Step-by-Step Guide to Geocoding Using U.S. Census 2009 TIGER®

Step I- Compile or obtain address list

If you are compiling your own address list, read through all steps first. This will help you determine the data and the data format you will need.

In older versions of ArcMap, your data will need to be in .txt (Tab delimited text file), .dbf (DBASE), or .mdb (Microsoft Access) to import into ArcMap. If your data comes to you in another format, most software packages have a Save As option which will convert your data into one of these formats. Arc 9+ allows for tables in Microsoft Excel to be added directly to your map file.

Confirm or edit addresses until at least one field contains address number and street name together and (if available) zip code in another field. You can leave any other data fields that you wish.

Tip: Use short, concise column labels without spaces or special symbols to avoid problems during the Save As or Add New Data processes.

Save your data file as .dbf , .txt, or .mdb if using Arc 8 or as .xls if using Arc 9+.

Step 2 – Open ArcMap

Add the TIGER line road layer(s) for area. If you do not have these files already, 2009 TIGER files can be downloaded at: <u>http://www.census.gov/geo/www/tiger/</u>.

The past three (2007-2009) Vintages of TIGER data are available in shapefile format from the U.S. Census Bureau. The All Lines file contains a column for road flag that will allow you to easily filter all edges down to roads for use in defining your geocoding service in the next step.

If you are geocoding for a multi-county area you will need to merge all of the road layers together and use this merged file as the reference file when you define the geocoding service in the next step. To merge these in Arc 8, use the Geoprocessing Wizard. In Arc 9, this process is a bit more complicated:

- 1. Copy one of the road layers to another location using the ArcToolbox/Data Management Tools/General/Copy. This prevents changing the original layer in case you need it in the future.
- 2. Using the ArcToolbox/Data Management Tools/General/Append, select the remaining road layer(s) to append/concatenate to the COPY of the first road layer.

Now you have a reference file to use when defining your geocoding service. This is a good time to add your address data file from step I and browse it in ArcMap. Make sure your data set is complete, sometimes errors will occur during the save as process and you will have to repeat the process.

Tip: TIGER data are published without a defined projection, but are NAD 1983 data. The reference layer *must* have a defined projection for the geocoding service to work.

Step 3 – Create Address Locator (also called Geocoding Service)

You can define an Address Locator in ArcToolbox or ArcCatalog. The instructions that follow are for defining a service from the Toolbox panel within ArcMap.

In ArcMap, launch the Arc Toolbox panel, if not shown. In the toolbox pane, click to expand "Geocoding Tools" and select Create Address Locator.

A dialog box will open giving you a list of types of services you can define. If you have addresses from a single city or zip, the easiest way is to define a **US STREETS (FILE)** geocoding service using the TIGER shapefile filtered to display roads for the county. If your address data span several cities or counties OR if you have a zip code for each address then you will want to consider defining a **US STREETS WITH ZONE (FILE)** for greater accuracy. The 2009 TIGER All Lines file can be used for defining either type of service.

	Address Locator			
Once a type is selected:	Address Locator Style US Streets with Zone	<u> </u>	Configuration Keyword (optional)	
I. Select your reference file.	Reference Data	- 🖻	The configuration keyword	
This is the TIGER road file	Reference Data	Role	+	parameters of the table in a
from Step 2.		Primary table	×	Relational Database Management System
F				(RDBMS) - ArcSDE only.
2. Set the role of the			+	
reference layer as "primary				
table"	Field Map		2	
cable.	Field Name			
	*House From Left	LFROMADD		
2 Males sums all of the	*House To Left *House From Bight	LTOADD REROMADD		
5. Make sure all of the	*House To Right	RTOADD		
appropriate fields are	Prefix Direction Prefix Type	<none></none>		
	*Street Name	FULLNAME		
recognized. If not, see image	Street Type Suffix Direction	<none></none>		
at right for fields to use from	*Left Zone	ZIPL		
TIGER 2009	"Right Zone	ZIPR		
HGEN 2007.				
	Output Address Locator			
Select a location and name	D:\data\temp\GEO358\April2010\DGroads2009			
for your geocoding service.	Configuration Keyword (optional)			
It will get very confusing		OK Cancel Environments	< Hide Help	Tool Help
once you have defined a				- controp

number of services if you have New Address Locator I, New Address Locator 2, etc.

5. Click OK to compile the service.

6. Click Close once the process is complete.

Step 4 – Geocode Address List

Right click on your address list in the layers window. Select Geocode Addresses. When the dialog box opens, you will see the service you just defined plus any other geocoding services previously used in the current map project.

With the new service highlighted, click OK.

Select, or verify the appropriate fields are selected from your address data set to correspond with the Address Input Fields needed by the geocoding service.

Tip: In the output section, it is helpful to save the resulting shapefile with a meaningful name and in a location where you will be able to locate it.

The Geocoding Options button will bring up a set of options for the geocoding service that you may wish to alter. These options include spelling sensitivity, intersection connectors, and output fields. The default values are shown below.

Geocoding Options
Matching Options Place Name Alias Table <none></none>
Spelling sensitivity:
Minimum candidate score: 10
Minimum match score: 60
Connectors: & @ Separate connectors by a space, e.g. "& @ , /"
Side offset: 20 in Feet
End offset: 3 % -j
Output Fields □ X and Y coordinates □ Standardized address □ Reference data ID □ Percent along
OK Cancel

Click OK to run the service on your address data.

Step 5 – Review results



Once process completes, a Review/Rematch Addresses box will appear. This box will tell you how well your geocoding service worked and give you the opportunity to manually match any points that it was unable to locate.

The critical points are those that remain unmatched. In the screen shot at the left you can see this is only 9 addresses.

Click Rematch to open the Interactive Review window. The "show results" drop down will allow you to view unmatched addresses, all addresses, addresses by score, or addresses with tied candidates. Start with unmatched addresses. You will need to review each address shown in the top frame of the window.

The bottom frame displays all possible matches for the selected address in the top frame.

In this example, you can see that TIGER is missing data on the LeftFrom and LeftTo fields for the first candidate shown.

now re	esults: Uni	matched A	ddresses			•	Manage result se	ts	Refresh	Rematch	n Automatic	ally		Matched:	23 (70%)
FI	D Shape	Status	Score I	Match_type	Side	Match_addr	AR	C_Street		ARC_Zone	Туре	<u> </u>		Tied:	1 (3%)
1	0 Point	U	0 A	· · · · ·			410 Arnes St	reet		66006	Pharmacy			neu.	1 (370)
	4 Point	U	0 A	.			4701 West 6	th Street		66049	Pharmacy			Unmatched:	9 (27%)
	5 Point	U	0 A	1			3000 West 6	th Street		66049	Pharmacy				
	7 Point	U	0 A	.			4701 West 6	th Street		66049	Grocery				
	8 Point	U	0 A	`			3000 West 6	th Street		66049	Grocery				
	13 Point	U	0 A	`			4000 West 6	th Street		66049	Pharmacy				
	15 Point	U	0 A	`			4000 West 6	th Street		66049	Grocery				
1	23 Point	U	0 A	κ			112 8th Stree	et		66006	Pharmacy				
	30 Point	U	0 A	`			3421 West 6	th Street		66049	Pharmacy				
						Nocorda (c	/ 2)								
Addr	ress:			14 Ca <u>n</u> didat	es	1,000103 (0	,							Cand	idate details:
Addr	ress:			14 Ca <u>n</u> didat	es Side	Match addr		LeftFrom	LeftTo	RightFrom	RightTo	PreDi	r 🔼	Cand	idate details:
Addr reet o	ress: or Intersection	112 87	ISTREET	14 Ca <u>n</u> didat Score ⊽ 46	es Side R	Match_addr 113 N 8TH ST, 66006		LeftFrom	LeftTo	RightFrom	RightTo	PreDi N	r A	Cand From	idate details:
Addr reet o ne	ress: or Intersection	112 8TH	ISTREET	14 Ca <u>n</u> didat Score ⊽ 46 41	es Side R L	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006		LeftFrom 300	LeftTo	RightFrom 101 301	RightTo 199 399	PreDi N N	r 🛆	Cand From To	idate details:
Addr eet o ne	ress: or Intersection	112 8TH 66006	ISTREET	14 Ca <u>n</u> didat Score ∇ 46 41 34	es Side R L R	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 401 N 8TH ST, 66006		LeftFrom 300	LeftTo 398	RightFrom 101 301 401	RightTo 199 399 499	PreDi N N N	r 🛆	Cand From To PreDir	idate details:
Addr eet o ne	ress: or Intersection	112 8TH 66006	ISTREET	14 Ca <u>n</u> didat Score ∇ 46 41 34 34 34	es Side R L R R	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 401 N 8TH ST, 66006 201 N 8TH ST, 66006		LeftFrom 300	LeftTo	RightFrom 101 301 401 201	RightTo 199 399 499 299	PreDi N N N	r 🔺	Cand From To PreDir PreType	idate details:
Addr eet o ne	ress:	112 8TH 66006	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34	es Side R L R R R	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 401 N 8TH ST, 66006 201 N 8TH ST, 66006 801 N 8TH ST, 66006		LeftFrom 300	LeftTo	RightFrom 101 301 401 201 801 701	RightTo 199 399 499 299 899	PreDi N N N N	r 🔺	Cand From To PreDir PreType StreetName	idate details: 10 19 N 8TH
Addr eet o ne	ress:	112 8TH 66006	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34	es Side R L R R R R R R	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 401 N 8TH ST, 66006 201 N 8TH ST, 66006 801 N 8TH ST, 66006 701 N 8TH ST, 66006 501 N 8TH ST, 66006		LeftFrom 300	LeftTo	RightFrom 101 301 401 201 801 701 501	RightTo 199 399 499 299 899 799 599	PreDi N N N N N N	r 🔨	Cand From To PreDir PreType StreetName StreetType	idate details: 10 19 N N 8TH ST
Addr reet o ne	ress:	112 8TH 66006	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34	es Side R L R R R R R R R R R	Match_addr 113 N 8TH ST, 66006 401 N 8TH ST, 66006 401 N 8TH ST, 66006 801 N 8TH ST, 66006 801 N 8TH ST, 66006 501 N 8TH ST, 66006 501 N 8TH ST, 66006		LeftFrom 300	LeftTo 398	RightFrom 101 301 401 201 801 701 501 601	RightTo 199 399 499 299 899 799 599 699	PreDi N N N N N N N N N	r 🔨	Cand From To PreDir PreType StreetType StreetType	idate details:
Addr reet o ne	ress:	112 8TH	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34 34 34	es Side R R R R R R R R R R L	Match_addr 113 N 8TH 5T, 66006 300 N 8TH 5T, 66006 401 N 8TH 5T, 66006 801 N 8TH 5T, 66006 801 N 8TH 5T, 66006 601 N 8TH 5T, 66006 601 N 8TH 5T, 66006 601 N 8TH 5T, 66006		LeftFrom 300	LeftTo 398	RightFrom 101 301 401 201 801 701 501 601 1001	RightTo 199 399 499 299 899 799 599 699 1099	PreDi N N N N N N N N N	r	Cand From To PreDir PreType StreetType SufDir Zone	idate details:
Addr reet o ne	ress:	112 8TH	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34 34 34	es Side R R R R R R R L L	Match_addr 113 N 8TH 5T, 66006 401 N 8TH 5T, 66006 401 N 8TH 5T, 66006 201 N 8TH 5T, 66006 601 N 8TH 5T, 66006 601 N 8TH 5T, 66006 601 N 8TH 5T, 66006 1000 N 8TH 5T, 66006		LeftFrom 300 1000 900	LeftTo 398 1098 998	RightFrom 101 301 401 201 801 701 501 601 1001 901	RightTo 199 399 499 299 899 799 599 699 1099 999	PreDi N N N N N N N N N N N	r 🔨	Cand From To PreDir PreType StreetName StreetType SufDir Zone	idate details: 11 15 N 8TH ST 660
Addr reet o ne	rgss:	112 8TH 66006	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34 34 34	es Side R L R R R R R R R R L L L	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 401 N 8TH ST, 66006 801 N 8TH ST, 66006 801 N 8TH ST, 66006 501 N 8TH ST, 66006 600 N 8TH ST, 66006 1000 N 8TH ST, 66006 1000 N 8TH ST, 66006		LeftFrom 300 1000 900 1400	LeftTo 398 1098 998 1420	RightFrom 101 301 401 201 801 701 501 601 1001 901 1401	RightTo 199 399 499 299 899 799 599 699 1099 999 1423	PreDi N N N N N N N N N N N	r A	Cand From To PreDir PreType StreetName StreetType SufDir Zone Score	idate details: 10 15 N 8TH ST 660 46
Addr eet o ne	ress:	112 8TH	ISTREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34 34 34	es Side R L R R R R R R R R L L L L	Match_addr 113 N 81H 57, 66006 300 N 81H 57, 66006 201 N 81H 57, 66006 201 N 81H 57, 66006 201 N 81H 57, 66006 601 N 81H 57, 66006 600 N 81H 57, 66006 1400 N 81H 57, 66006 1		LeftFrom 300 1000 900 1400 1300	LeftTo 398 1098 998 1420 1398	RightFrom 101 301 401 201 801 701 501 601 1001 901 1401 1301 1201	RightTo 199 399 499 299 899 799 599 699 1099 999 1423 1399 1200	PreDi N N N N N N N N N N N N N N	r 🔨	Cand From To PreDir PreType StreetName StreetType SufDir Zone Score Side	idate details: 10 15 N 8TH ST 660 46 R
Addr eet o ne Stan	ress: or Intersection	112 87H 66006	I STREET	14 Candidat Score ∇ 46 41 34 34 34 34 34 34 34 34 34 34	es Side R R R R R R L L L L L L	Match_addr 113 N 8TH ST, 66006 300 N 8TH ST, 66006 201 N 8TH ST, 66006 201 N 8TH ST, 66006 201 N 8TH ST, 66006 501 N 8TH ST, 66006 501 N 8TH ST, 66006 610 N 8TH ST, 66006 1000 N 8TH ST, 66006 1400 N 8TH ST, 66006 1400 N 8TH ST, 66006 1200 N 8TH ST, 66006		LeftFrom 300 900 1400 1300 1200	LeftTo 398 1098 998 1420 1398 1298	RightFrom 101 301 401 201 801 701 501 601 1001 901 1301 1201	RightTo 199 399 499 299 899 799 599 699 1099 999 1423 1399 1299	PreDi N N N N N N N N N N N N N N		Cand From To PreDir PreDir StreetName StreetType SufDir Zone Score Side Match_addr	idate details: 10 19 N 8TH ST 660 46 R 113 N 8TH ST,

This is likely the correct street segment for the selected address point. Highlight this candidate and click the Match button.

The next example, however, does not display any possible matches.

Intera	ictive R	ematch -	Geocodi	ng_Result *								
ow resul	ts: Ur	matched A	ddresses			▼ Ma	nage result sets R	efresh Rematch	Automatically		Matched:	24 (73%)
FID	Shape	Status	Score	Match_type	Side	Match_addr	ARC_Street	ARC_Zone	Туре		Tied:	1 (3%)
0	Point	U	0	A			410 Ames Street	66006	Pharmacy			- (,
4	Point	U	0	A			4701 West 6th Street	66049	Pharmacy		Unmatched:	8 (24%)
5	Point	U	0	A			3000 West 6th Street	66049	Pharmacy			
7	Point	U	0	A			4701 West 6th Street	66049	Grocery			
8	Point	U	0	A			3000 West 6th Street	66049	Grocery			
13	Point	U	0	A			4000 West 6th Street	66049	Pharmacy			
15	Point	U	0	A	_		4000 West 6th Street	66049	Grocery			
23	Point	M	46	M	R	113 N 8TH ST, 66006	112 8TH STREET	66006	Pharmacy			
30	Point	U	0	A			3421 West 6th Street	66049	Pharmacy			
									N			
									<u> </u>			
Rec	ord: 14	•	3 🕨 🖬			Records (of 9)						
Addr <u>e</u> ss set or In 1e	: tersection	3000 W	EST 6TH :	0 Ca <u>n</u> didate	s Side	Match_addr	LeftFrom	LeftTo RightFrom	RightTo PreDi	r Pr	Cand From To PreDir	idate details:
											PreType	
											StreetName	í
											StreetType	
											cuiros a pos	,
											Suibir	
											∠one	
											Score	ļ
											Side	
Standar	dized Add	ress:									Match_addr	
) W	6TH ST	66049		<						>	_	,
Geocod	ing <u>O</u> ptio	ns	Zoom to C	andidates	🐞 <u>P</u> ick	Address from Map		Search	Match	Unma	tch Save Ed	dits Close

This requires a bit more knowledge of the area or the assistance of an online tool like Google Maps.

From Google Maps you can get a good idea of the correct location for this point. Zoom into the general area in your map project. Click the Pick Address from Map

button and then right click on the map in the correct location and select Pick Address to set the address point.

You can also modify the address to match TIGER. In the addresses shown above, for example, the 400 block of Ames Street is labeled N 300 Road in TIGER. Modify the address in the lower left pane to view candidates for the revised location. In this case, the revision will yield a 100% match.

Repeat this process for each point listed in the top window. Once you are finished, click the Close button.

Step 6 - Reviewing matched addresses

It is always a good idea to verify some (or all) of the addresses to ensure the geocoding process placed the address point in the correct place. In particular, you should verify all of the addresses with tied candidates. This is more important when dealing with multi-county areas, but the same address may exist more than once in a single county. For example, the address 408 Elm is valid in both the cities of Lawrence and Baldwin City resulting in tied possibilities and potentially placing the point in the incorrect city. To reopen the review address window, right click on the newly created address point layer, select data, and then select Review/Rematch Addresses. Select Matched (and subsequently Unmatched) Addresses with Candidates Tied to review all points with one or more candidates.

Review your map for outliers. Some points, especially when geocoding for a large area, may be placed in a different city or obviously outside the area of interest.

Tip: You can reduce the chance of misplaced points by defining your geocoding service to include the zip code (if it is available in your address data).

When you are finished reviewing or correcting any misplaced points, click Close. Review your map and ensure any edited points were moved to the correct location.



Questions? Please contact:

Xan Wedel Institute for Policy & Social Research The University of Kansas 1541 Lilac Lane 607 Blake Hall Lawrence, KS 66045-3129 (785) 864-9111 xan@ku.edu