

Instructions for Creating a 3D Scene Using ArcScene



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December 14, 2004**

ArcScene is a map display program customized for displaying 3D data. Creating a simple 3D scene can be done very quickly; however, creating something more complex can take much longer. The display of even a simple scene can be very spectacular. The purpose of this document is to provide instructions for creating a 3D fly-through using Environmental Systems Research Institute's (ESRI) ArcScene program. This document is intended for people who have some previous GIS experience but have never used ArcScene. By the end of the document you should be able to create your own 3D fly-through using the data of your choice.

The purpose of the project I worked was to create a geographically accurate depiction of the Iola Township located in Waupaca County. A fly through could be used in a presentation or to depict land use change in the future. A Community may want to visualize what a new housing development would look like on the landscape. These objectives can be accomplished using ArcScene.

Step 1: Starting to create your scene

- Open ArcScene and add the data appropriate for the project. You will want to set a coordinate system for the project, that way all of your layers will overlay properly. To do this right-click on the scene layers heading, then click properties (you can also double-click). Scene Layers is located in the upper left hand section of the screen, at the top of the layers list. In the scene properties menu click the coordinate system tab. It's under this menu that you set a common coordinate system. Generally, before you begin a project, you can request the data being used to be in a particular projection (e.g. WTM). If working with county data in Wisconsin, it is best to project all layers to the county projection.
- In order to create your scene you will need a layer that contains elevation information. In most cases this will be a digital elevation model or DEM. The better the resolution of your DEM, the more detailed your elevation surface will be. A DEM with a 30 meter resolution will do fine. Add your DEM to the scene.
- Also you will probably want a layer to be your base surface, depending on what you are trying to do. For example, land use data is a suitable base, because it is an interpretation of what actually exists on the landscape. Add your base layer to the scene.

Instructors Commentary: If everything went as planned, the layers overlay properly. If you still have problems with layer overlay, try using ArcToolbox (Data Management Tools) to project the problem layers into the same coordinate system as the one you set in ArcScene.

Step 2: Displaying the Data in 3D

- Right click on the layer you want to use as your surface base layer, and then go to properties (e.g. land use layer).

- In the layer properties, click on the base heights tab. Next, select obtain heights for layer from surface (Figure 1). Click on the drop down menu and select the layer with elevation data (e.g. DEM file). This tells the land use layer to use the elevations from your DEM file; otherwise ArcScene doesn't have elevation values for your base layer. See Figure 1 for an example of what this menu looks like.

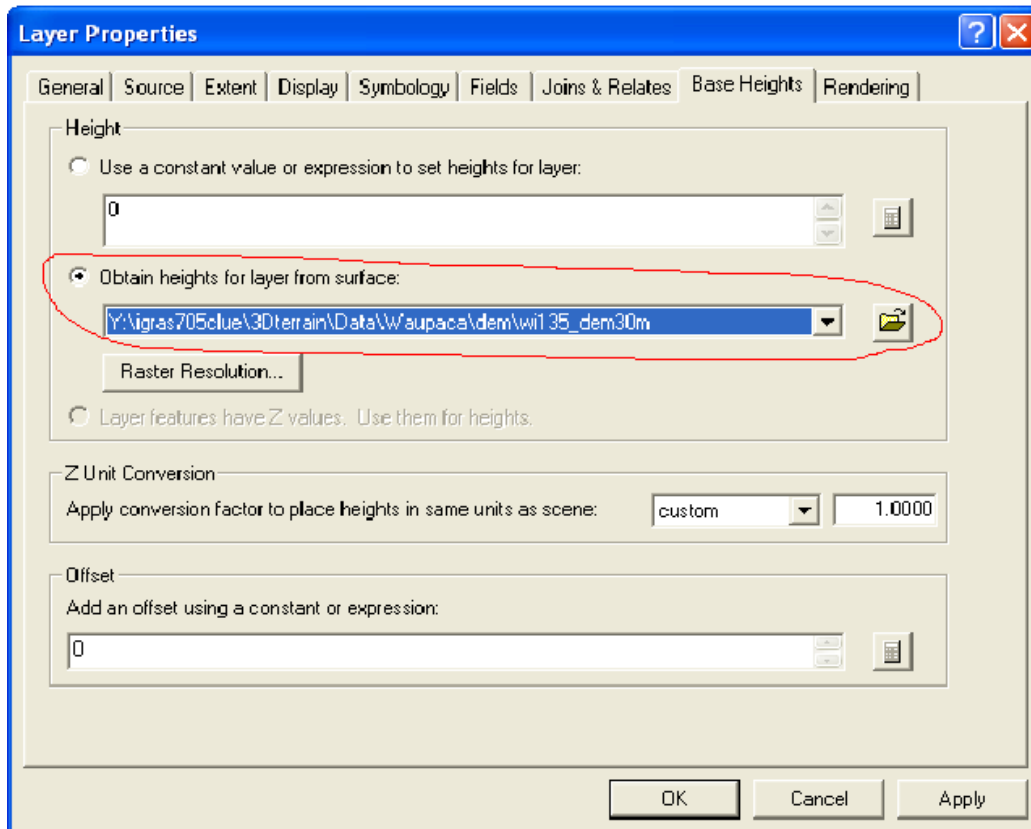


Figure 1

- Repeat the steps above for all layers displayed in the scene.

Instructors Commentary: A TIN file can also be used for elevation values. You can convert your raster (DEM) file to a TIN using the 3D analyst extension in ArcScene.

Step 3: Exaggerating Terrain

The base surface layer may appear as if it has some relief. If you are working with data from an area with low elevation changes, your scene might not look that different. It is very common to choose a higher exaggeration value to show the elevation change (e.g. Bayfield county in Wisconsin is slightly hilly; however, without an exaggeration value it looks completely flat). Exaggerating the terrain will allow subtle elevation changes to be seen. An exaggeration value of zero is the true elevation.

- Right click on the scene layers heading.
- In the scene properties menu click the general tab.

- There will be a drop down menu that says vertical exaggeration. You can either select an exaggeration from the menu or type in your own (see Figure 2).
- Clicking calculate from extent button will automatically calculate an exaggeration factor based on the extent of the base layer and the elevation variation in the scene.
- The vertical exaggeration can also be changed by double-clicking on the base layer (located on the left under scene layers). Next, click on the base heights tab. Then change the Z value to a higher value.

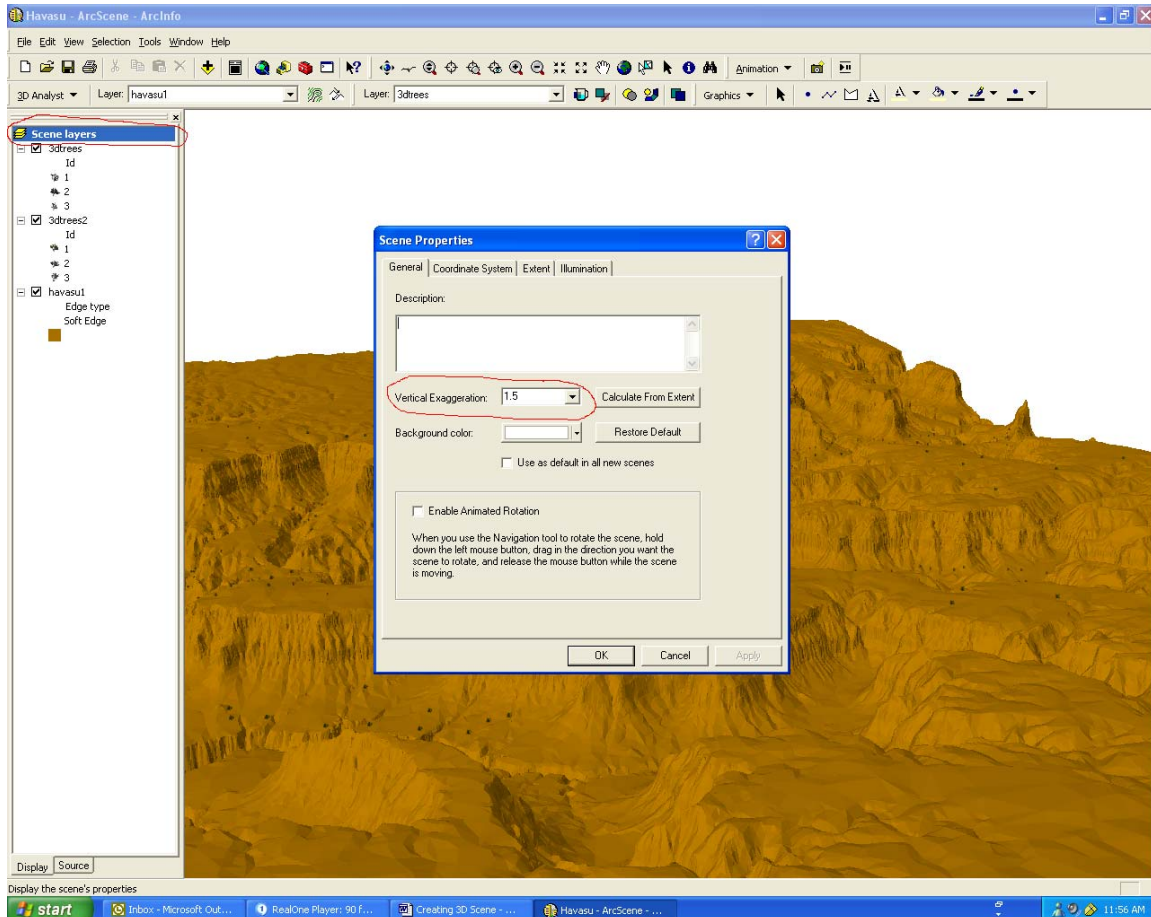


Figure 2

Instructor’s Commentary: Polygon layers can be difficult when extruded into 3D. This occurs when the elevation data is in a grid format, while polygon files are in a vector format. This can cause the polygon to only read one elevation from the center, causing the rest of it to not be extruded. Your surface will not follow the proper elevations if this happens. There are probably several ways around this. I found the easiest is to convert the polygon layer to raster using ArcToolbox. When converting your polygon to a raster you probably want to use the best resolution possible so as to minimize data loss.

Step 4: Adding 3D symbols

Arc Scene allows you to use 3D symbology to represent geographic point features. There are 3D symbols for individual trees, buildings, cars, and street furniture. ArcScene comes equipped with a large selection of symbols. Some of the symbols (e.g. trees) can only be applied to point features. A symbol can be attached to individual point features or to a group of features. The first step is to create a point shapefile in ArcCatalog, and then add this shapefile to ArcScene. **Note:** Remember each time you add a new layer into ArcScene you must go to the symbology tab and change the base height.

- To turn your points into 3D symbols, right click on the point layer and go to properties.
- Click on the symbology tab.
- On the left hand side (under the heading “show”) you need to click on categories, then unique values. (Figure 3).
- There will be a drop down box under “value field”. This is for selecting the attribute field you want to use when creating your symbols, most likely you will be using the “Id” field (Figure 3).
- After this field has been selected, click the add all values button in the lower left corner. This will add all your values for the selected value field (Figure 3).

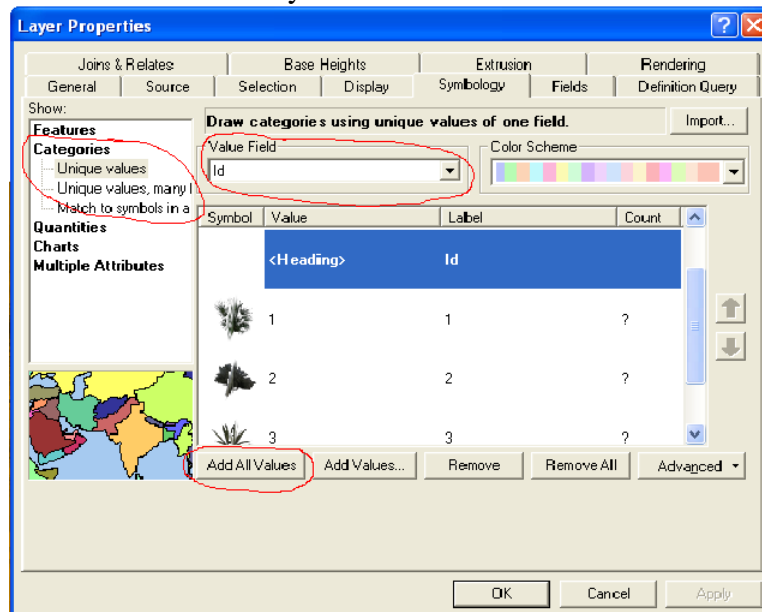


Figure 3

- Now just click double click on one of the values, this will bring up the symbol selector window. You may need to click the more symbols button and turn on whatever symbol group you want to use (Figure 4).
- Find the symbol you want to use and click okay. You may want to change the size and color etc. This can be done in the symbol selector window.
- Once all of your points are symbolized just click ok in the layer properties window. Your symbols will now be drawn in.
- All of these same steps apply to symbolizing houses, cars, etc. **Note:** When changing sizes and symbols, ArcScene tends to crash during this process. To

avoid numerous crashes and saved work, change all symbols at once without having to leave the symbology tab.

- When symbolizing a point shapefile to houses, one can give each point a separate Id by copying the dbf. file attached to the shapefile and placing it into Microsoft Excel. Once in Excel, manually assign single numbers (in ascending order) within each cell. Then, copy the dbf. file and attach it to the metadata attached to the shapefile.

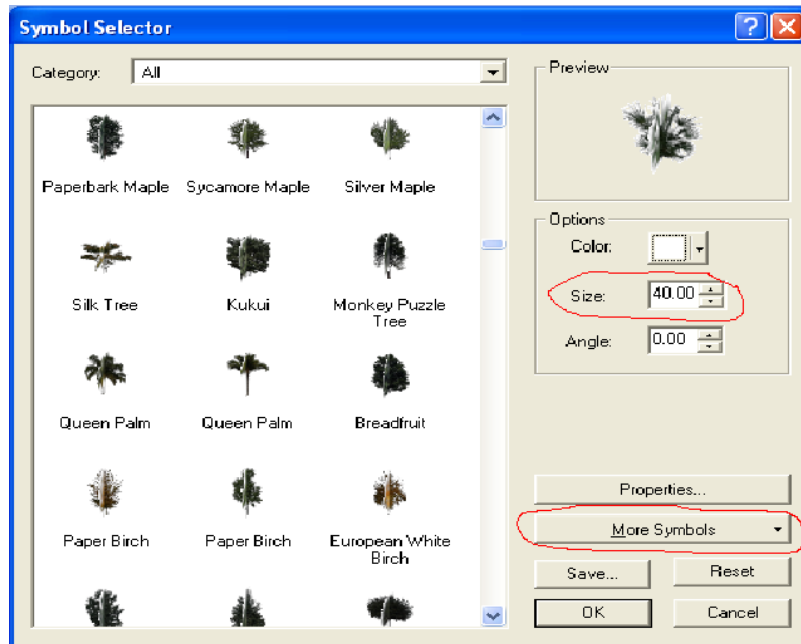


Figure 4

Instructors Commentary: Adding trees to your scene will make it appear much more life like. ArcScene comes with hundreds of real world tree types that can be used. I recommend taking the time to create a point file for your trees. This can be a time consuming process but it is worthwhile. It is possible to extrude all of the woodlands polygons above the base surface. If ArcScene had realistic tree textures you could extrude the woodlands and apply a texture to the polygon to represent forests. This would be a much quicker and easier way to create forests.

Step 5: Creating a fly through animation of your scene

For the final step of your project you may want to create a fly through animation of your scene. This animation can then be exported to a format that is compatible with all Windows computers. The animation could be added to a PowerPoint presentation to impress your audience. Creating a smooth animation can be a bit tricky at times due to the programs lack of good camera controls but exporting a rough fly through is rather simple.

- You will need to create a path for the camera to follow. To do this, you first need to turn on the following toolbars: 3D graphics and animation. Go up to the view menu at the top of screen. Click

toolbars and then check 3D graphics and animation. You can turn on all of the toolbars if you want. You may find the others useful.

- Under the graphics toolbar click new graphics layer. Click the new line tool and draw your path. Double click to end the line. This layer will be your flight path. See Figure 5.
- Click on your flight line to select it. Click the animation toolbar and select the camera flyby from path. This brings up a new window.
- Assign a vertical offset to tell the computer how high to fly above your path.
- Simplification factor is how closely the computer follows the twists and turns of your line.
- You can play around with the other camera settings on your own. Just click import to apply your camera setting.
- Now click the open animation controls button. See figure 5.
- Click options in this window and set the duration of the flight. See figure 5.

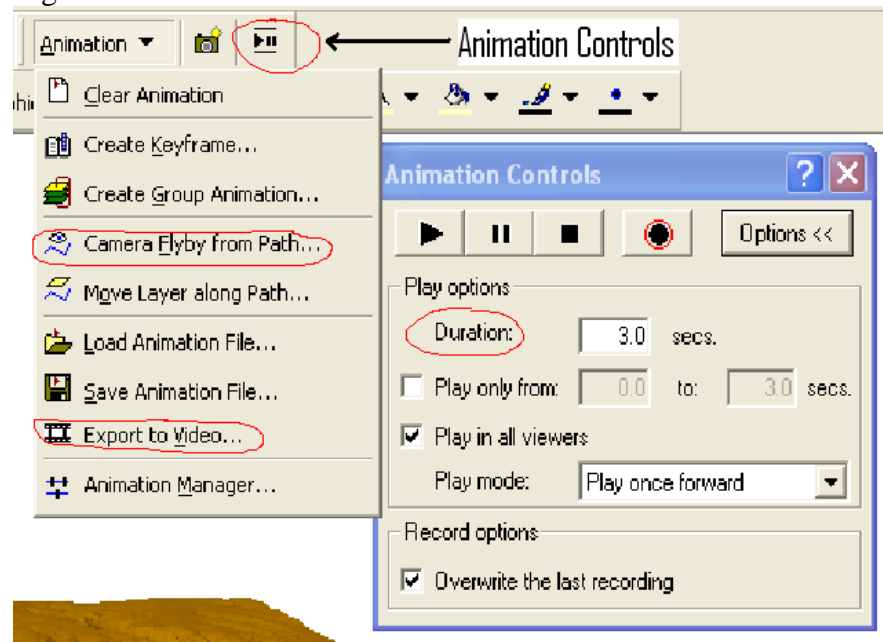


Figure 5

- Click play to see your fly through. You may need to go back and change some of the flight settings to get things the way you want. Again, just click select the camera flyby from path.
- Experiment with the settings to get them how you like. When you are ready to record your animation click the record button in the animation controls.
- Once the video is recorded you want to export it in a different format so others can watch it. Click the animation menu and select export to video. See figure 5 for an example of the animation menu. Give the video a name and select the format you want it in, probably .avi.

- [Select your compression](#); just use the default that comes up. After you click okay the computer will begin to fly through frame by frame. This is the export process. It can take awhile depending on your computer hardware and the duration of your video. It should be noted that any other windows that are opened will be recorded in your animation. The computer is recording anything that is displayed on screen. The only thing that won't be recorded is your mouse cursor.

Instructors Commentary: You will probably find that the computer doesn't follow your camera path the way that you would like it to. Using the animation manager you can specify specific orientation setting along your flight path. I found this feature to be very difficult to use. First you need to create key frames along your flight path. The setting at these key frames can be edited by manually typing in the camera orientation settings. Needless to say this can take a long time. It would be nice if there were arrows you could click and rotate to specify camera direction. Still you may want to experiment with the animation [manager](#); it can make a big difference how your video turns out.

After all of those steps have been completed you should have a nice looking finished product, a video that can be played using Windows Media Player or some similar program. I hope that you found these instructions to be useful. I know it would have been helpful if I would have had an instructions document to help me create my animation. Good luck creating your own animation; it can be a rewarding experience. The finished product should justify the time invested in creating it.