

Georeferencing Raster Data using ArcGIS Pro

Introduction

Digital geographic data is frequently acquired by scanning aerial photographs or paper maps. Once the data is added into a GIS program, they need to be assigned their proper map coordinates so that they will occupy a real-world space.

Georeferencing defines the location of a dataset using known map coordinates and assigns it a coordinate system. This allows for the dataset to be viewed, queried, and analyzed with other geographic data. Typically, in a GIS environment such as ArcGIS Pro, raster datasets (such as images) are georeferenced using a control layer. This layer contains known coordinates and is used as a point of reference for the georeferencing process.

This guide will make use of the Regional Municipality of Waterloo (RMOW) roads file as the control layer and a scanned map of the city of Kitchener, Ontario from 1913 (then called Berlin).

Preparing the Data

1. Open the Catalog and right click on **Folders->Add Folder Connection** and connect to the folder containing your data.

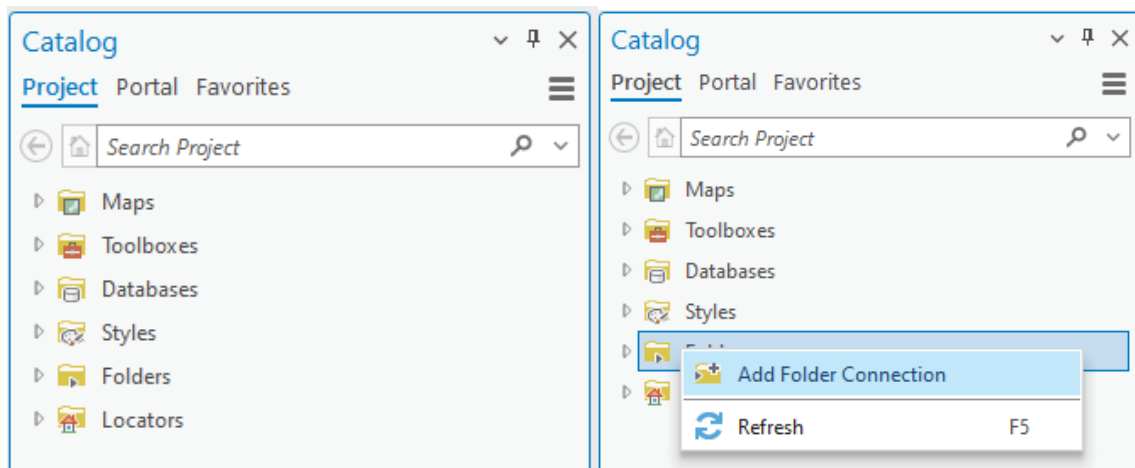


Figure 1: Add data folder.

2. Drag and drop your control layer and your dataset to be georeferenced.
 - a. Note: Since the image is not georeferenced it will appear at (0, 0)

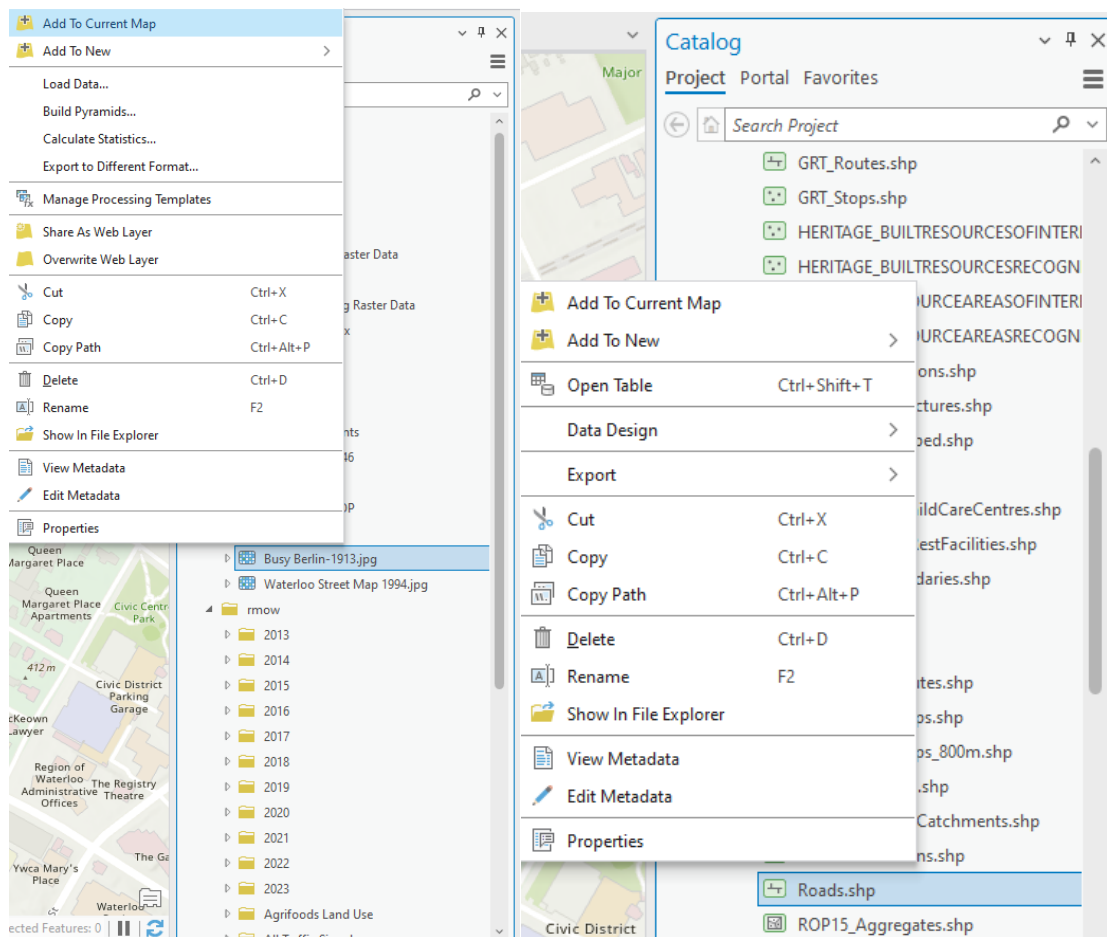
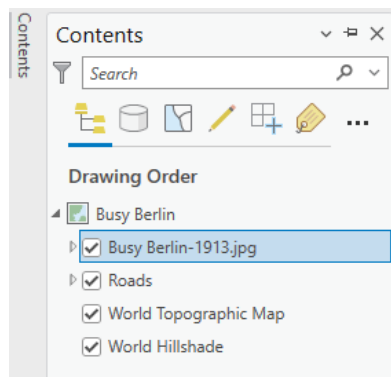
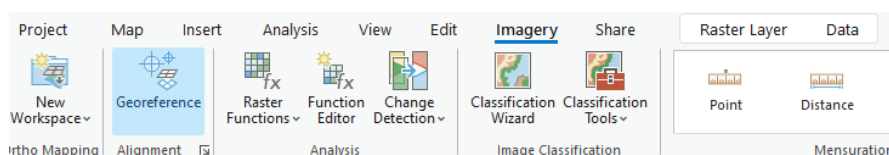


Figure 2: Add your datasets to the map.

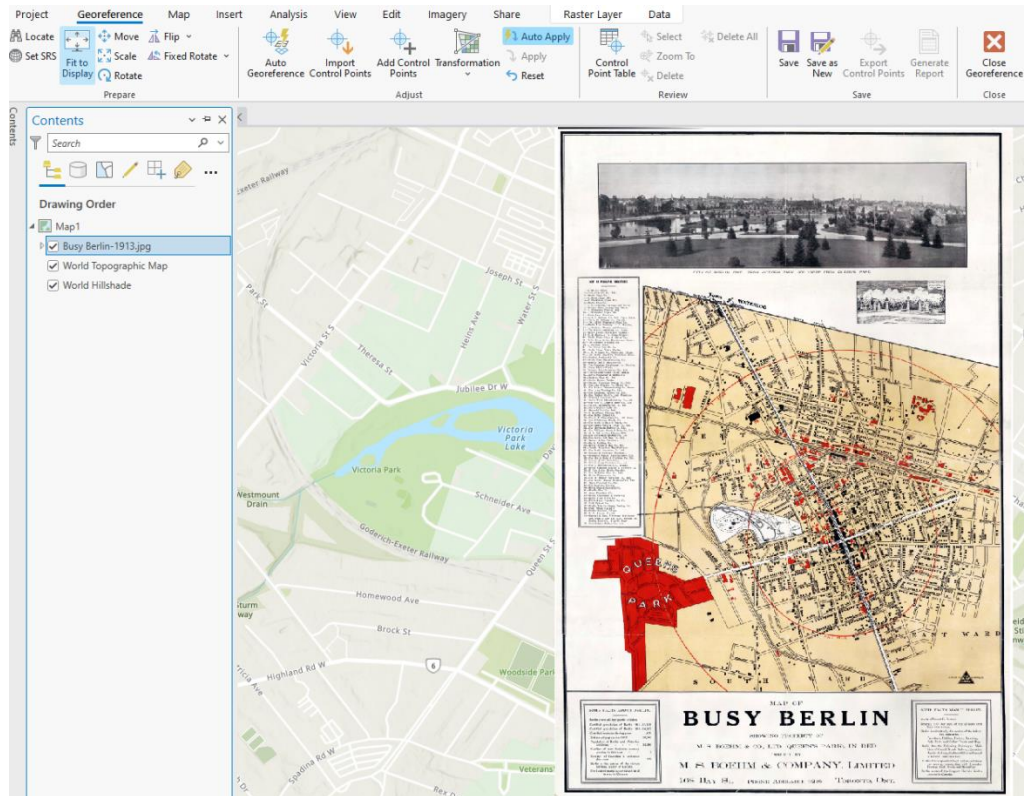
3. Open Contents bar and select the dataset that needs to be Georeferenced.



4. Open the **Imagery** tab and select **Georeference**.



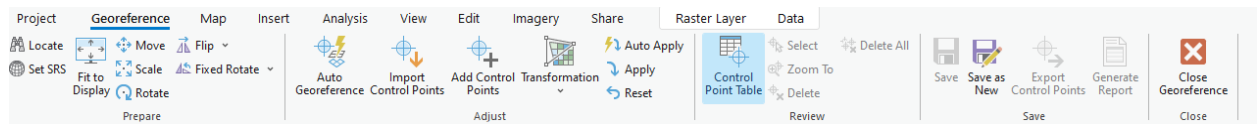
5. Center your screen over the area you are working in and click **Fit to Display** in the Georeference tab.
 - a. Note: This should bring the image to your work area



6. Use the other tools in the Prepare group to roughly align the image with the reference data.

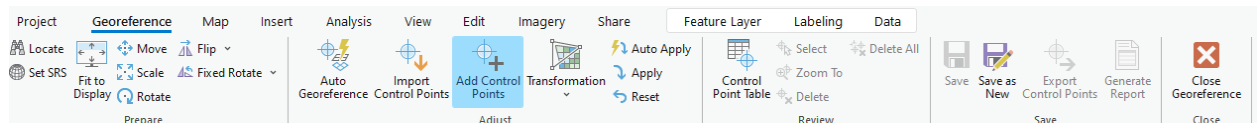


7. Click on **Control Point Table** in the Review group, here you can see the control points you set.



8. In the Adjust Group, click on **Add Control Points**

- Note: you will need at least 3 points, but the more the better
- Note: It may be better to turn off **Auto Apply** and **Apply** the changes once all the desired points have been added



9. Find a landmark you can recognize in the image and in the control layer.

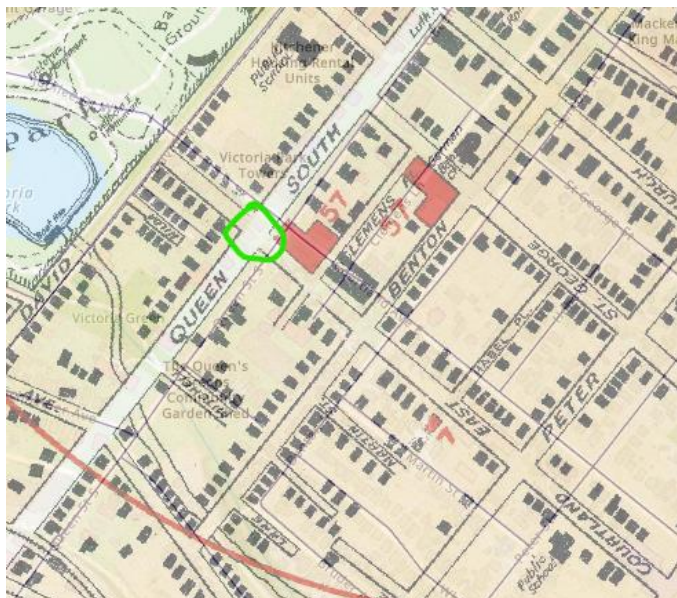


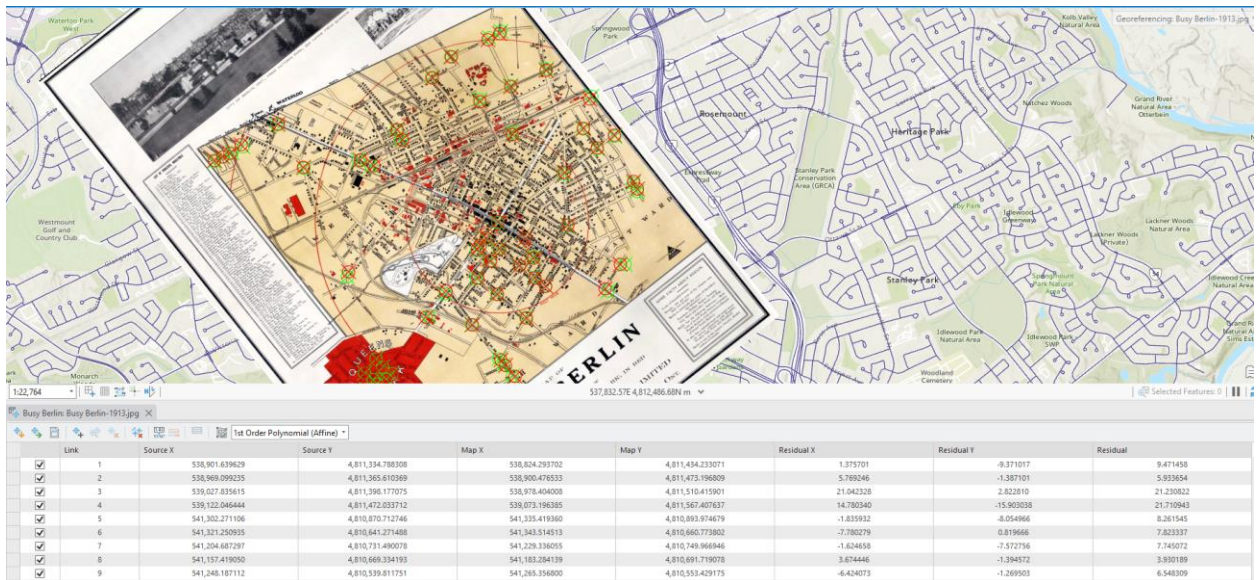
Figure 3: Chosen Landmark is the Intersection of Queen South and Courtland East

10. Click on the landmark's location on the image to place the **From Point (Source)** and then click on the landmark in the control layer to make your first control point.

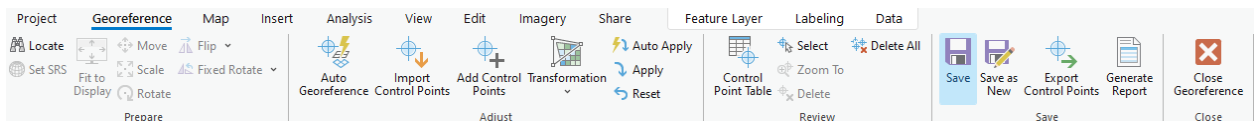
- Note: It may be helpful to increase the image transparency in the **Raster Layer** tab to see both layers at once. You can also use the swipe tool.



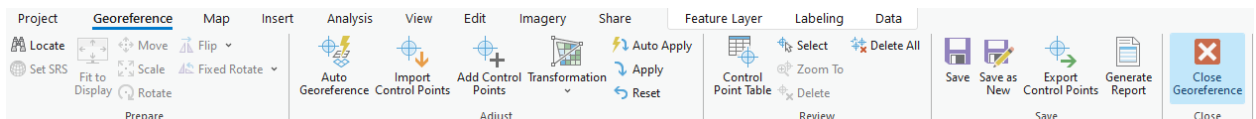
11. Continue adding points until the desired level of detail, then click **Apply**.
 - a. Note: make sure that the transformation is **1st Order Polynomial (Affine)**






12. **Save** your georeferencing in the **Save** group as you go along to make sure nothing goes wrong.



13. Click **Close Georeference** once you are finished.



14. In the folder your dataset is in, you will notice a few more files, these will contain your georeferencing data.

 Busy Berlin-1913.jgwx	2023-10-16 2:16 PM	JGWX File	1 KB
 Busy Berlin-1913	2020-09-13 1:08 AM	JPG File	7,117 KB
 Busy Berlin-1913.jpg.aux	2023-10-16 2:16 PM	XML Document	58 KB