

Geocoding in ArcGIS Pro

Geocoding is the process of appending geographic coordinates to tabular data. This is useful if you have a table of addresses with supporting fields you would like to perform spatial analysis on. This tutorial will assume you have basic knowledge of ArcGIS Pro.

Types of Geocoding:

Single Address Geocoding → One address at a time into coords on a map

Batch Geocoding → Convert entire table of addresses into points

Reverse Geocoding → Coordinates to address

This tutorial will be focusing on **Point Address Geocoding**, a branch of Single Address Geocoding. Point address geocoding is one of the most accurate geocoding methods.

Creating Address Locator

An Address Locator/Geocoder is the main tool ArcGIS uses to append geographic coordinates to a table of addresses onto a map. ArcGIS Pro has a built-in general Locator that can be used globally. The downside to using this Locator is the credit usage. Credits are ESRI's form of premium currency used for advanced spatial analysis or storage in AGOL (ArcGIS Online).

To avoid tapping into your organization/personal funds, ArcGIS has tools to create your own local locator with street address data for free. If you would like to skip to the geocoding, we have created the Locator for you in the folders. Simply connect the folders to your workspace in ArcGIS Pro from the catalog tab and skip to [Geocoding Process](#) below.

To create a locator, you'll need reference data containing **address information** in the attributes table, along with **spatial locations**. Some examples are:

Address points – each building has its own full address (ex. 200 University Ave W)

Street Centerlines – uses ranges to estimate house location (ex. 1-200 University Ave W)

Postal Code Boundaries or city boundaries (ex. N2L 3G1, Waterloo)

Your table will contain fields depending on your locator method. Some common fields are **Street name**, City, and Postal Codes.

If your study area is in a city, you'll commonly find street address data on that cities open data portal. For example, you can find Region of Waterloo's Street address data here: [RMOW Addresses](#). This dataset contains the full Street Point address, which is what we need for a Point Address Locator. You will have a copy inside the tutorial folder.

Bring the RMOW address data onto the map. Go to the Analysis Ribbon and click 'Tools' to search. Open the 'Create Locator' Tool in ArcGIS Pro. Set the Country to Canada and put your addresses in "Primary Table(s)". Set its role to Point Address.

The screenshot shows the 'Create Locator' tool interface. At the top, there's a 'Geoprocessing' header and a 'Create Locator' title. Below this is a 'Pending edits.' status bar with icons for undo, redo, save, and delete. The 'Parameters' tab is active, showing a dropdown for 'Country or Region' set to 'Canada'. Below that, there's a section for 'Primary Table(s)' and 'Role'. The 'Primary Table(s)' dropdown is set to 'Addresses' (indicated by a red 'x' icon), and the 'Role' dropdown is set to 'Point Address'. There are also empty dropdowns for additional tables and roles.

You will see more options for field mapping when you input your primary table. This is where you input the important fields for our Locator to work.

The screenshot shows the 'Field Mapping' section of the tool. On the left, there's a list of fields: 'House Number From', 'House Number To', 'Parity', 'Building Name', 'Street Join ID', 'Prefix Direction', 'Prefix Type', '*Street Name', 'Suffix Type', and 'Suffix Direction'. On the right, there are corresponding dropdown menus. Most are set to '<None>', but the '*Street Name' dropdown is set to 'STREET'. The '*Street Name' field is highlighted with a red asterisk, indicating it's the most important field for the locator to function.

Fill this out to the best of your abilities. The most important field for your locator to function is highlighted by a *.

In the case of RMOW data, set the following:

Feature ID: **OBJECTID** (Optional) – Leave this empty in most cases, including this one

House Number: **AddressNum**

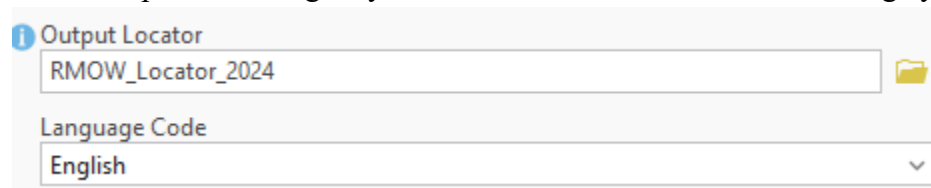
*Street Name: **FullStreet**

Unit: **UnitNumber**

UnitType: **UnitType**

City/Municipality: **Municipali**

In the Output Locator, give your Locator a name and location. Change your language to English.



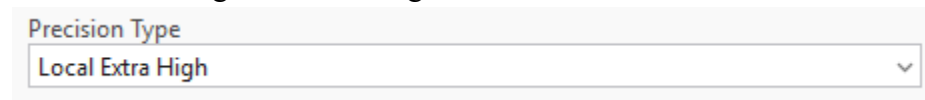
Output Locator

RMOW_Locator_2024

Language Code

English

Precision Type is the amount of processing details your locator will have. Turn this setting to 'Local Extra High' for cities/regions

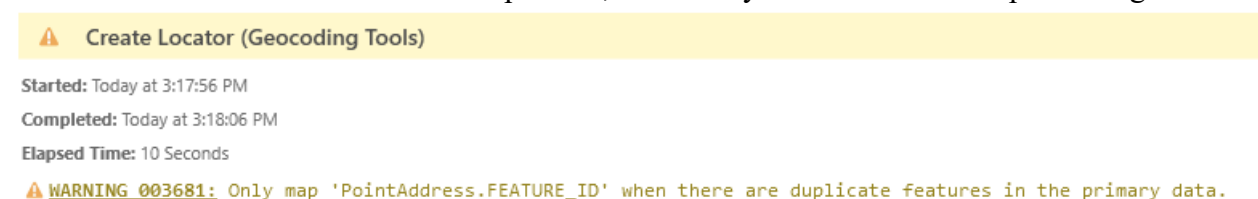


Precision Type

Local Extra High

The rest of the fields can be empty for a simple locator. Hit run when you are ready to create your Locator.

If you choose to include the Feature ID, you may receive this warning. This is because the Feature ID field is only used when there are duplicate features in the table representing the same real-world locations. If there are no duplicates, it will only result in unneeded processing time.



Create Locator (Geocoding Tools)

Started: Today at 3:17:56 PM

Completed: Today at 3:18:06 PM

Elapsed Time: 10 Seconds

WARNING 003681: Only map 'PointAddress.FEATURE_ID' when there are duplicate features in the primary data.

Tips for creating Locator:

- Keep attribute fields clean (no nulls or duplicates)
- Ensure consistent abbreviations ('st', 'street', etc.)
- Update locator if reference data updates
- Make sure you are in your desired map projection. Locators share the same projection as your map unless otherwise specified

Geocoding Process

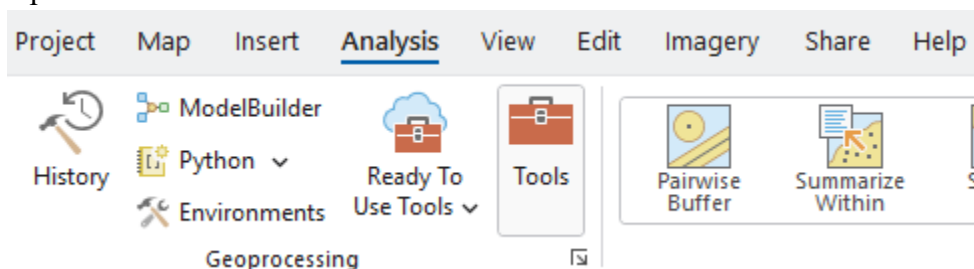
Prepare Data:

When preparing your table for geocoding, ensure your table (Excel, CSV or geodatabase table) has viable street address field or postal code/place. Your table containing location data should match the ones you used in creating your Locator.

In the folder this tutorial came with, there will be a CSV file of building permits in the City of Waterloo. Bring it into the content pane. Explore it as you please. The important field is ‘ADDRESS’.

ADDRESS
178 MARSHALL ST
756 CEDAR BEND DR
35 KING ST N
581 CHESAPEAKE CRES
117 JOHN ST E
29 HICKORY ST W
484 COLONIAL DR
47 UNION ST E
265 LEXINGTON CRT
183 WEBER ST N
105 WILLIAM ST W
529 NEW BEDFORD DR
718 WOOD LILY ST

Open the ‘Geocode Addresses’ tool in the toolbox.



Input Table: Your input table will be the table containing address location as well as additional information of interest. In this case, place the Building Permits CSV in the input table.

Input Address Locator: Place the Locator you have created or the one placed in the tutorial folder in the 'Input Address Locator' Field. Ensure you do not accidentally use the ArcGIS world geocoding services to avoid credit usage.

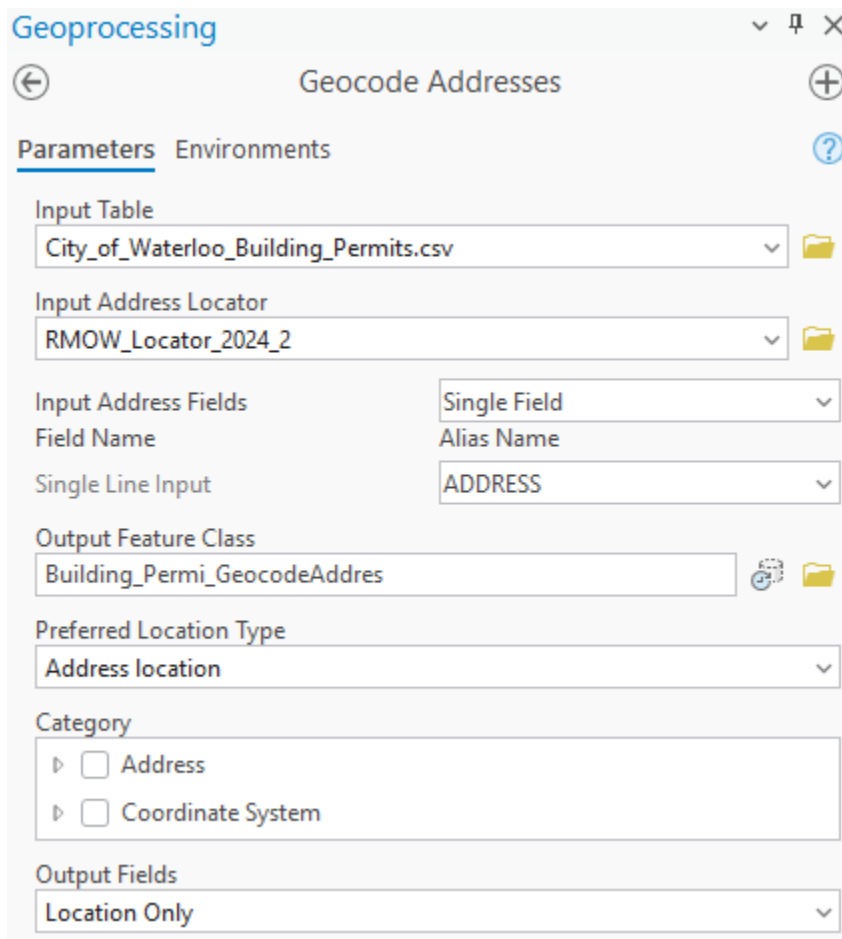
Input Address Field/Single Line Input: Depending on how many fields in your input table contains location data, you can either choose between single, multiple, or single with country field. In this case, choose single field, and your single line input will be 'ADDRESS'.

Output Feature Class: Select your output feature class location and name.

Preferred Location Type: Select Address location for your preferred Location Type.

Category: Leave everything in Category unchecked

Output Field: To reduce clutter from your address locator, avoid using 'All' in the output fields. We still want to manually match any addresses that don't get matched, so we will use 'Minimal' instead of 'Location Only'. Hit run when you are ready.



The screenshot shows the 'Geoprocessing' window with the 'Geocode Addresses' tool selected. The 'Parameters' tab is active. The tool's interface includes the following fields and options:

- Input Table:** A dropdown menu showing 'City_of_Waterloo_Building_Permits.csv'.
- Input Address Locator:** A dropdown menu showing 'RMOW_Locator_2024_2'.
- Input Address Fields:** A dropdown menu showing 'Single Field'.
- Field Name:** A dropdown menu showing 'Alias Name'.
- Single Line Input:** A dropdown menu showing 'ADDRESS'.
- Output Feature Class:** A text field containing 'Building_Permi_GeocodeAddres'.
- Preferred Location Type:** A dropdown menu showing 'Address location'.
- Category:** A section with two unchecked checkboxes: 'Address' and 'Coordinate System'.
- Output Fields:** A dropdown menu showing 'Location Only'.

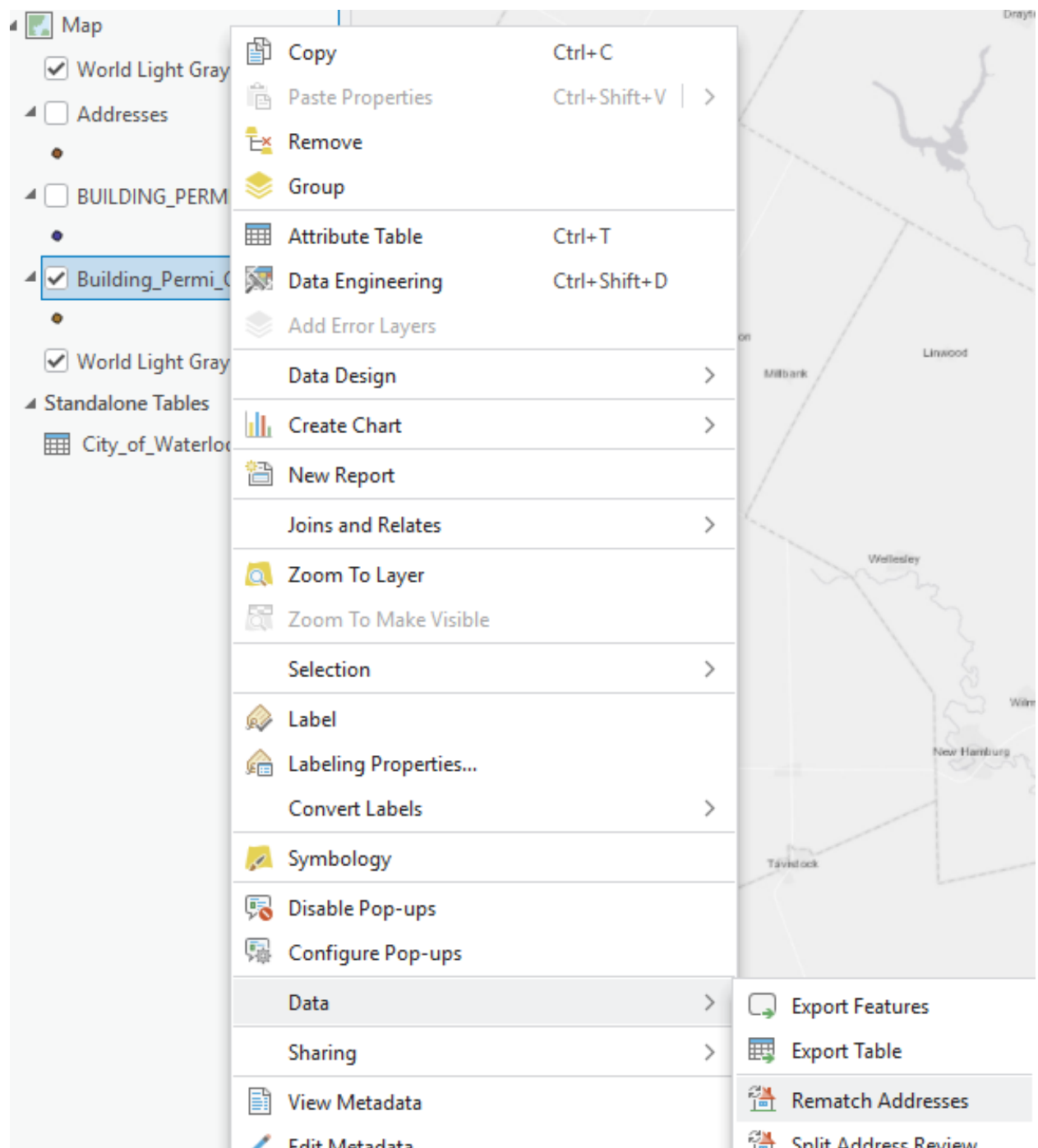
Matching addresses:

As the geocoding process is ongoing, you may notice that the addresses are being categorized into 'Matched', 'Unmatched' and 'Tied'. View this in more detail by clicking on 'View Details' on the bottom of your geoprocessing tab.

An acceptable match score depends on the purpose/use of data. The matchscore itself will depend on the quality of the reference and input data. Often times, a match score of 95% or greater is considered good.

32307 Matched (98.03%)
527 Unmatched (1.60%)
121 Tied (0.37%)

Often in a workplace, a 100% match is ideal. This tutorial will give you an idea on how it's done. Right click your geocoded feature class, hover over data and click 'Rematch Addresses'.



Rematch Addresses - Building_Permi_GeocodeA... ? v 🔍 ✕

Locator
 RMOW_Locator_2024_2 ▼

Unmatched Matched Tied (+)

Match Address	
ADDRESS	159 KING ST N

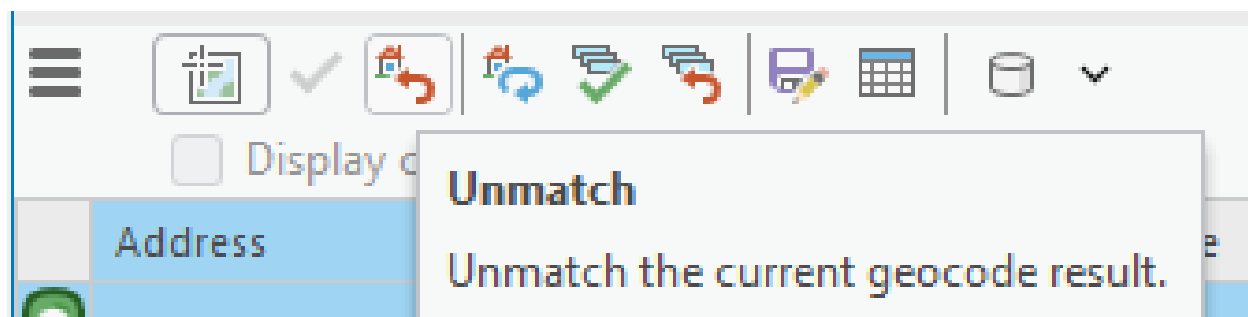
Auto Apply ☐

◀ 1 / 527 ▶

Apply Cancel

You can view the status of your addresses here. In the 'Matched' tab, you can view all the addresses from your data table found a candidate from the reference table (Locator). You may see some false positives.

Use the Select tool in the Map ribbon to select any points you wish to view. You can unmatched these points using the unmatched button in the second pane. Beware that any decisions you make in rematching/unmatching will be made immediately and move it out of its tab.



Unmatched	<u>Matched</u>	Tied	(+)
Match Address	35 King St N, Waterloo		
ADDRESS	35 KING ST N		

Navigating to the ‘Tied’ tab, you can view the locations the Locator matched tied addresses to. You will have to manually figure out which address is the correct one. View the attributes of your input table for hints. In this case, since we know we are in Waterloo, select the Waterloo location for 50 Albert St in the second pane.

Rematch Addresses - Building_Permi_GeocodeA... ? v ⌵ ×

Locator
RMOW_Locator_2024_2 v

Unmatched Matched Tied (+)



Match Address 50 Albert St, Cambridge

ADDRESS 50 ALBERT ST

Auto Apply ☐ Apply Cancel



◀ 1 / 121 ▶

☐ Display cached match candidates

	Address	Type	Score
	A 50 Albert St, Cambridge	PointAddress	100
	B 50 Albert St, Waterloo	PointAddress	100

Confirm your choice by clicking on the green check icon. Alternatively, double click the desired address to lock in your choice.

☒ Display cached match candidates

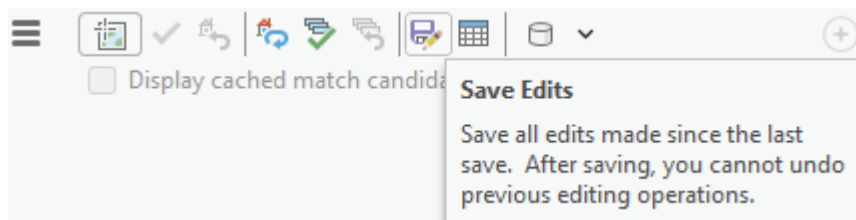
	Address	Type	Score
	A 50 Albert St, Cambridge	PointAddress	100
	B 50 Albert St, Waterloo	PointAddress	100

For unmatched addresses, there is a high chance that the address from your input table either does not exist in your Locator or has a different type of naming format. This occurs more often when your Locator's reference data is from a different year compared to your input data.

In the first case, put in the common abbreviation your reference data uses in the Rematch Address pane.

In the second case, there is nothing to be done unless you have direct access to address data from the city/region/municipality.

Remember to save your edits as you go.



Note down the unmatched addresses you could not resolve and state it in your analysis. Give a good reason why you can/cannot proceed with the analysis due to these unmatched addresses.

Tips:

- Clean the tables before geocoding
- Remove duplicates, fix typos, split address fields (addresses and postal codes in one field)
- If you know the exact boundaries of the data you are trying to geocode is, you can filter your Locator's address set to that location to avoid tied addresses in other cities.
 - Alternatively, you can do a multifield Locator and include the city if your data provides it.
- Always check match scores before using in analysis

Common Mistakes:

- If you are stuck only seeing a limited number of addresses in the rematch addresses pane, close the pane and clear any selections you have on the feature class. Reopen the rematch addresses pane to see everything again.
- All Addresses Unmatched:
 - Check if the address locator/geocoder is for your region
 - Check if your address format matches with your locators
- Credit Warnings
 - Create your own local locator to avoid credit usage