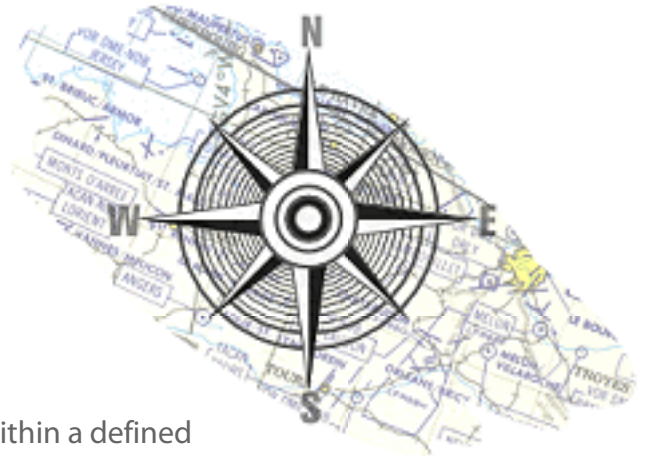


## REGISTERING SCANNED MAPS

Using CANVAS 11 GIS+ Capabilities to Register or Warp Scanned Maps Learn how to transform a non-GIS raster image of a scanned map into a valuable component that could be used during your next map project.



Maps need to provide visual references for known locations within a defined area. Modern maps largely consist of information that is contained within .SHP or other Geo Science data files. The information within these files can relate to distances, directions, object properties, and area size and must be imported with complete accuracy and then artistically enhanced within a design environment.

After import, the objects and other information can be selected, annotated, labeled or enhanced so that locations, such as air-ports, roads or areas that depict counties, cities or parks, become easy to understand as visual map elements.

Sometimes it is necessary to introduce items during a project that do not contain geo-referencing data. So that accuracy of the map project can be maintained, latitude and longitude information will need to be embedded into an image.

Canvas 11 GIS+ is a single cross-platform illustration product that can work with a huge range of coordinate reference systems, map projections, and geodetic datums. Canvas also provides complete support for both angular and linear units of measurement; therefore, specific latitude and longitude coordinates can be assigned to precise landmarks that are within a map that has been scanned or imported into Canvas. With GIS+ in your digital toolset, you can open geo-referenced files, apply projections and coordinate reference systems, as well as warp raster maps to meet the precision-driven needs of a cartography or geological project.

In addition, .SHP, TIGER(Census), Mr.SID, and other GIS related formats can be imported, annotated, and enhanced so that your next map project will be visually appealing and yet retain complete accuracy of the imported GIS data.

### Registering Maps

Working with raster maps or scanned maps can be baffling since these maps are simply images that do not contain geo-referencing information. In the first part of this tutorial, we will show the necessary steps to correlate a point on the raster map to its latitude and longitude. If you wish to follow along, you can download the necessary files in either zip (29 MB) or bin (23 MB) format.


*Let's start with Step 1 on the next page.*

### STEP 1: OPENING THE MAP

The file (**MiamiRoads\_1.tif**) is an older topographic map of Miami that has been scanned to TIFF format. The map has a legend that contains projection and scale information that we will use to register the map.

Choose File > Open. Navigate to the file and click Open.

Scroll to the very right of the image to see the projection information: Universal Transverse Mercator, Zone 17, and North American Datum. With this information we can configure the GIS settings.

 **Tip:** If no map projection is indicated in a legend, it is recommended that you use a UTM projection that is appropriate for that specific region.


**Produced by the United States Geological Survey in cooperation with the Soil Conservation Service**  
**Compiled from USGS 1:24 000- scale topography maps dated 1955-1973 and orthophotomaps dated 1972-1973. Planimetry revised from aerial photographs taken 1979 and other source data. Revised information not field checked. Map edit 1981.**

**Projection and 10 000- meter grid, zone 17: Universal Transverse Mercator. 25 000- foot grid ticks based on Florida coordinate system, east zone. 1927 North American Datum.**  
**To place on the predicted North American Datum 1983 move the projection lines 40 meters south and 22 meters west.**

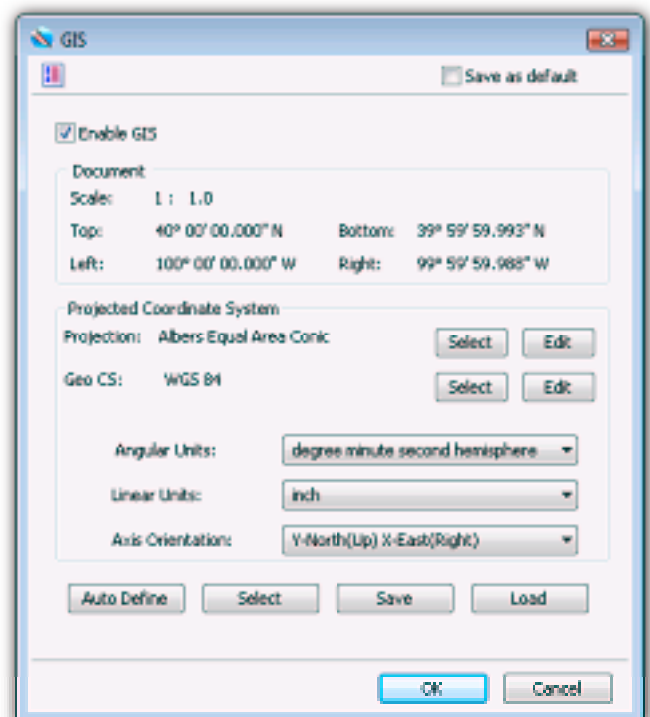
### STEP 2: CONFIGURING GIS SETTINGS

Next, we are going to open the GIS manager and configure the settings. Choose GIS > GIS Document Settings to open the GIS manager.

Select the Enable GIS checkbox to activate all the GIS options.

 **Tip:** The GIS manager is found in the Configuration Center. If you start a new Illustration document and select the GIS document checkbox in the New Document dialog box, the GIS manager opens automatically.

Since we already have projection and datum information from the map legend, we will click the Select button to open the Projected Coordinate Reference Systems dialog box. In the menu on the left, select WGS 84 / UTM zone 17N. You will notice that all the projection and datum information will populate the fields on the right side.



Click OK to exit the dialog box and return to the GIS manager.

You will notice that the projection and datum information now appear in the Projected Coordinate System of the GIS manager.

Property	Value
Area of use	WGS84 / UTM zone 17N
Datum	World Geodetic System 1984
Ellipsoid	WGS 84
Semi major axis	6378137.0000 m
Semi minor axis	6356752.3142 m
Inverse flattening	298.2572
Prime meridian	Greenwich
Source CRS	WGS 84
Projection	UTM zone 17N
Method	Transverse Mercator

Parameter name	Value
Longitude of natural origin	-81° 00' 00.0...
Latitude of natural origin	00° 00' 00.000"
False easting	500000.000 m
False northing	0.000 m
Scale factor at natural origin	0.9996

Datum Transformation : None ▼

Click OK to apply these GIS settings to the document.

**Projected Coordinate System**

Projection: UTM zone 17N

Geo CS: WGS 84

Angular Units: degree minute second hemisphere ▼

Linear Units: meter ▼

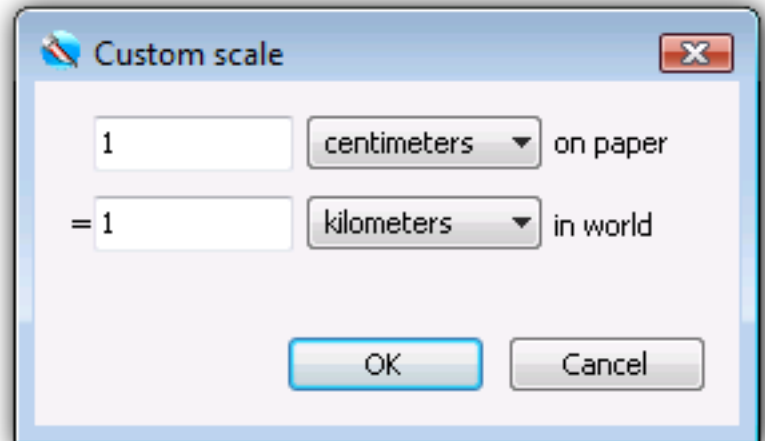
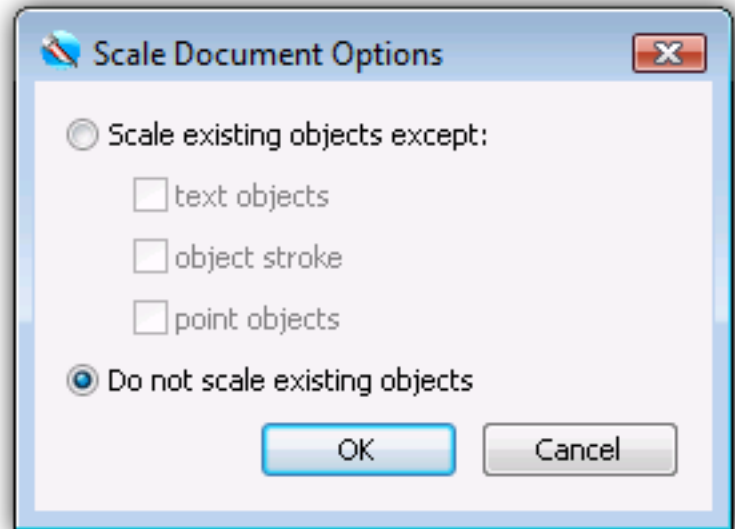
Axis Orientation: Y-North(Up) X-East(Right) ▼

### STEP 3: SETTING THE SCALE

According to the scaling information located below the map, the scale is 1 cm = 1 km.

To set the scale, do the following:

- 1) Deselect all objects and open the Drawing Scale menu in the Properties bar.
- 2) Select Define custom scale. The Scale Document Options dialog box appears.
- 3) Ensure to select the Do not scale existing objects radio button.
- 4) Click OK. The Custom scale dialog box now opens.
- 5) Enter 1 centimeter in the first field (on paper).
- 6) Then, enter 1 kilometer in the second field (in world).
- 7) Click OK to set the scale.

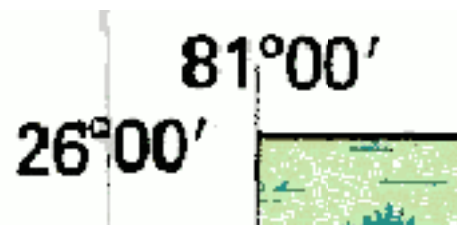


### STEP 4: CHOOSING REFERENCE POINTS

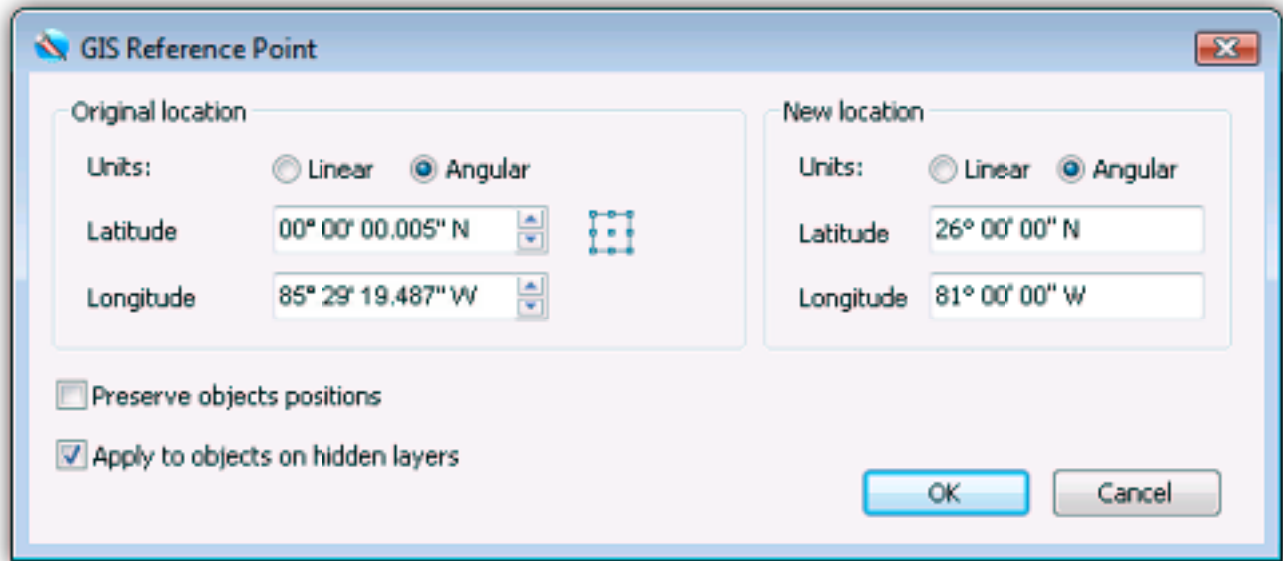
To properly register a raster map, we need to know the latitude and longitude of one position on the map. We'll use the point in the upper left area. Notice that our scanned map has tick marks with degrees of latitude and longitude that we can use as reference points.

Use the Magnifying Glass tool to zoom in to the upper left corner.

Now choose GIS > Choose Reference Point. A prompt appears when you move the cursor into the drawing area. Click the crosshair in the upper left corner where you see 26°00 and 81°00. The GIS Reference Point dialog box opens. In the New Location area, enter 26°00N in the Latitude field and 81°00W in the Longitude field.




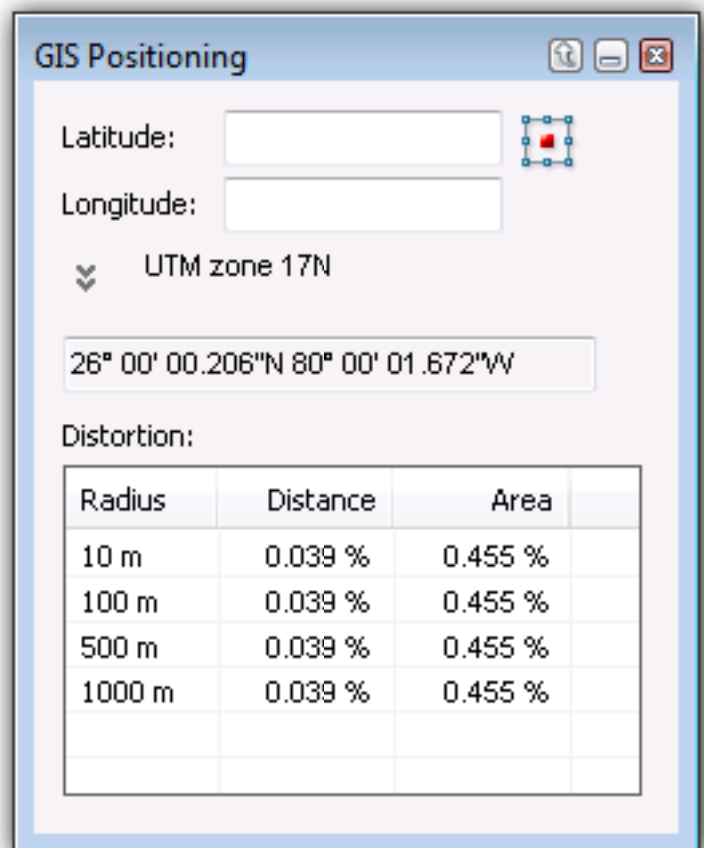
 Tip: Ensure that the longitude is indicating W, and not E.



To verify that we have properly referenced the map, we'll magnify the upper right corner of the map and check the GIS positioning.

Choose GIS > GIS Positioning to open the GIS palette. Move the cursor around the map, especially around the edges and corners near the tick marks. Coordinates of the cursor are indicated in the GIS palette.

 **Tip:** You can also see the GIS position in the Status bar if you have chosen to display this information in a field.




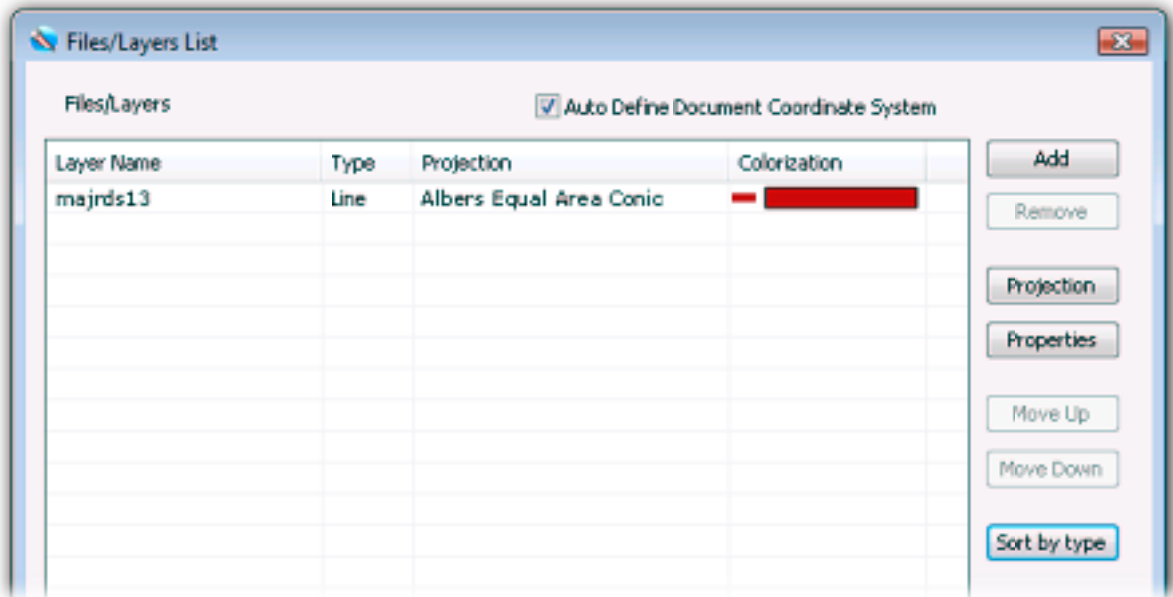
## WARPING RASTER MAPS

In the second part of this tutorial, we will open a Shapefile, place two GeoTIFFs, and then warp a raster map. The three files that you will need are majrds13.shp, miami1.tif, miami2.tif, and MiamiRoads\_3.tif.

### STEP 1: OPENING SHAPEFILE

Let's start by opening the **Shapefile**. Choose File > Open and navigate to the folder and select **majrds13.shp**.

 **Tip:** To open or place a Shape file, all three files must be located in the same directory.



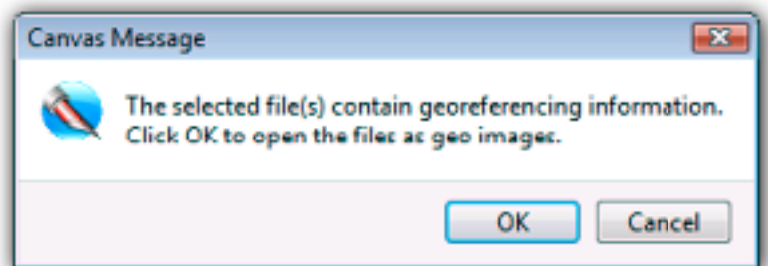
When the Files / Layers List dialog box opens, notice that the file consists of line objects. You can select any color for the lines in the Layer Properties dialog box. Click the Properties button to open this dialog box.

Also, the Projection information should state **Albers Equal Area Conic**. We want to use this projection in this tutorial. Do not change any projection information. Click OK to open the file.

### STEP 2: PLACING GEOTIFF FILE

Now, let's place two GeoTIFFs on top of the Shapefile. Choose File > Place and navigate to the folder. Select miami1.tif and miami2.tif. Click Place.

A message appears indicating that the files contain georeferencing information. You can open the files as geo images by clicking OK. We want to open the files as geo images so click OK.

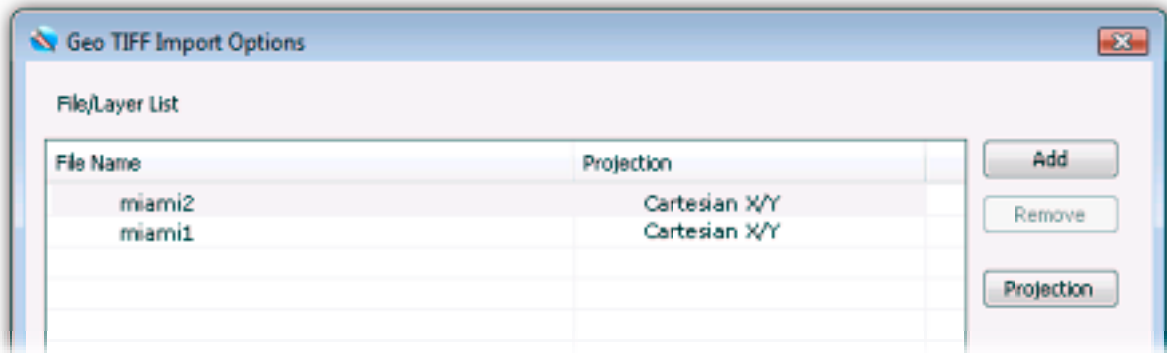


If you click Cancel, the images will be placed as ordinary TIFF images.

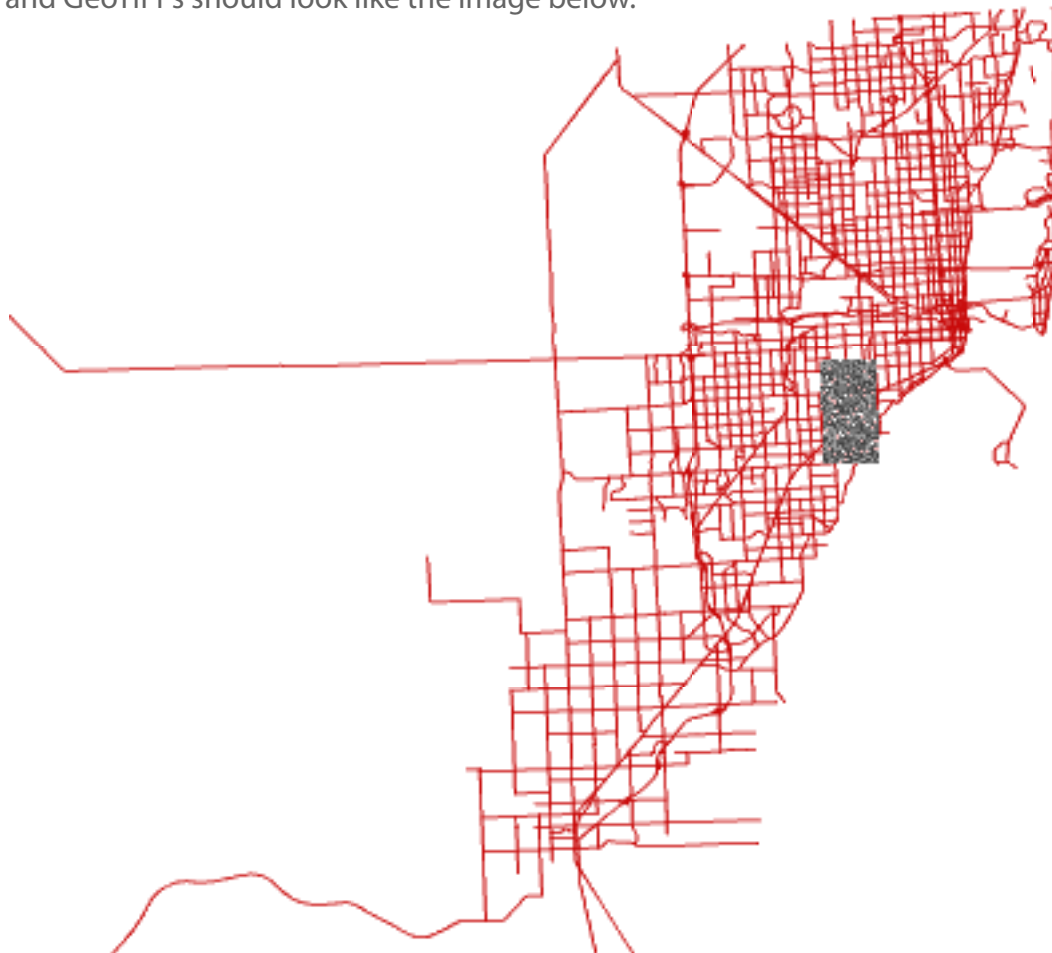
When the GeoTIFF Import Options dialog box opens, the projection information is indicated as Cartesian X/Y. Although this projection can be changed by clicking the Projection button, we will keep the projection as is.

Click OK to place the GeoTIFFs.

 **Tip:** You do not have to manually place the GeoTIFFs. Canvas automatically places them according to projection information.



The Shapefile and GeoTIFFs should look like the image below.



### STEP 3: PLACING RASTER MAP

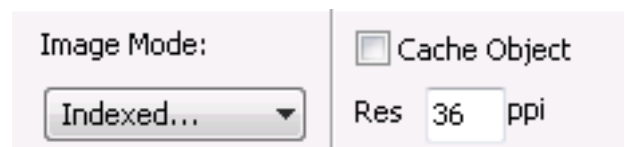
Now, it's time to place the raster map. This file has no georeferencing information.

Choose File > Place and navigate to the folder. Select MiamiRoads\_3.tif and click Place. When the cursor changes to the place icon, click the icon in the drawing area to place the raster map.

### STEP 4: PERFORM THE WRAP

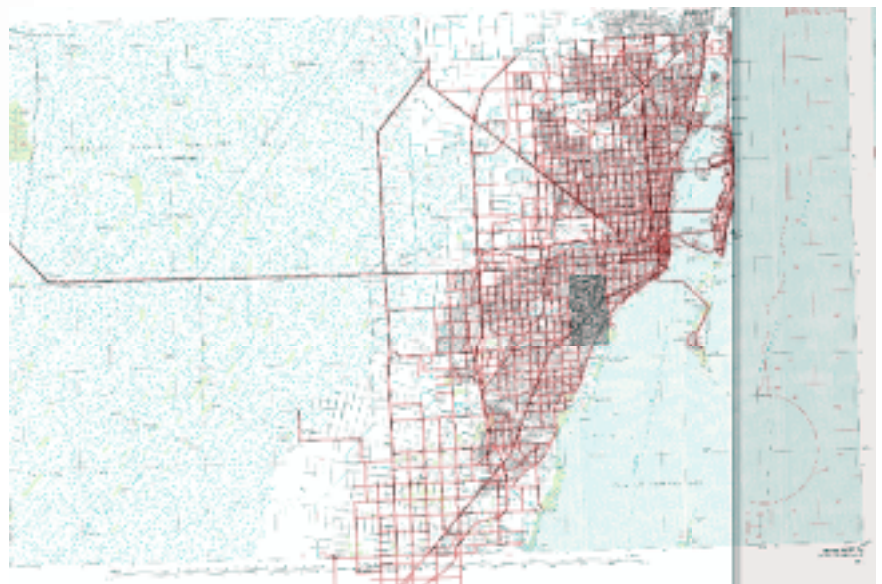
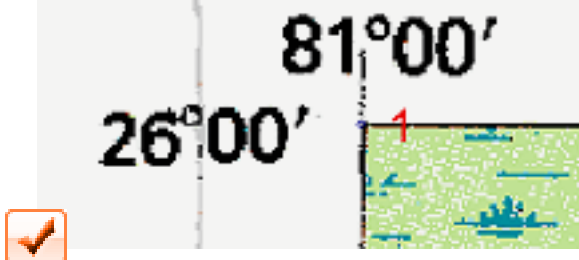
Since the raster map has tick marks with latitude and longitude indicated, we can use these known coordinates to perform the warp.

However, note that the raster map is in Indexed mode. Indexed images cannot be warped so let's change the image mode to RGB via the Properties bar. Select the raster map and choose RGB Color from the Image Mode menu.



Select the raster map and choose Image > Image Warp > Coordinates. The Coordinates controls appear in the Properties bar. Perform the following steps to warp the raster map:

- 1) Select the GIS radio button to enable the latitude and longitude fields. In the upper left corner, click the cursor where you see the tick mark for 26°00N and 81°00 W. In the latitude and longitude fields in the Properties bar, enter 26°00N and 81°00 W.
- 2) Then, click in the lower left corner and enter the coordinates (25°30N and 81°00W).
- 3) Repeat the same procedure for the upper and lower right corners. At the end you should have four control points.
- 4) Click Create in the Properties bar to perform the warp.



A warped copy of the raster map will be created on top of the Shapefile and GeoTIFFs. To see the accuracy of the warp, select the warped image and lower the transparency to about 50%. See the image on the right.