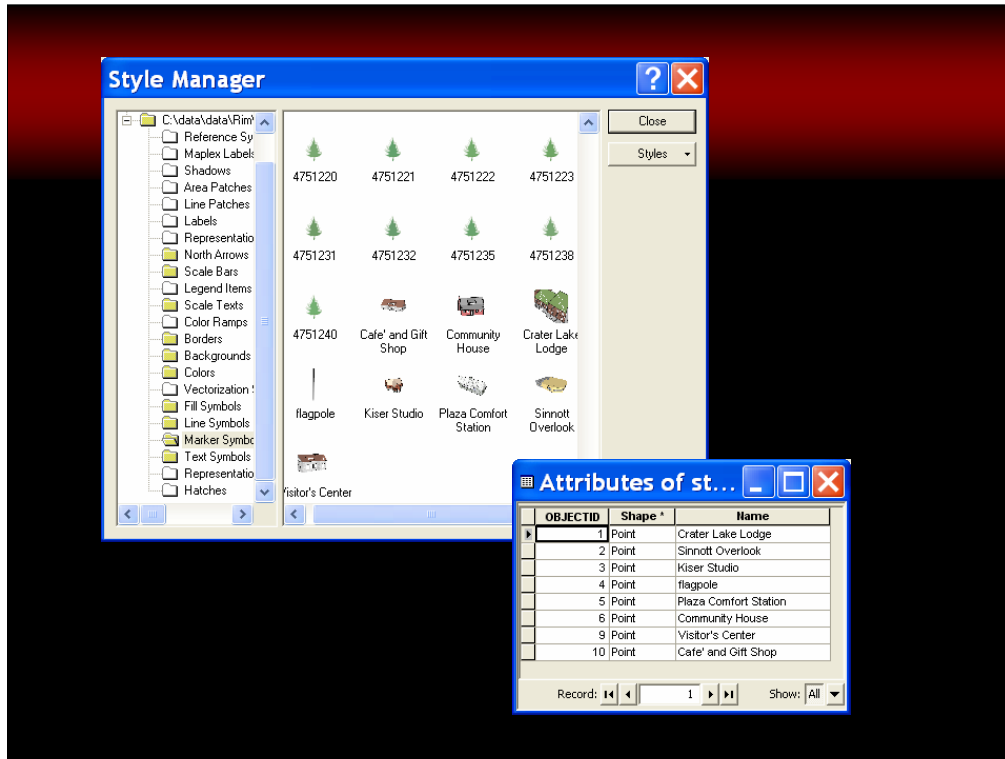
Once the sketches were created, we could symbolize the point feature layer for building locations with picture marker symbols using the building pictures that were created earlier.



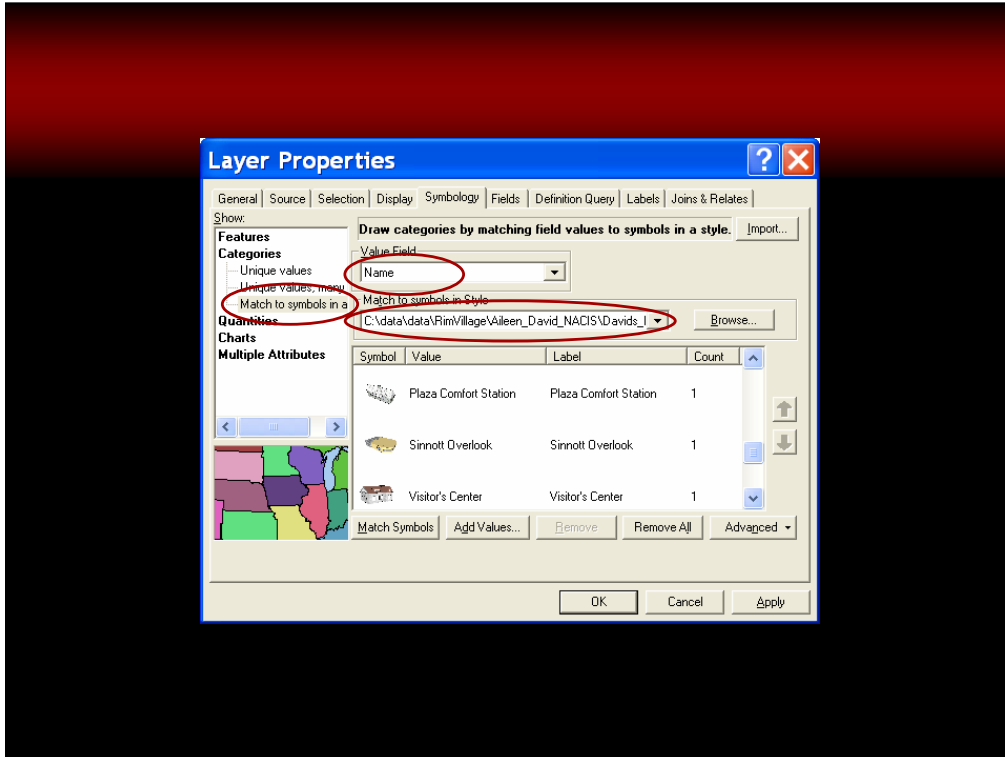
Notice here that each point in this GIS layer has a unique symbol that is a small sketch of the building.



Using Style Manager, you can create these symbols as picture marker symbols – simply specify the location of your small graphic and set the size in the Style Manager.



Note that the name of the symbol is exactly the same as one of the attributes for the point features. If the spelling and capitalization of the name of the symbol and the attributes in a field are exactly the same...

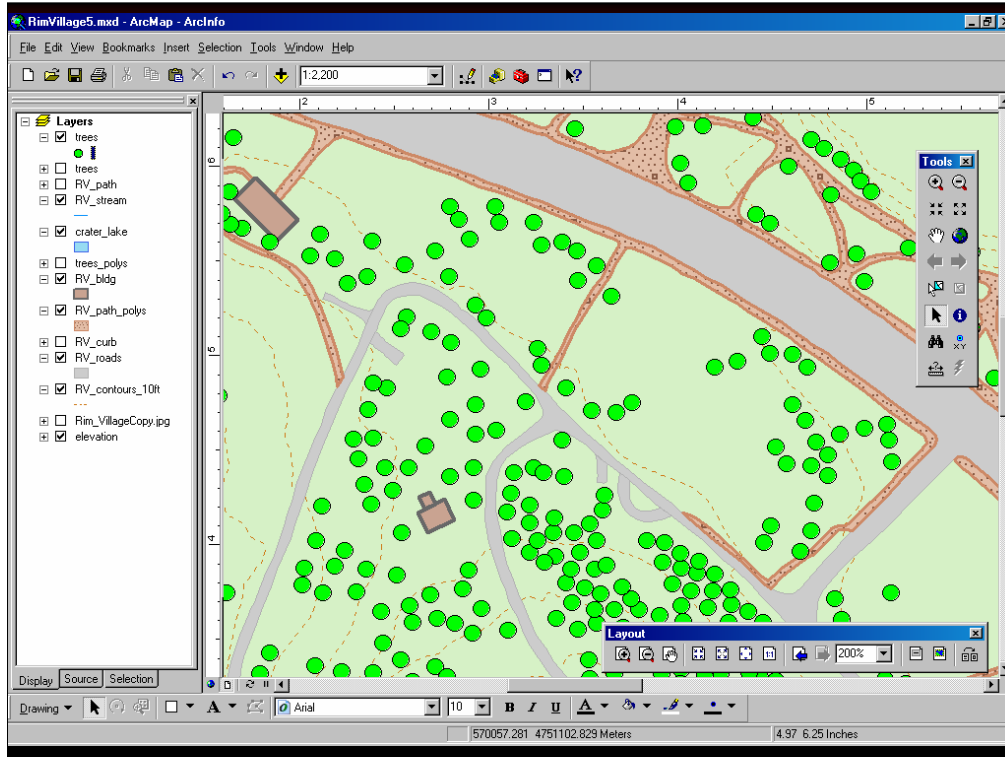


...you can use an option called Match to Symbols in a Style. This requires that you identify the field that you are using and the location of the style file. Once you do this, the symbols will automatically be assigned to the point features.

## Rim Village - Vegetation

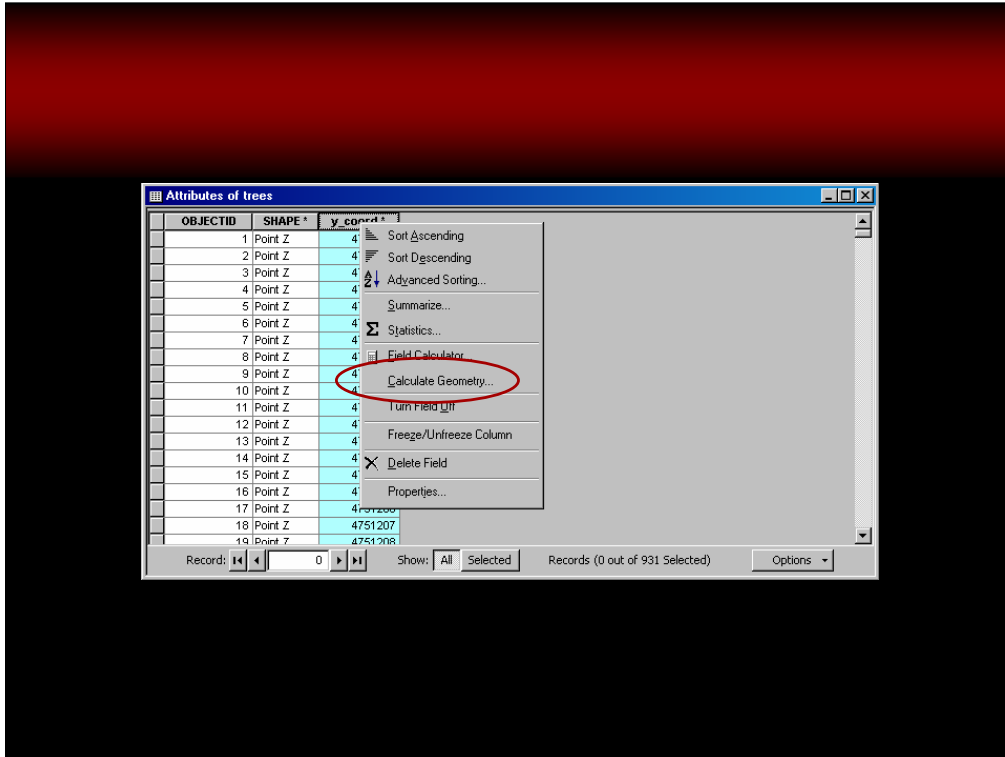


Now let's move on to the vegetation. The method used to add trees to the map was really pretty innovative, I think. The trickiest part is to get the symbols to draw in order so that the trees towards the bottom of the page are drawn on top of the trees towards the top of the page. Otherwise the perception of depth in the map is thrown off.



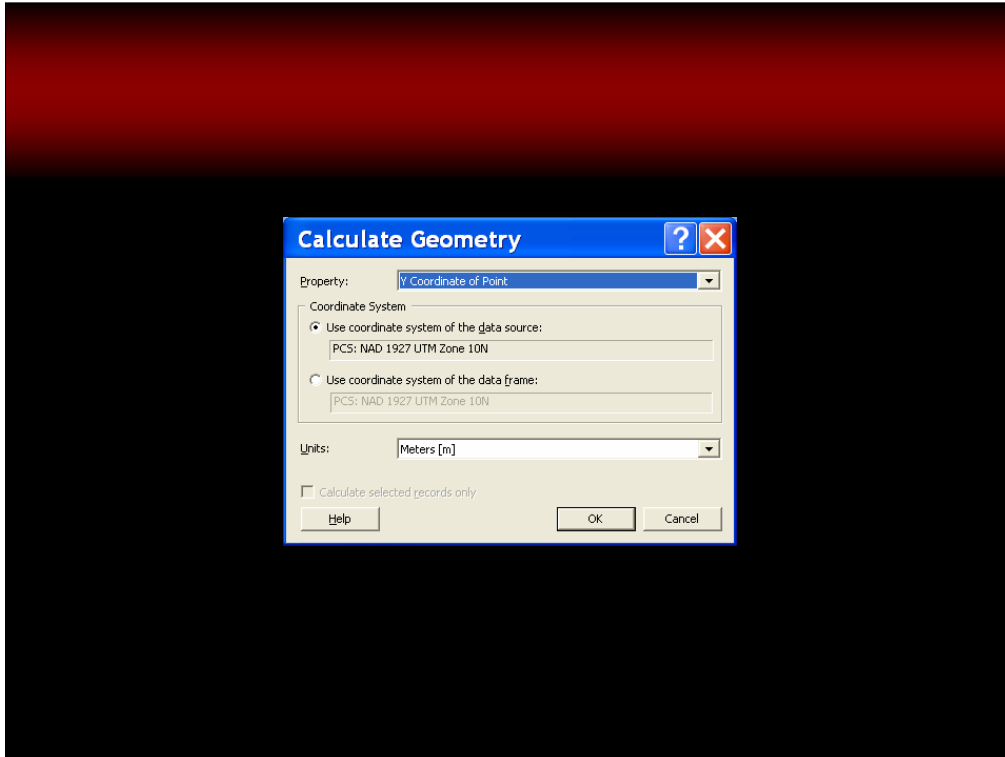
The basic steps are:

First, start with a point feature layer representing the points where you want to place the markers (that is, the tree symbols).

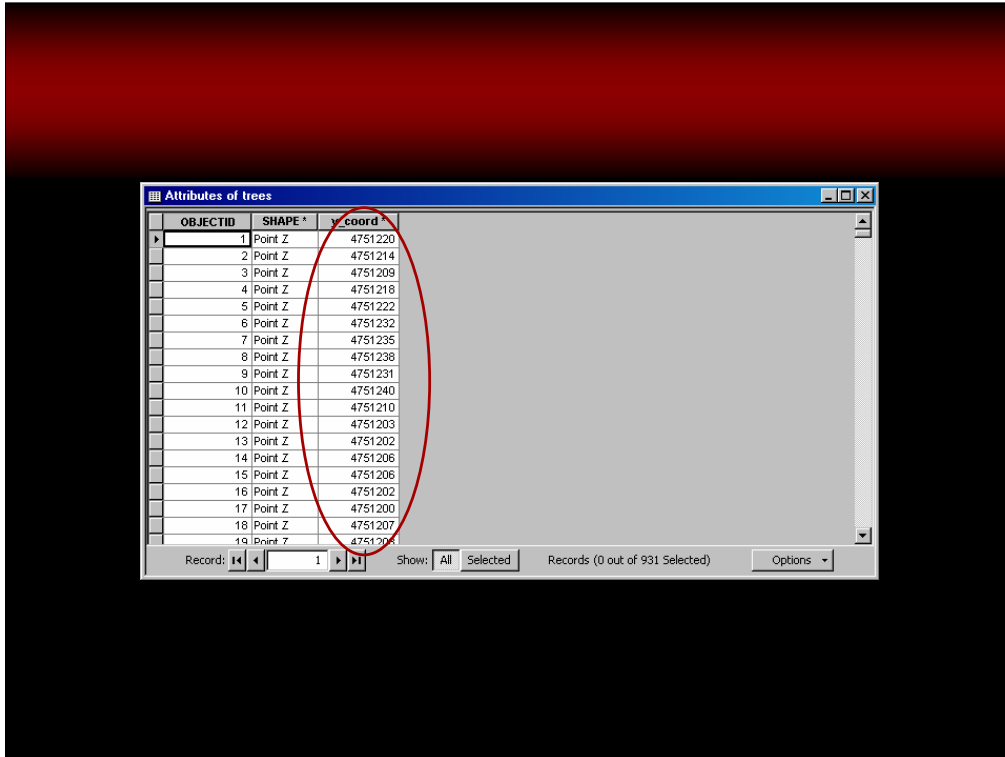


Add a long integer field for the y-coordinate and calculate its value. Calculating the y-coordinate is easy if you use the Calculate Geometry option instead of the Field Calculator.

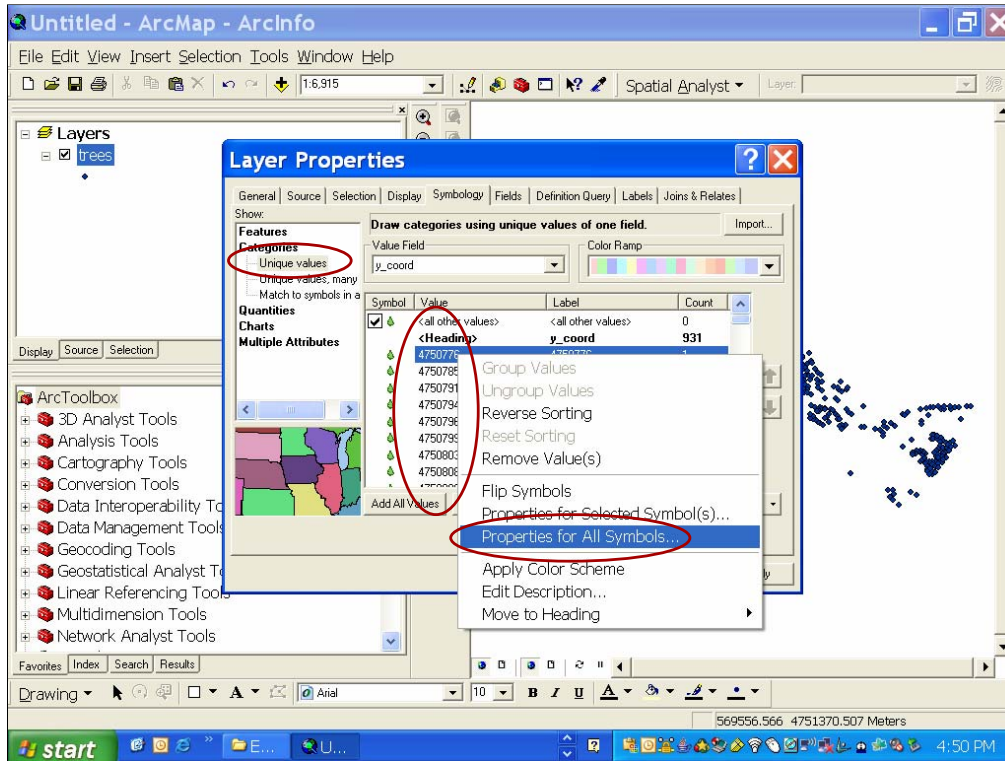




Using the drop down menu at the top, select Y Coordinate of Point and the value you need will be calculated for all your tree points.

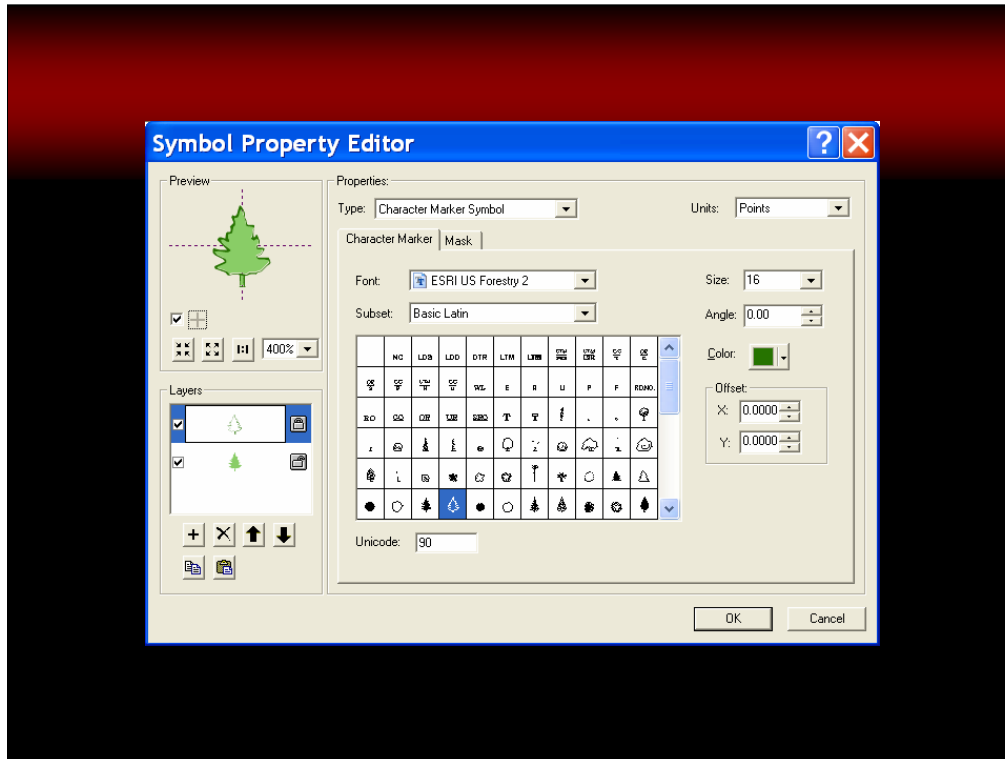


Now you have an attribute that will help you to make sure that your tree symbols are placed correctly. This is the attribute that you will be using to set the drawing order.



Set the layer symbology to Unique Values based on the y-coordinate field. Now set the symbology.

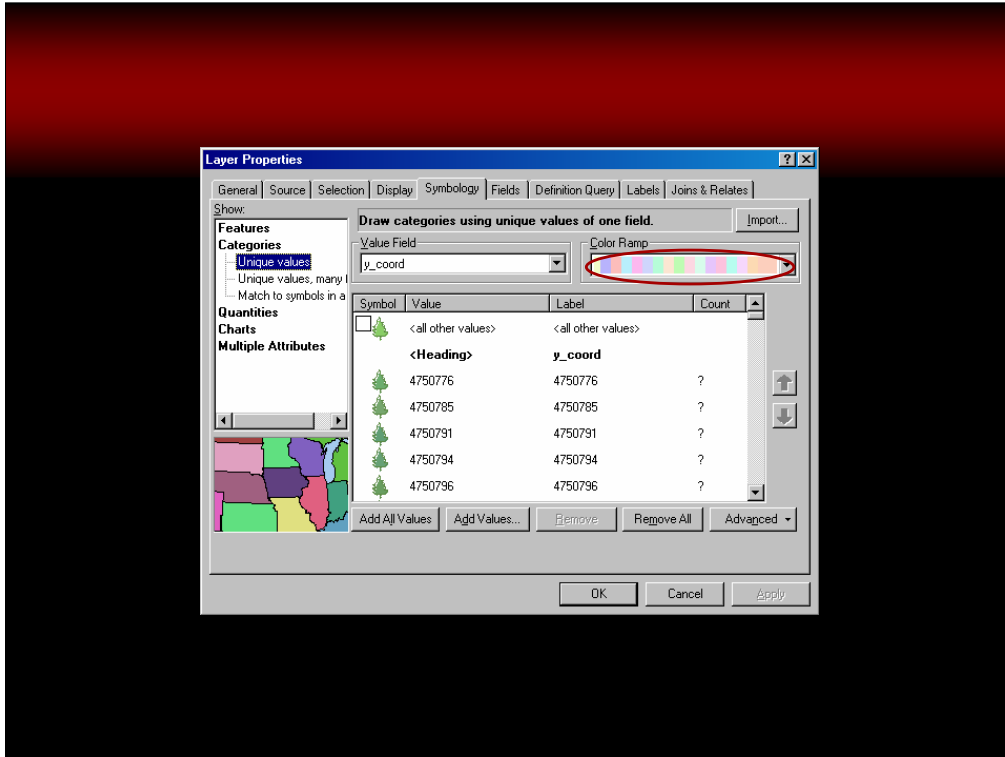
Right click on any point symbol and select Properties for All Symbols.



Click Properties to get to the Symbol Property Editor. Change the Type to a Character Marker Symbol and use the ESRI Forestry 2 font. Select an outline symbol (we used the symbol with the Unicode value 90), set the size to 16 points and give it a darker green color. Change the zoom to 400% so you can see it a little better. Now use the bottom two buttons under the preview pane to copy and paste that symbol to a new symbol layer.

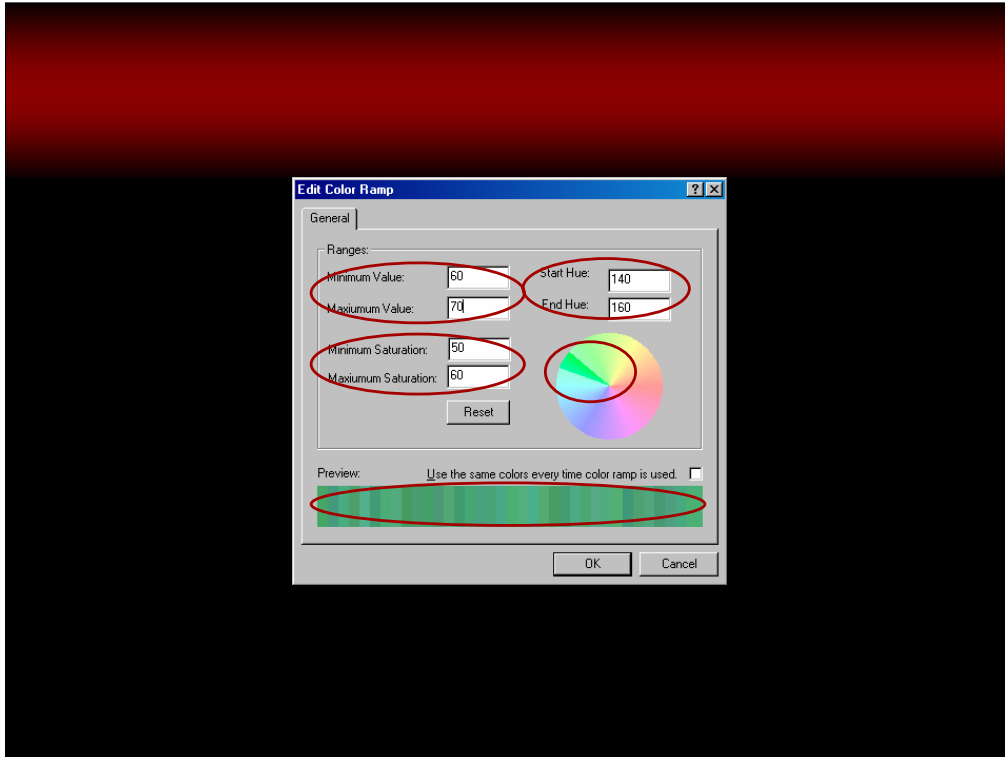
Change the symbol for the bottom layer to the fill for the outline tree symbol that you chose for the top layer (we used the symbol with Unicode value 89). Notice that like these are similar to the highway shields – there are fills and outlines that can be used together to create the multi-layer multicolored symbol.

Now use the little icon to the right of the layers to lock the top layer only. Click OK to get back to the Layer Properties dialog.



For a little variation in color you can use a restricted color ramp to set the fill colors. Recall that the outline layer of the symbol is locked, so if we change the color of the symbols now, it will only change the bottom layer, or in this case the fill of the symbol.

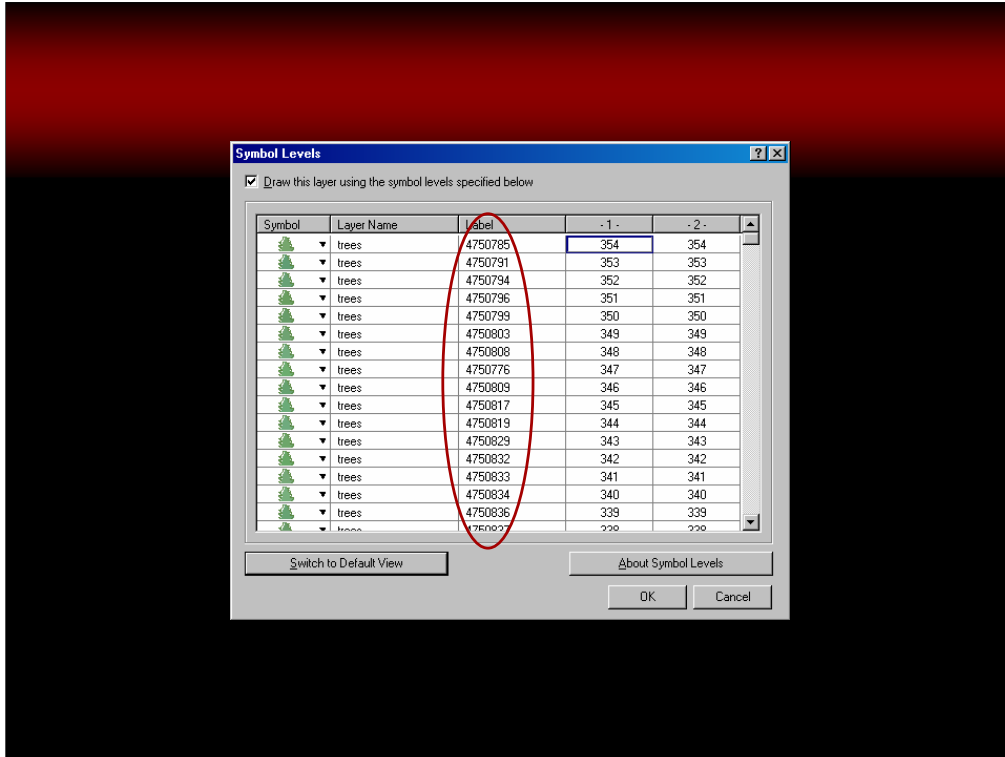
Right click on the color ramp to see its Properties.



Click and drag on the edges of the wedge on the color wheel to restrict the colors in the ramp. For our trees, we set the wedge to the upper left in the green area. You can also set this by typing in the Start and End Hue Values. Now set the value and saturation to something that will work for your map. You can view your setting on the Preview at the bottom. Click OK to accept all your changes.

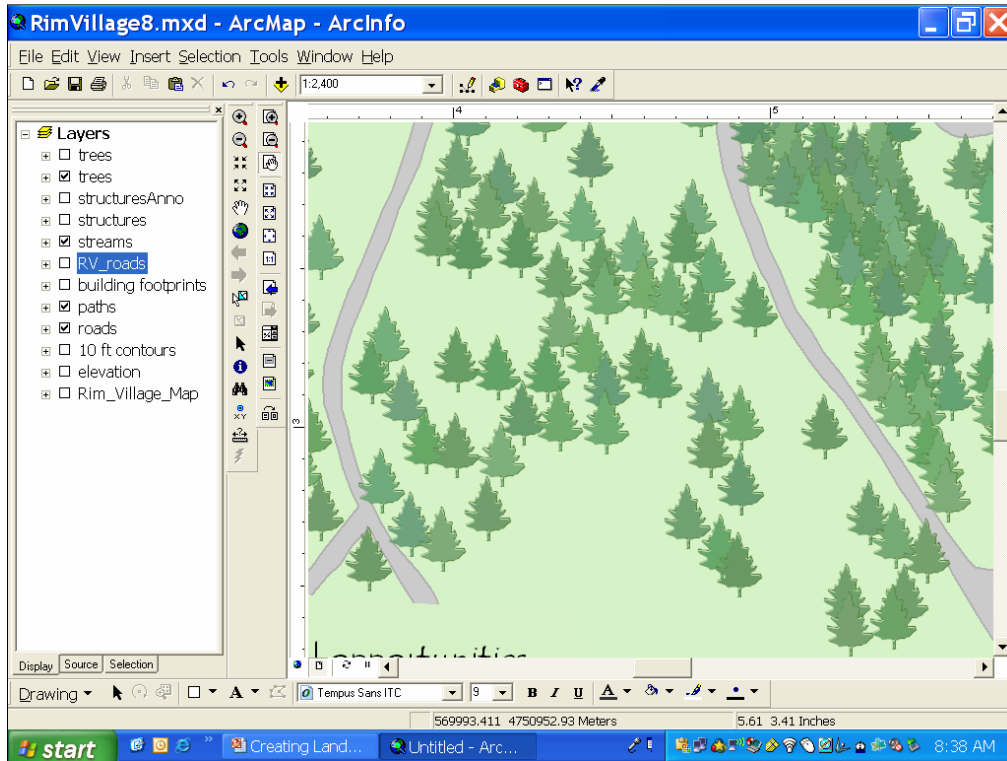


This gives the trees a little more realist coloration. Notice that the outline color is the same but the fill colors are slightly different.



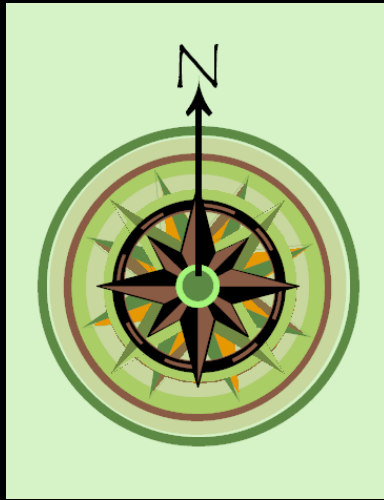
Finally, you need to run a scrip that our colleague Shara wrote to set the symbol levels. By setting up the drawing order based on the y-coordinate, the symbols that are at the top of the page will draw first and those at the bottom will draw last.



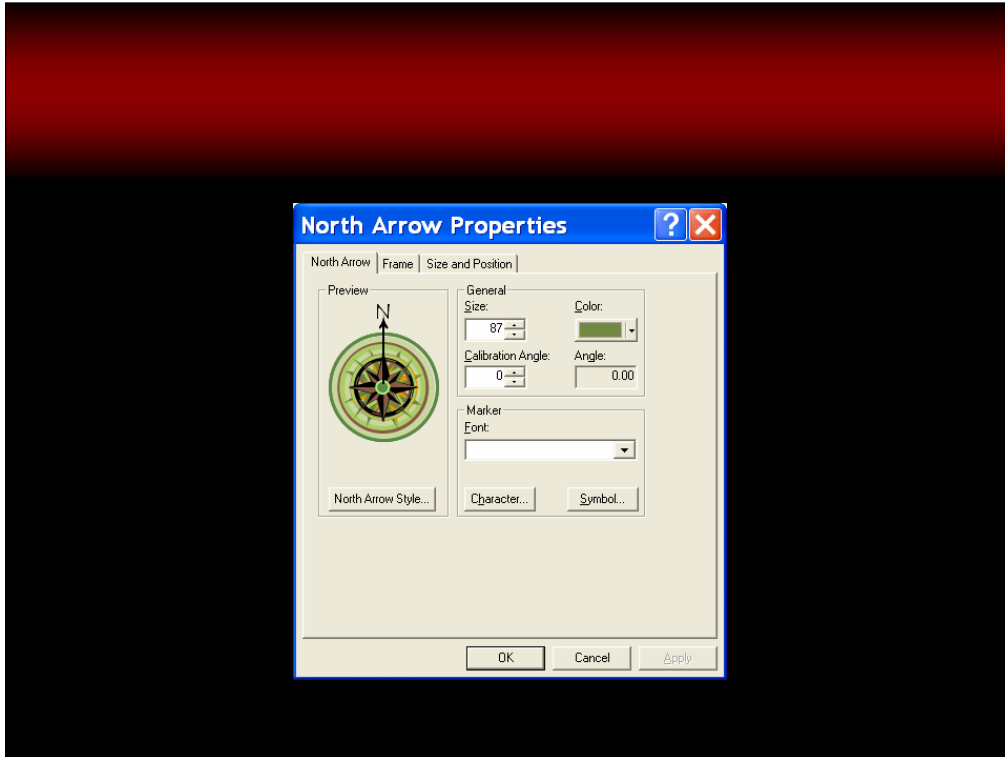


And this is the final result.

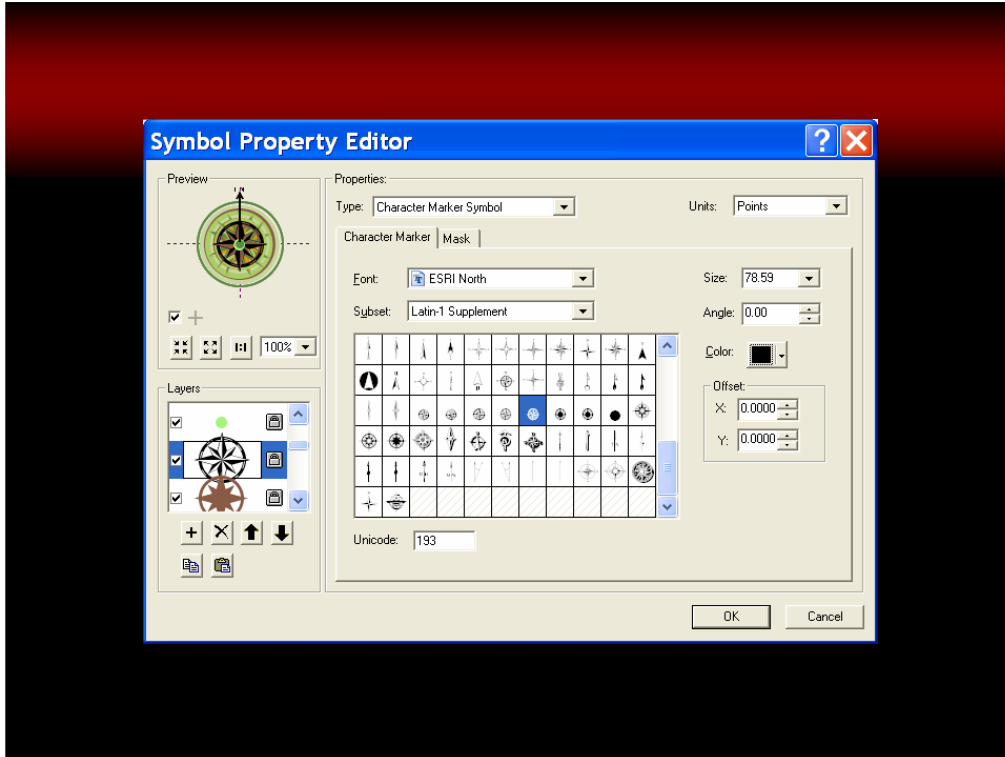
## Rim Village - North Arrow



Now let's turn to a couple of the more decorative effects on this map.



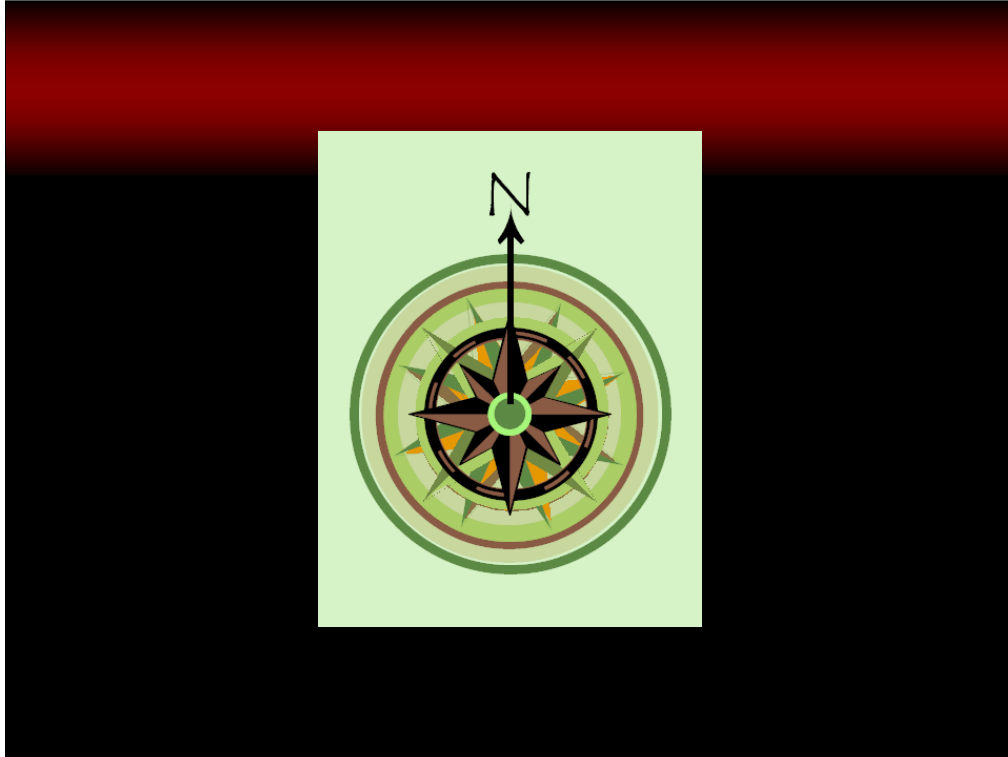
ESRI provides a number of fonts with selections of related glyphs from which you can easily make your own customized symbols. The north arrow was created in ArcMap using a number of glyph characters from the ESRI North Arrow font.



There are many symbols in the ESRI North font which can be assembled to make a colorful and unique north arrow. Modifying its appearance or creating a new north arrow symbol can be achieved in the Symbol Property Editor, and the north arrow symbol is edited as any other character marker symbol.

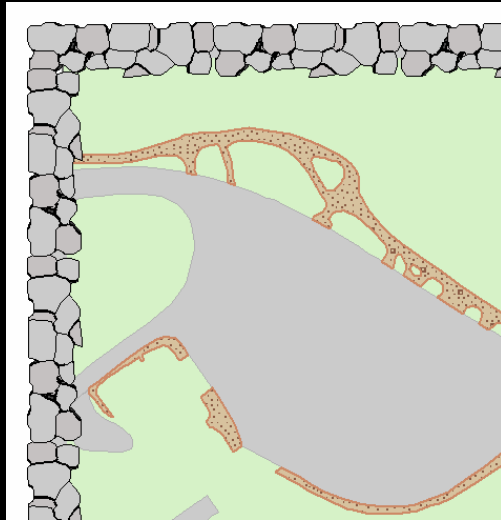


Once all the layers for the north arrow were symbolized, I added an arrow to indicate North and I added a piece of text with an N. I set the text properties to be the same as the other text on the map, and then I was done.

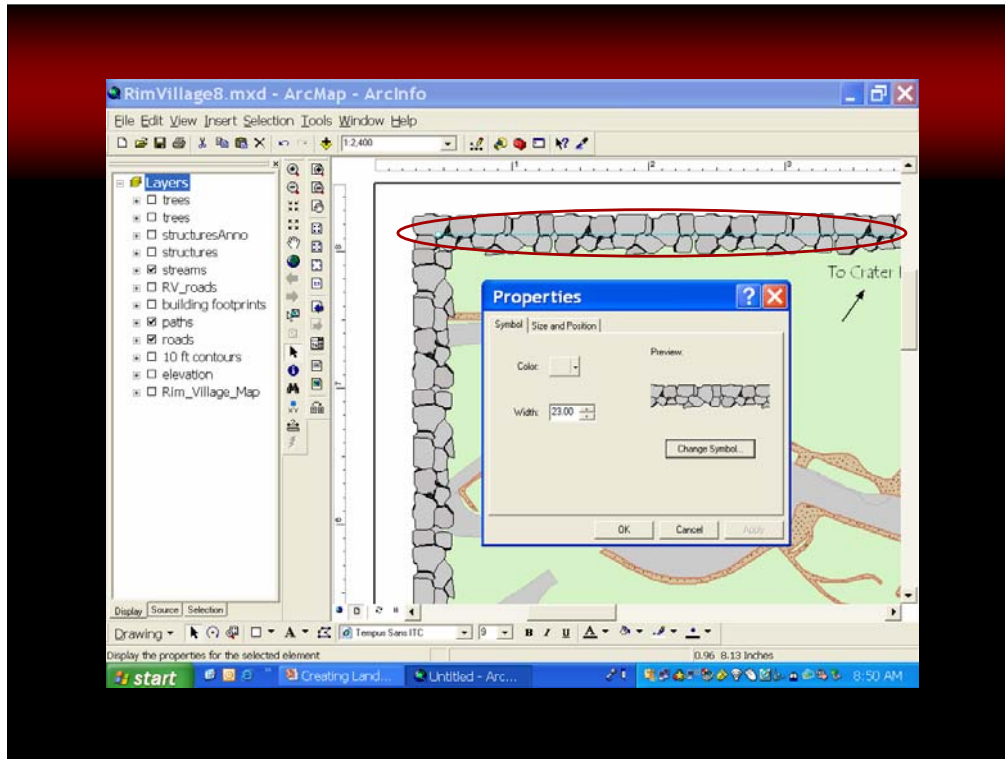


When you edit the north arrow symbol this way, you end up with a symbol that changes dynamically with the data – that is, if you change the orientation of the data, the north arrow will change its orientation, too.

## Rim Village - Decorative Border



I'll end with the decorative border.

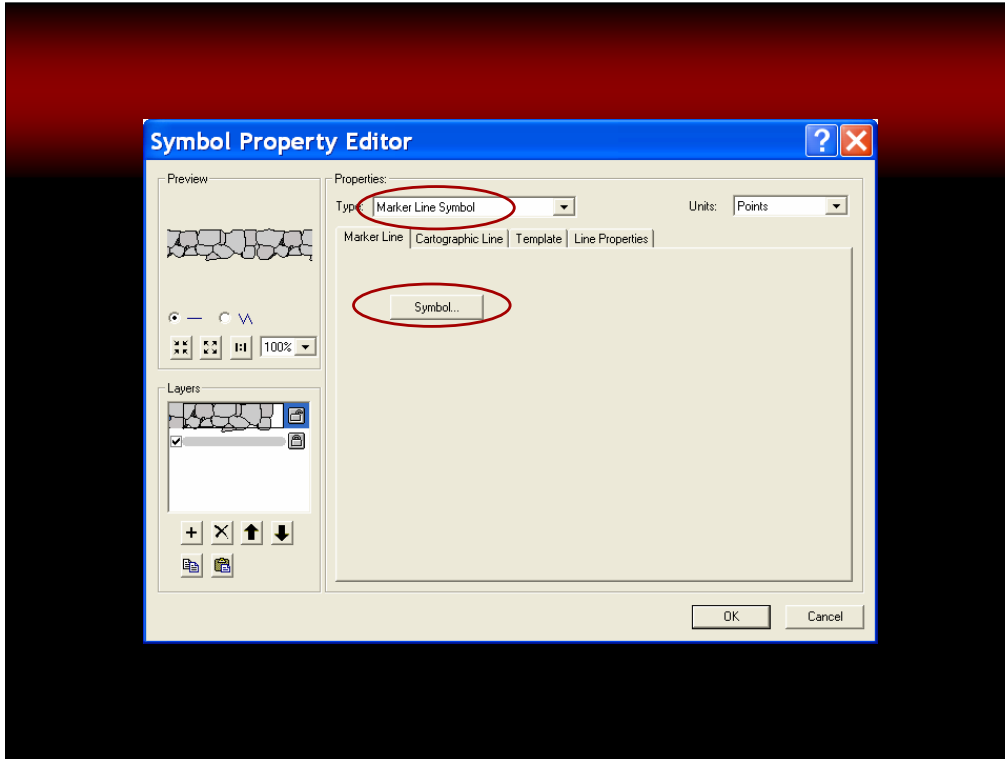


We created this decorative border as a line symbol with picture markers strung along it. The marker symbol is a repeating element so you want to give some thought to how the edges will match up – you want it to appear seamless and you don't in this case want to see the repetition in the border if you can avoid it.

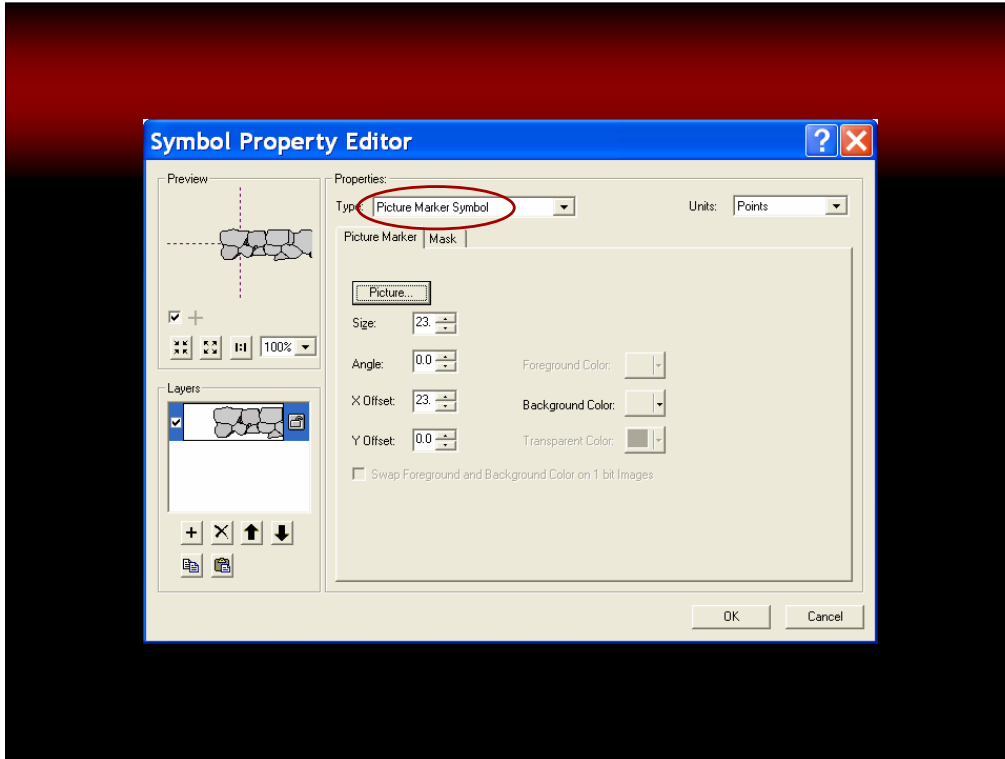
In ArcMap, draw lines for the border. You will need to start a new line at any corners and also at any spot where you want to border to change, for example, a border where the line has directionality and you want a pattern you are going to use to face towards the corners from the middle of the border.

Now Edit the line symbol properties.

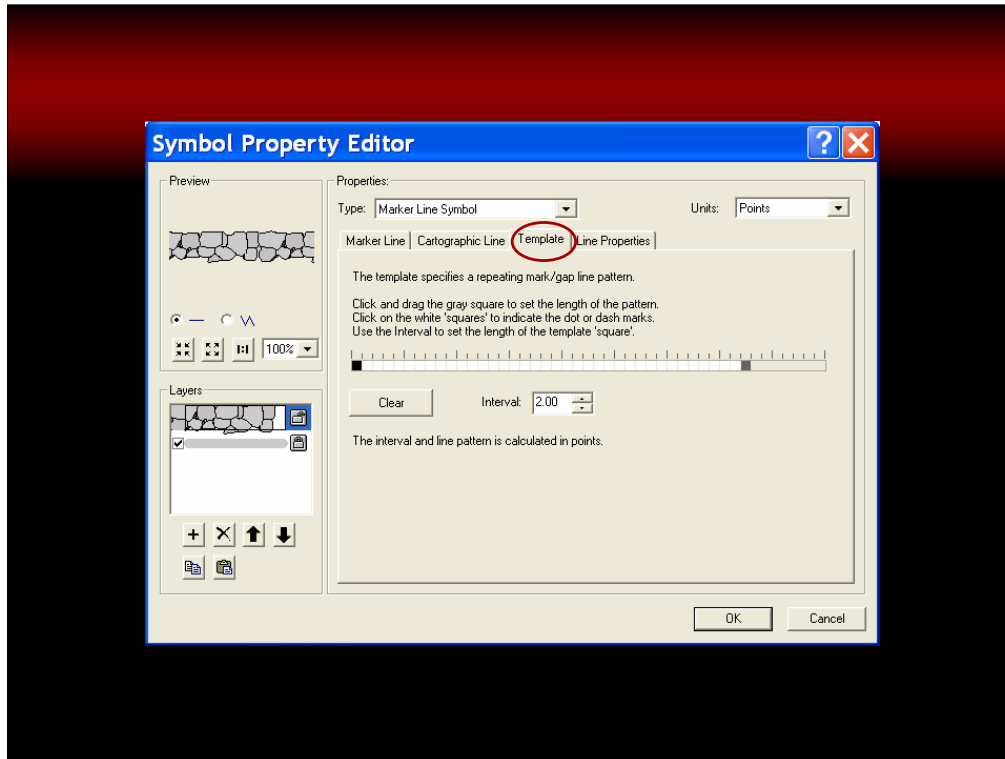




Make it is a marker line symbol. Set the Symbol to be a Picture.

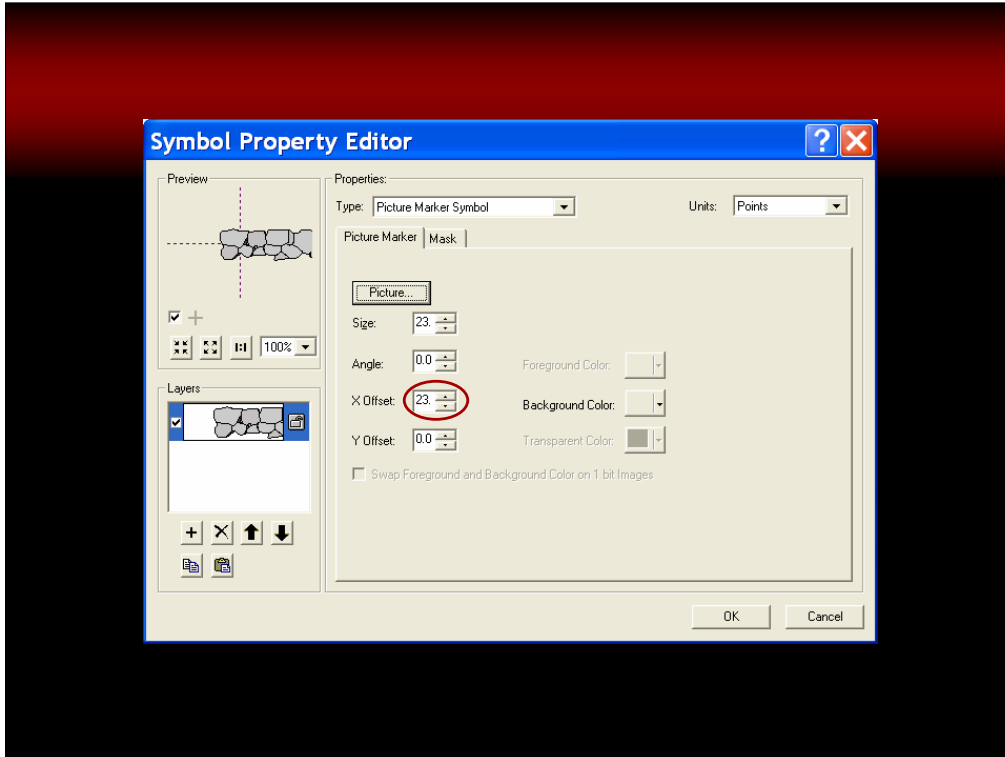


Set the picture to be the graphic you want to use.

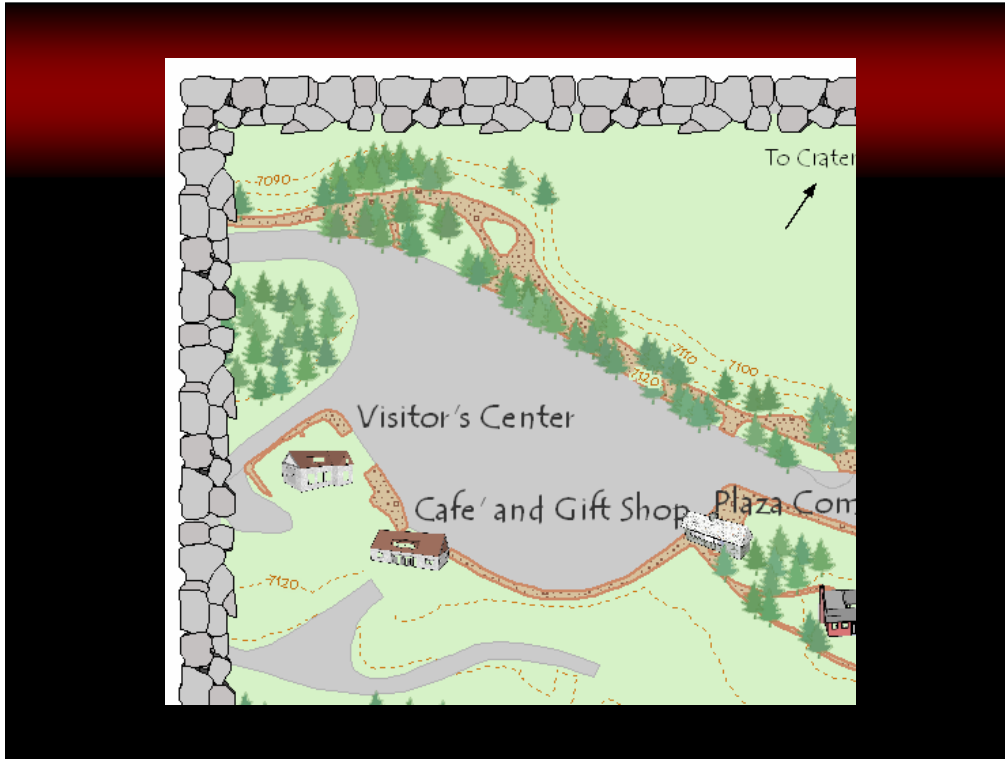


Adjust the marker spacing so the picture is spaced just right on the line. For our map, we made the boulder marker and inch long so that we could adjust this more easily. Knowing this, we could set our map extent to 7 inches by 10 inches and be assured that the marker along the bounding lines would fit perfectly.

If you want, you can also place other picture markers or other graphics on top of the corners to mask the joins if necessary (and it usually will be necessary).



Note that we also had to set the offset so that the overlaps would occur where we wanted them to – for our marker line symbol, we created just a small amount of overlap.



The result is a decorative border that is really a line with marker symbols that repeat along it.

## Discussion

- Some of the most widely used maps
- Extensive market – cheap or free
- Massive numbers of maps produced / reproduced
- Produced by people with wide range of cartographic skills and knowledge
- Often denigrated by cartographers

So that brings us to the end of our demo. I'll switch now to a few discussion points and then I will conclude.

I hope you are able to see now the utility of landmark maps. These are quite popular and possible are some of the most widely used maps by a very large number of users. The market for these maps is massive – often they are given out for free or the price is at least minimal. Huge numbers are produced by a variety of people with varying degrees of cartographic training and skills. It is curious that these types of maps are Nonetheless often overlooked if not denigrated by cartographers.

## Conclusion

- Increasing importance of travel and tourism → increased attention to tourist (landmark) maps
- GIS can be used to create them with greater attention to speed, consistency, scale and accuracy
- People like them

With the increasing importance of tourism and the ability to use GIS to create landmark maps, perhaps we will see more of these produced by cartographers and GIS users in the future. That in my mind would be a good thing as it is usually the case that map readers really like these types of maps!

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