

Georeferencing in ArcGIS Pro

Section 1 – Setting up ArcGIS Pro

1. Run ArcGIS Pro and sign in.
2. On the right side of the screen, select the **Blank** icon to create a new project. Name the project and use the directory to navigate to an appropriate location for your items to be stored and saved. Select OK to continue.
3. Under the **Insert** tab select **New Map**.

The map is automatically populated with a default basemap. You can choose to use basemaps (change basemaps by clicking the Map ribbon and clicking basemaps) or you can add local orthoimagery or roads (available from Scholars GeoPortal).

4. To change the projection to UTM NAD83 Zone 17N, right-click **Map** in the Contents panel on the left side of the screen. Select **Properties > Coordinate Systems** and under **XY Coordinate Systems Available** navigate to **Projected coordinate system > NAD 1983 > NAD 1983 UTM Zone 17N**. Click OK to return to the map window.
5. Zoom to the approximate coverage of the air photo mosaic.
6. Add the mosaic that you want to georeference.
7. With the mosaic selected (it will have a pale blue box around the layer name), click the Imagery tab

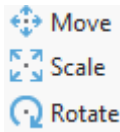


and click Georeference

8. From the **Prepare** section of the **Georeference** tab, select **Fit to Display**



and use the

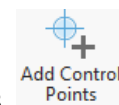


Rotate/Move/Scale tool to roughly position the image.

Section 2 – Adding Control Points



Use well visualized features such as intersections to establish control points.

1. On the **Map ribbon**, activate the **Explore** tool.
2. Zoom to an intersection on the historical imagery. In the left **Contents** pane, check and uncheck the arrow to compare the intersection across the historical imagery and the orthoimagery to determine if the location can be used. (**Note:** A similar process can be used when georeferencing the historical imagery to road networks).



3. From the **Adjust** section of the **Georeference** tab, select **Add Control Points**
4. Click the intersection on the historical image first, turn off the mosaic layer and then click the intersection on the current orthoimagery or basemap. Hold down the letter **C** on the keyboard and the

left button on the mouse while simultaneously moving the mouse in order to pan and navigate around the imagery to find new points of interest.

5. Repeat steps 1-4 to add at least 10 well-distributed points. As points are added you will notice the historical image adjust accordingly, making it easier to create future control points.
6. Depending on the imagery, use as many points as necessary to create a tight match (10-20 points). It is advisable to add as many points to the periphery of the image as possible. This will assure a decent alignment with adjacent mosaics.
7. Under the **Review** section of the **Georeference** tab, select **Control Point Table**. Change the **Transformation** to **SPLINE** using the drop-down and zoom in and out to study the quality of the control points that have been used. If an area looks warped, select the nearby control point and turn it off in the **Control Point Table** by deselecting the checkbox. If the match looks better with the point off, delete it by selecting the row for that control point and clicking the delete button. 
8. Continue to add and remove points as needed.
9. When you are satisfied with the quality and quantity of your points, click the **Export Control Points** button under the **Save** section of the **Georeference** tab. Browse to the appropriate directory and name the file according to the name of the mosaic. 

Section 3 – Saving the geotiff

1. From the **Save** section of the **Georeference** tab, select **Save**. This will update the TIFF with the georeferencing information (.tfwx).
2. From the **Close** section of the **Georeference** tab, select **Close Georeference** to stop georeferencing.

NOTE: A georeferenced image may appear dark when you first view it. Ideally, georeferenced mosaics will be combined using the *mosaic dataset* format at which time various functions will be applied such as **stretch** and **clipping**.