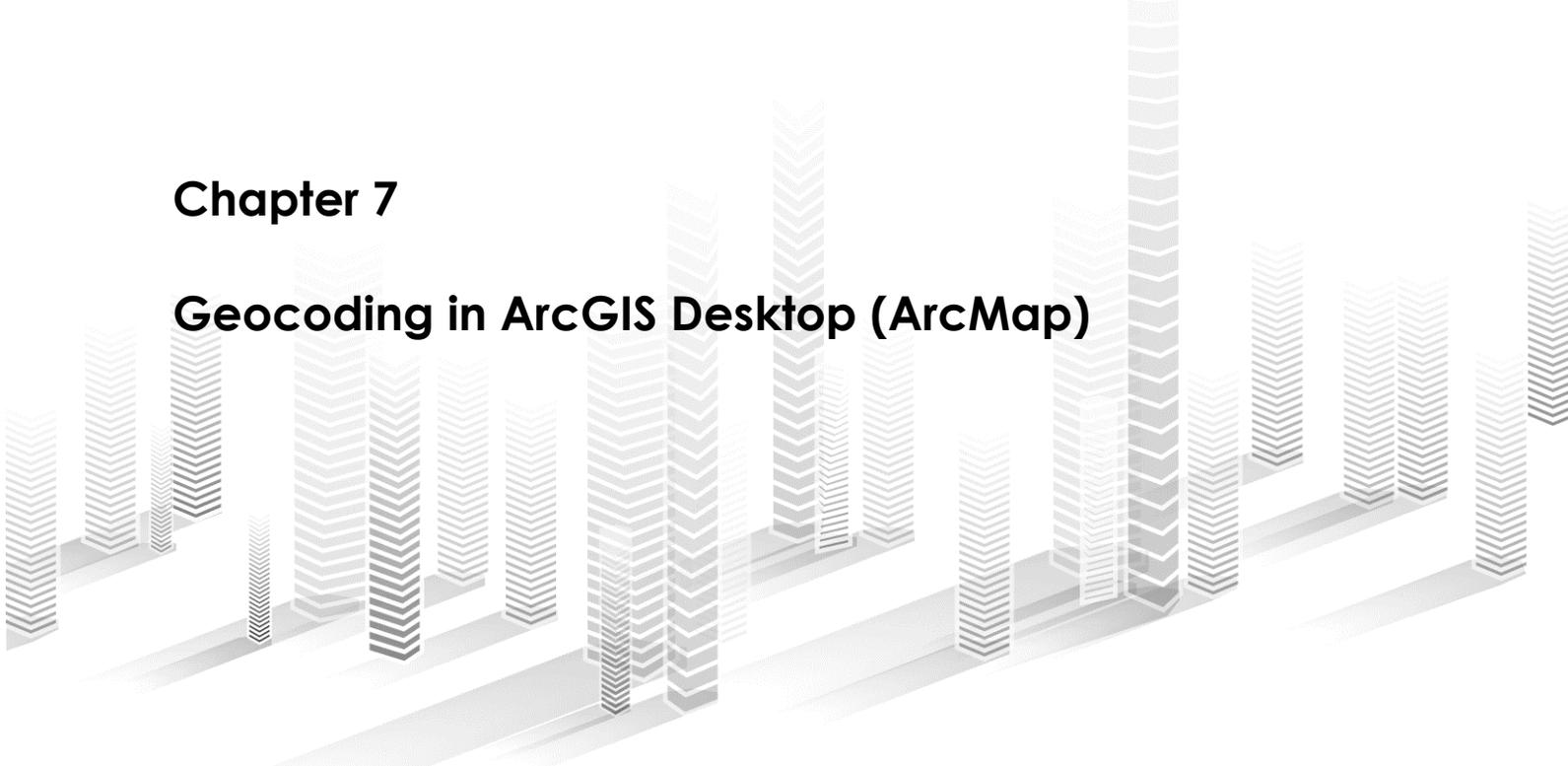


Chapter 7

Geocoding in ArcGIS Desktop (ArcMap)



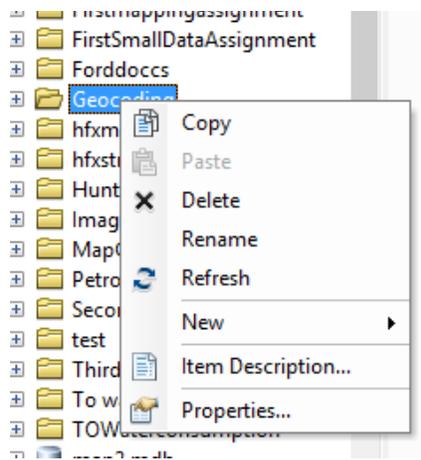
Summary: In many cases, online geocoding services are all you will need to convert addresses and other location data into geographic data. When you have a larger number of points to geocode, however, and available lookup data, the case for doing the job yourself can be compelling. This tutorial shows you how to geocode addresses using ArcGIS Desktop's built in geocoding utility. If you are unsure of the basics of the ArcMap user interface, see the quick tour of ArcGIS desktop tutorial.

Skills you will learn: How to create an address locator in ArcMap, and how to use that locator to geocode effectively limitless numbers of addresses and other non-geographic location data.

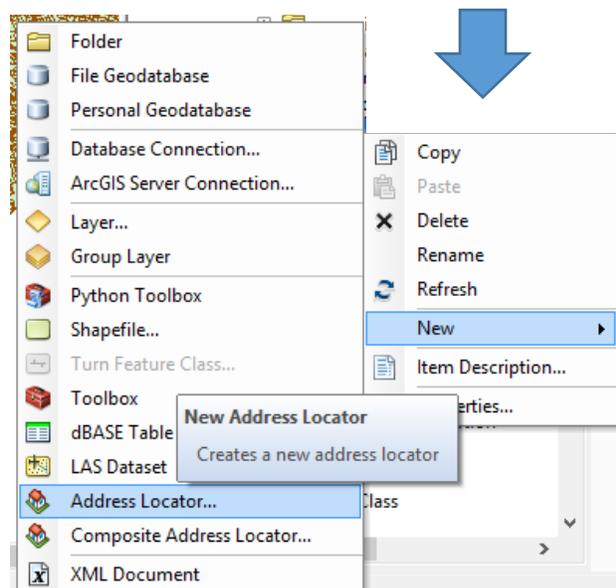
Creating an address locator

The first step in geocoding using ArcMap is to create an address locator, a special intermediary file that makes the connection between a reference map and the data to be geocoded.

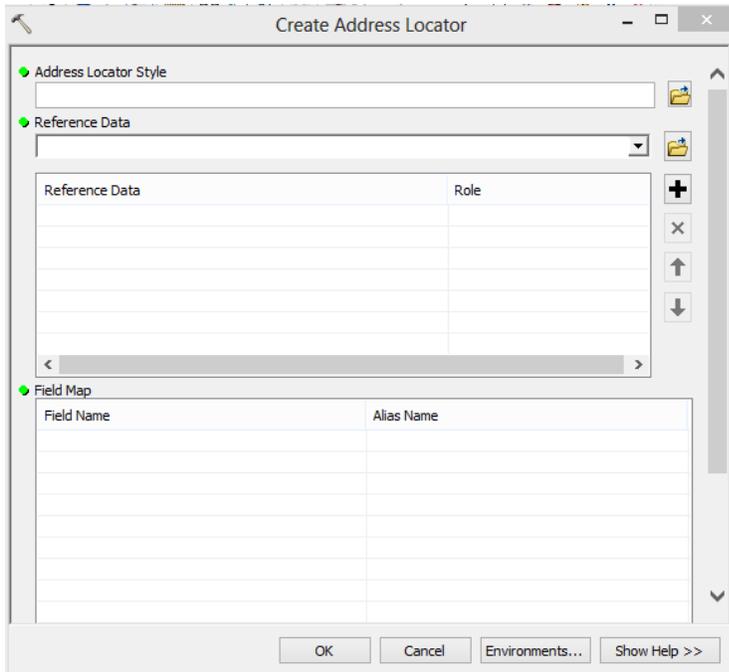
Open the Catalog window in ArcMap and right click on any folder to bring up the menu illustrated below. If the catalog window is not pinned to the side of the data frame, you can open it by clicking on the catalog icon.



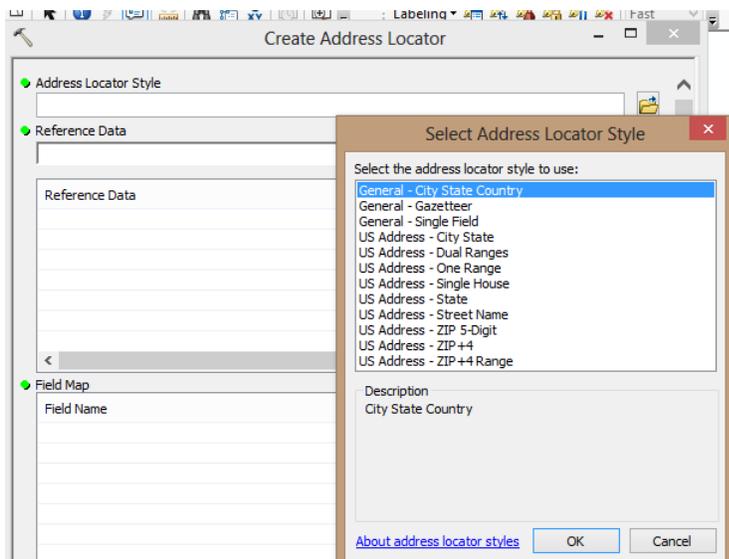
Next, choose New>Address Locator



The create address locator dialogue will open, as seen here.



Click on the open file folder icon to the right of the top window (Address Locator Style) to see a list of possible styles.

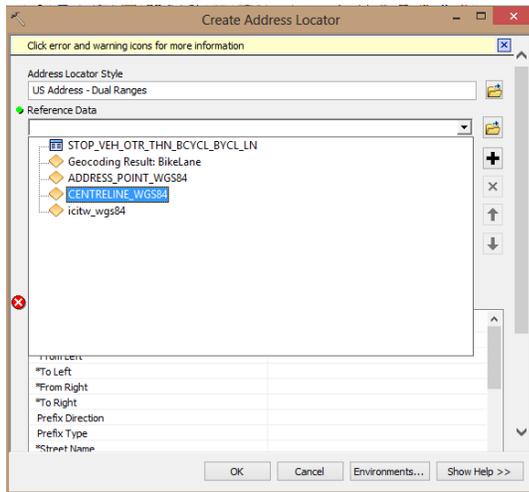


The styles are templates that use different types of reference tables as the bases for address locators.

Choose US Address –SingleHouse if your reference data table is accurate down to individual street addresses (i.e. a map of individual addresses). Use US Address – One Range if the reference data table is accurate down to a street segment (a range of

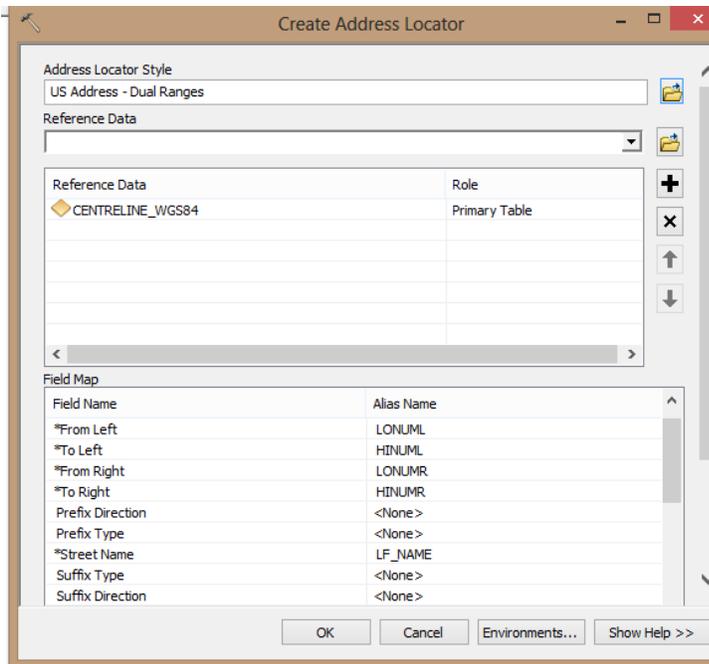
addresses). Use US Address – Dual Ranges if the reference data table is accurate down to a street segment with address ranges on both sides of the street (even and odd sides of the street). Other locator styles allow for situations such as a reference map of postal/zip codes.

In the next window, Reference data, use the drop down menu to pick the reference data table you opened earlier. You can also click on the open file folder icon to find a reference data table on your hard drive.



If this will be the only table you use, set it as the primary table. It is possible to add more tables to add more precision. See the ArcGIS help topic on geocoding.

The Field Map area at the bottom of the dialogue is used to designate the roles of fields in the reference table, such as which field represents the street name and which one represents the street number or lower/upper limit of a range of numbers. The fields marked with asterisks are required. For the US single house style, the street number and street name are required fields. For the single and dual ranges types, you also need to designate which fields contain the lower and upper limits of the street number ranges, as well as the street name. If your reference table contains a field for the city or the postal code, these fields should be designated as well.



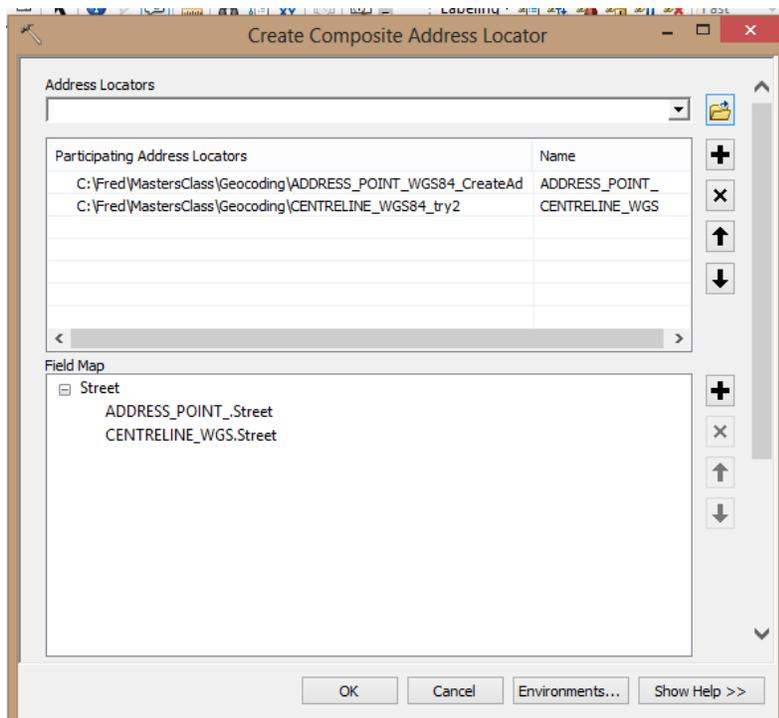
If you scroll down to the bottom of the dialogue box, you can also give the address locator a name and choose a folder to save it in (it will default to the location where you began this process).

When you have finished filling out the dialogue, click OK, and the address locator will be created. This may take several minutes. Once the locator has been created, you can use it to geocode addresses. It will continue to be available for future projects as it is saved as a file on your hard drive.

You can also create what is called a composite address locator. This is a locator that is comprised of more than one existing address locator. A composite address locator can increase geocoding accuracy by giving ArcMap more than one choice of reference data. For example, a composite address locator could be made up of a locator that geocodes down to a specific address and a second one that geocodes to street segments and intersections, to capture those instances in which the precise address is not available.

To create a composite address locator, right click on a folder in the Catalog window. Pick New>Composite Address Locator and then use the drop down or file folder icon at the top of the dialogue box to add existing address locators to your new composite locator. Use the arrows at the right side of the screen to control the order in which the address locators will be applied to the input data. Generally, put the locator with the greatest accuracy at the top of the list and then go down through

locators of diminishing accuracy. That way the most accurate method will be tried first, the second most accurate after that, and so on.



When you are done, click OK, and the new composite locator will be created.

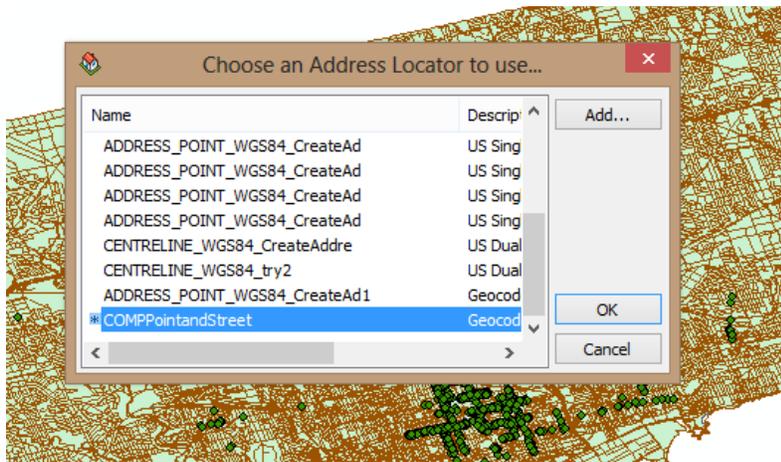
The geocoding process

Add the table to be geocoded to the Map document. Tables can be Excel files, dbf format database tables, csv text files, Access data tables (via an OLE connection). Excel, dbf and delimited text files can be opened directly by ArcMap using the add data button.

Tip: If you are geocoding a table using the US Streets-Dual Ranges locator style, or a composite locator containing this locator style, make sure that the table you are geocoding has a city or state/province field. If it just has address information, the geocoding operation will likely fail. If necessary, add the necessary fields to the table using the method described in the tutorial **A Quick Tour of ArcGIS Desktop**.

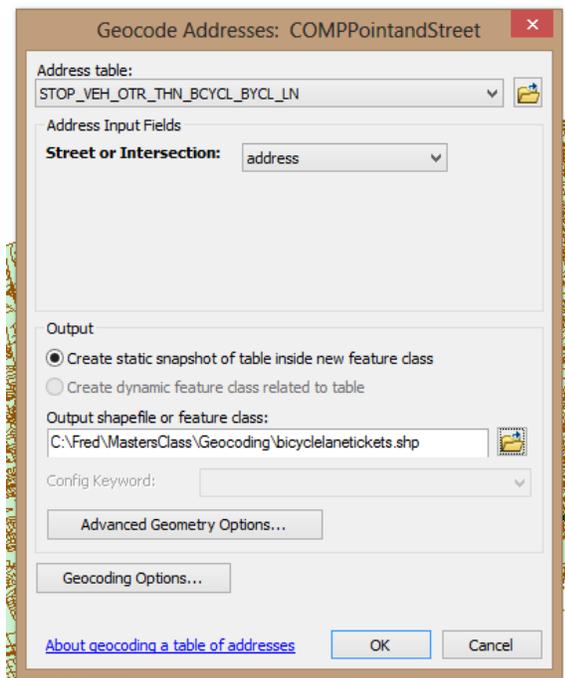
Right click on the table with addresses to be geocoded, and choose Geocode Addresses.

In the box that opens, choose the address locator you will use from the list and click OK. If it is not listed, choose ADD and navigate to the file location of the address locator and add it to the list.



Click OK.

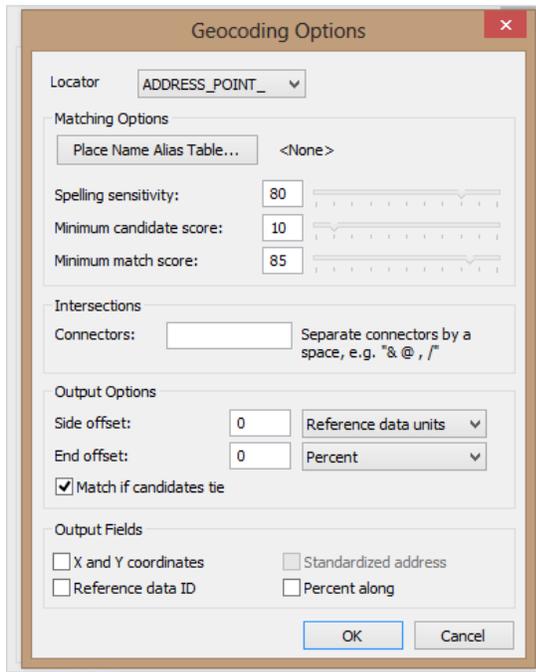
In the dialogue that opens, choose the fields in the input table (the one your are geocoding) that contain the information that indicates geographic location. This may include the street or intersection, the city and/or the postal code.



Unless you are storing your data in a file geodatabase, you will be able to choose only to create a static snapshot of your data table in the output shapefile that will be created by the geocoding process.

In the output shapefile or feature class text box, enter the name and file path of the new shapefile that will be created, or the name of the feature class to be saved in a file geodatabase.

This is enough to begin geocoding, but if you wish you can also adjust the geocoding settings. This is done by clicking on “Geocoding Options” to bring up the following window:



In this geocoding options window you can change a number of settings:

- Adjusting spelling sensitivity will determine how accurately the addresses in the input table must be spelled before they will be passed to the geocoding process.
- The minimum candidate score is the minimum score that the candidate address (the one found in the reference table that might match the input address) must attain before it will be considered as a match. Each candidate is given a score depending on how close the spelling, street number and other attributes are to the same attributes in the input table.
- The minimum matching score is the minimum score the match must reach before it will be accepted as the geocoded location and placed on the map.

The intersection connector is the character that can be placed between two street names in the address field of the input table to indicate the intersection of two streets. & and | are typically used.

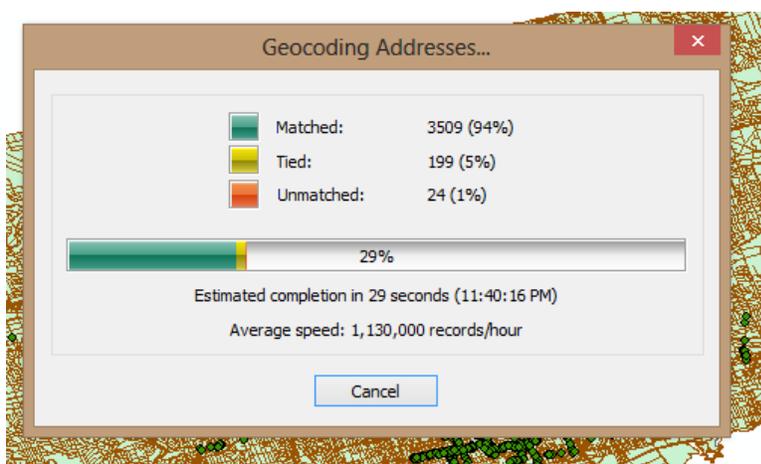
In the output options area, the side offset is the distance from the centre line of the street that a point will be placed. The units of measurement are chosen in the Reference data units dropdown.

The end offset determines how far from the end of a street segment defined by an address range that a point will be placed. This can be measured in a fixed unit or as a percentage. If a percentage is used, the point will be placed half way along the segment.

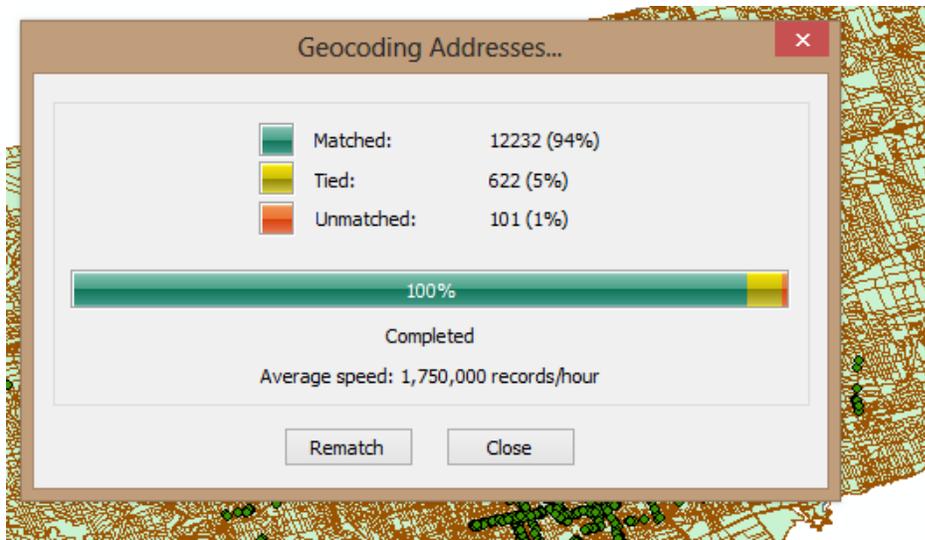
If match if candidates tied is checked off, addresses will be geocoded even if there are two matches that have the same score but slightly different geographical locations. One of the two will be matched. For the most precision, uncheck this box and rematch manually.

In the Output Fields area additional fields can be chosen to be added to the output shapefile or feature class in a file geodatabase.

Once you have finished modifying the options click OK and then click OK again. Geocoding will begin. Progress will be indicated in the Geocoding Addresses box. It provides a constantly updated statistic on the percentage of the addresses that have been matched, the percentage with tied scores and the percentage unmatched.



When geocoding is completed, the box will look something like this. For some applications, you will want to approach nearly 100 per cent matched (e.g. if you were mapping government projects in an investigation of possible political patronage). For some, a lesser percentage may be acceptable, for example if you are mapping points in order to see a general pattern for your research. Re-matching can be tedious and time consuming, necessitating a judgement call. If in doubt, go for higher precision.



You can now choose whether to simply accept the result as is, or tweak the result to geocode addresses that did not match or were tied.

Display a file that already has X and Y coordinates

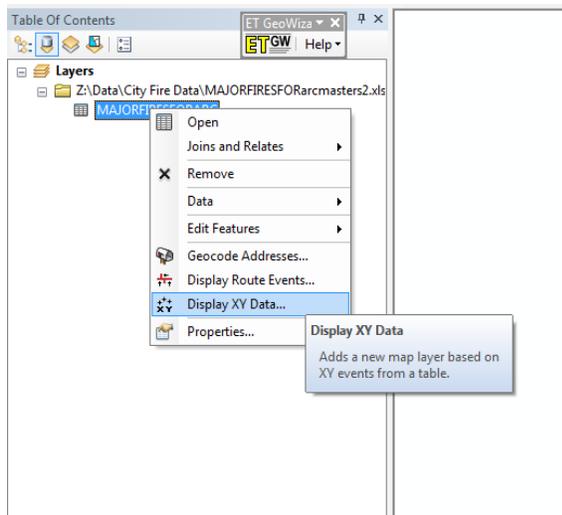
Occasionally, a table of data will already have X and Y coordinates, for geographic points, that can be displayed and used, but you must know the coordinate system the data is in. This is because coordinate numbers in and of themselves mean nothing, until ArcGIS know what the numbers mean.

The most important thing to understand is that you must tell ArcGIS what coordinate system applies to your data, or the points will be plotted in the wrong places.

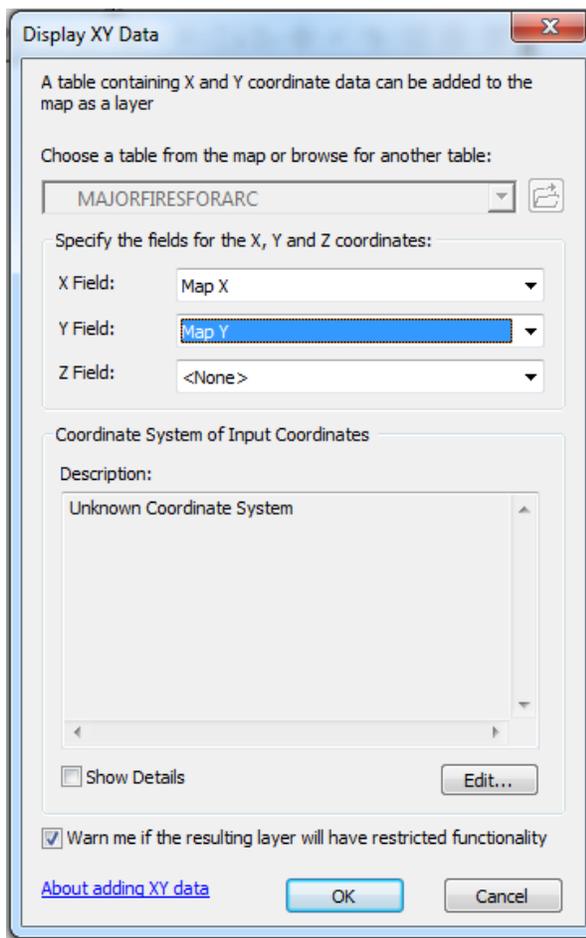
Getting started

Begin by adding the table with coordinates to the map document. It needs to be an Excel spreadsheet, a delimited text file (CSV) or a dbf file. It can also be in an Access database, but you need to make a connection with OLE first.

Once the file has been added to the map document, using the add data button, right click on the name of the table in the table of contents and choose Display XY Data.



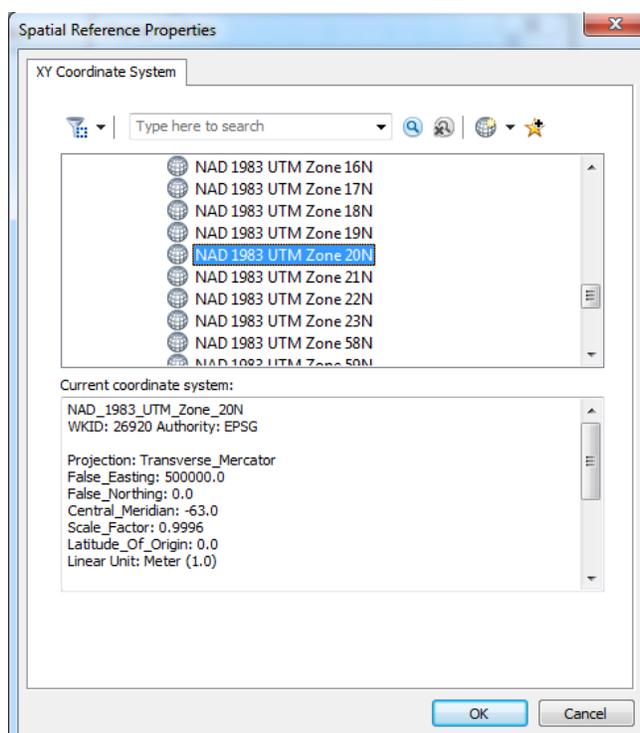
In the dialogue that opens, choose the appropriate fields in the table that contain the X and Y coordinates. You will need to know what the fields are before you begin this step. Latitudes and longitudes will typically be labeled as such, but such fields may also be labeled as X or Y or something else.



Leave the “Warn me if the resulting layer....” box checked off.

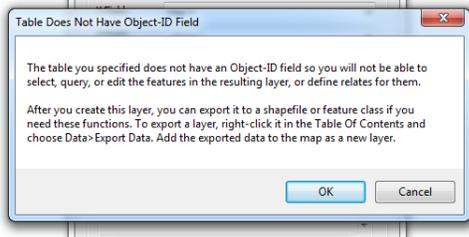
You also need to tell ArcGIS what the coordinate system is supposed to be, otherwise it can't interpret the coordinates. If you have previously added a shapefile or feature class to your map, Arc will propose to use that layer's coordinate system (actually the coordinate system of the map, which is set by the first layer you add). This might be, but probably isn't, the coordinate system you need for your data.

To define the coordinate system yourself, click on Edit, then navigate through the coordinate systems in the “Spatial Reference Properties” dialogue box until you find the system needed for your file. If the coordinates in your file are latitudes and longitudes, you need to look in the list of geographic coordinate systems. If they are X and Y coordinates for a projected coordinate system, you will need to look in the list of projected coordinate systems.



Once you have selected the coordinate system, click OK twice to close both dialogue boxes.

Unless the table has an Object-ID field, you will get this warning dialogue:



Normally, you will need to export the data from the layer that will be created, into a new shapefile or feature class in a file geodatabase, so you can do further analysis with it. Note that there are some limitations in what you can do with point data that have just a geographic coordinate system so it is usually wise to use the ArcGIS Project tool (in the Arc toolbox under Data Management Tools>Projections and Transformations) to create a new shapefile or feature class that also has a projected coordinate system based on the same geographic coordinate system. This allows for more accurate measurements in tools such as Select by Location.