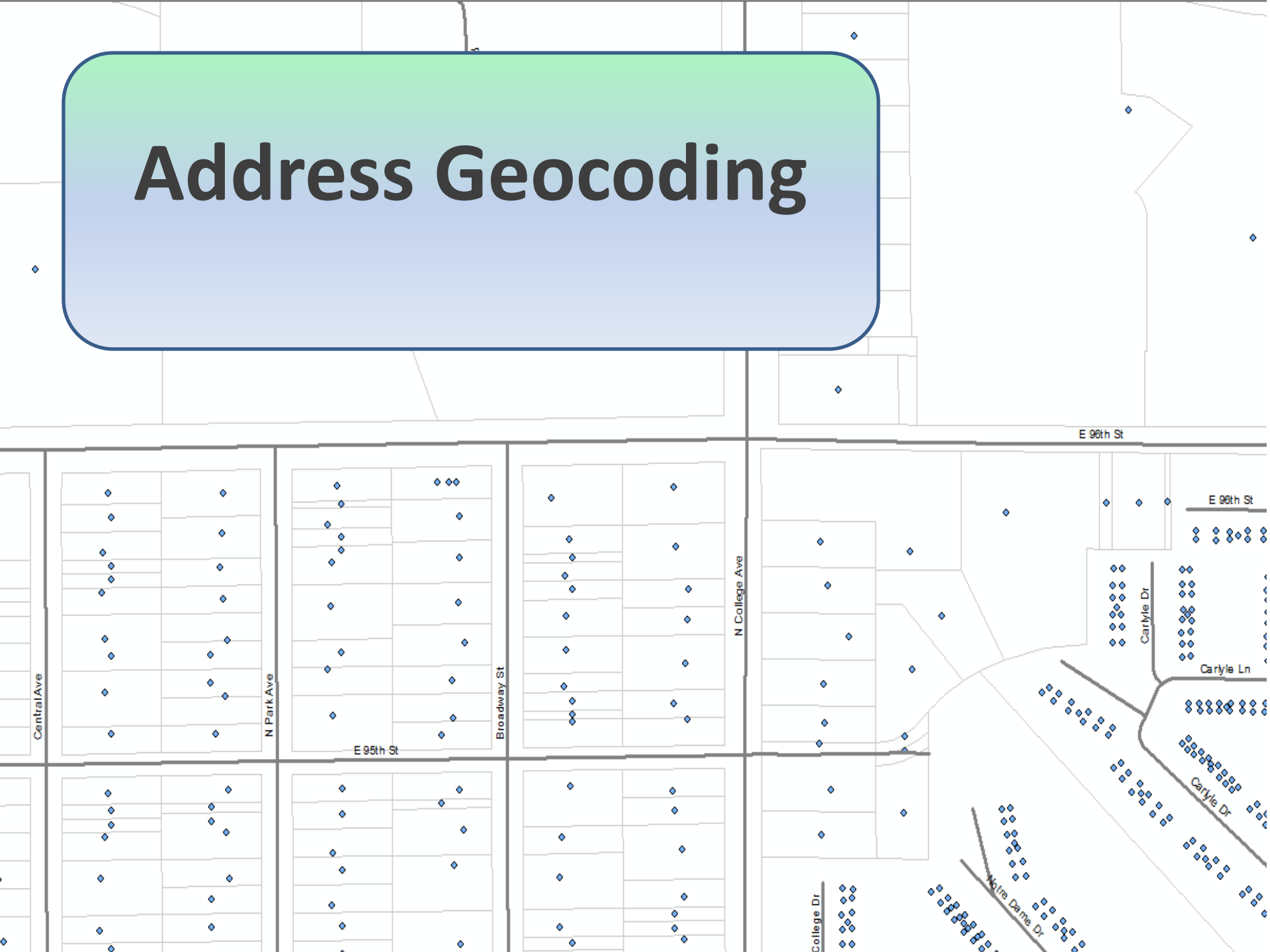


# Address Geocoding



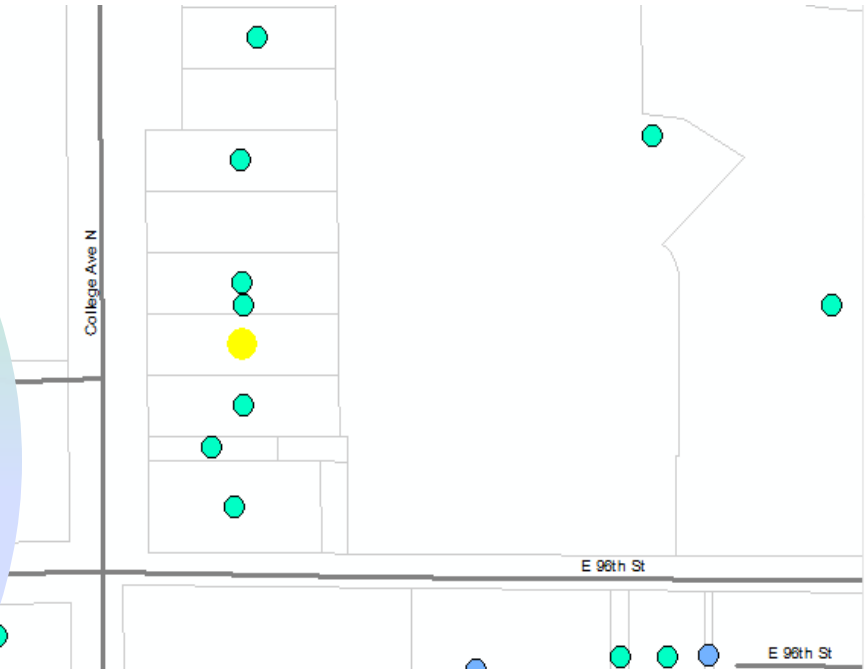
# Outline

- Definitions
- Data
- Address Locators
- Geocoding
- Demonstration

# What is an address?

(from a GIS perspective)

- An address is simply a method used to describe and reference a location
- A location is based on an existing feature in a GIS database.
- A location can be a street address (*9609 College Ave*)
- Place-name (*Indianapolis*)
- A specific location that has been identified and/or defined (*9609 College Ave, Indianapolis, IN 46280*)



Table

ADRPNTS\_8192014

OBJECTID *	Shape	NAME	ZCTA5CE10	LAT_DD	LONG_DD	CERTIFIED	FULL_ADDRE	STD_ADDR	STD_PD	STD_P
2098185	Point		46240	39.926788	-86.1432	True	803 E 96TH ST	803 E 96th St	E	<Null>
2585754	Point		46240	39.926788	-86.143426	True	803 E 96TH ST	803 E 96th St	E	<Null>
1271245	Point	Hamilton County	46280	39.928359	-86.142419	True	900 96TH ST	900 E 96th St	E	<Null>
3101184	Point	Marion County	46240	39.926812	-86.147225	True	9565 BROADWAY ST	9565 Broadway St	<Null>	<Null>
1429570	Point	Marion County	46240	39.926907	-86.147872	True	9590 BROADWAY ST	9590 Broadway St	<Null>	<Null>
1726431	Point	Marion County	46240	39.926906	-86.147919	True	9590 BROADWAY ST	9590 Broadway St	<Null>	<Null>
2577659	Point	Hamilton County	46280	39.927459	-86.145259	True	9601 COLLEGE AVE	9601 N College Ave	N	<Null>
2277763	Point	Hamilton County	46280	39.927721	-86.145363	True	9603 COLLEGE AVE	9603 N College Ave	N	<Null>
1793085	Point	Hamilton County	46280	39.927912	-86.145218	True	9607 COLLEGE AVE	9607 N College Ave	N	<Null>
1271326	Point	Hamilton County	46280	39.928187	-86.14522	True	9609 COLLEGE AVE	9609 N College Ave	N	<Null>
1160017	Point	Hamilton County	46280	39.928362	-86.145211	True	9611 COLLEGE AVE	9611 N College Ave	N	<Null>
2577533	Point	Hamilton County	46280	39.928461	-86.145223	True	9613 COLLEGE AVE	9613 N College Ave	N	<Null>
1904434	Point	Hamilton County	46280	39.929011	-86.145228	True	9615 COLLEGE AVE	9615 N College Ave	N	<Null>

# What is Geocoding?

Geocoding is the process of transforming a description —such as a pair of coordinates, an address, or a name of a place—to a location on the earth's surface. (ESRI)

Addresses

Find Locations

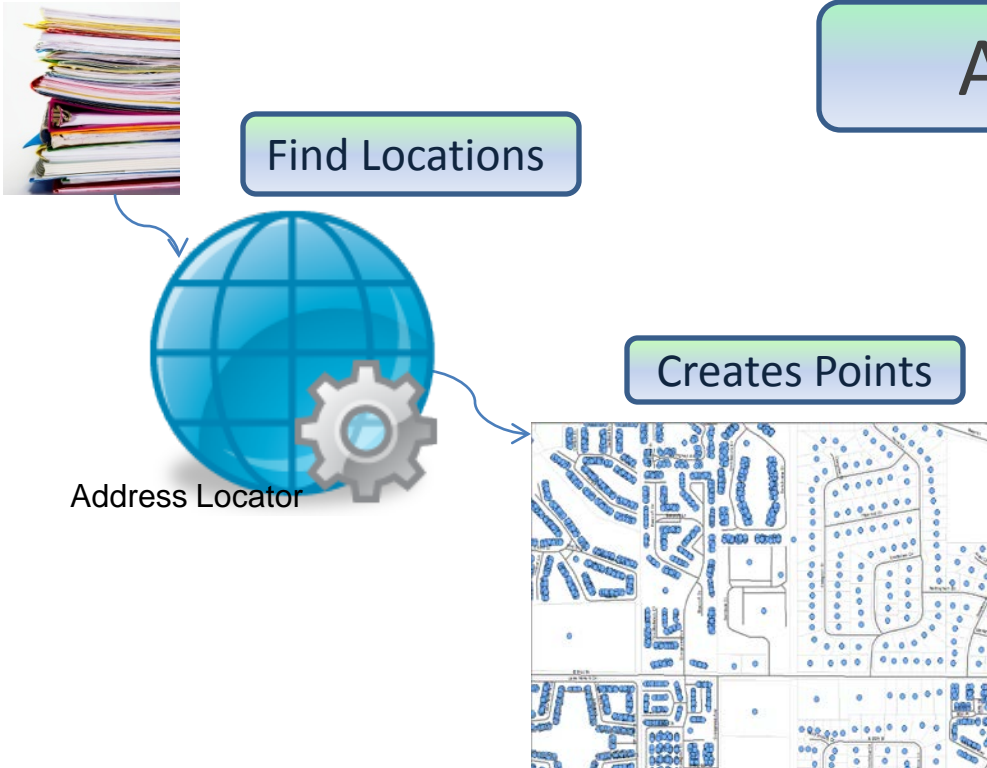
## Address Locator

An ESRI tool used to execute the geocoding process within the ArcGIS environment.

- Can be built by any user
- Built using location data
- Standardized address search

Creates Points

Address Locator





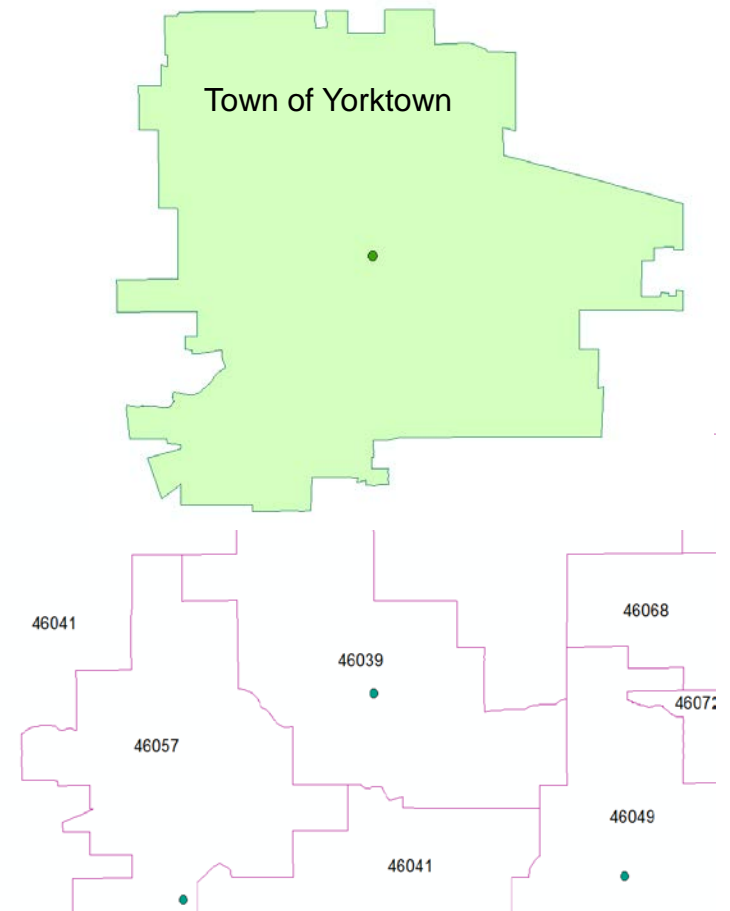
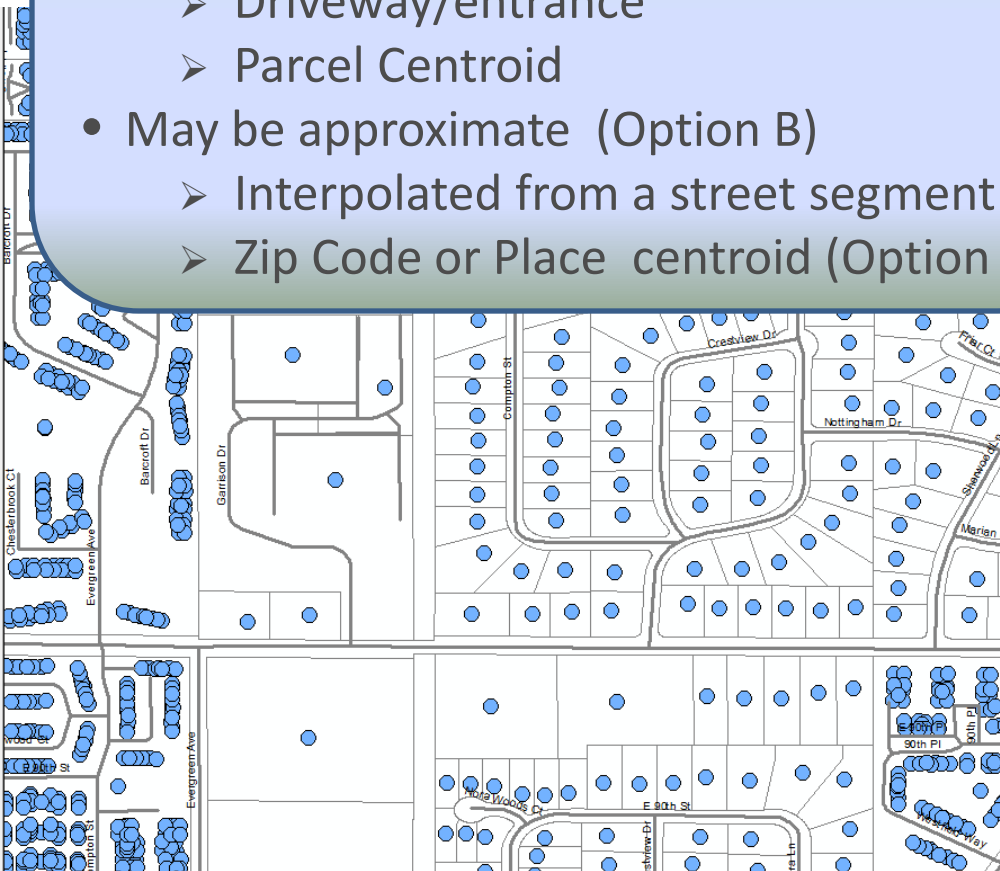
# Understanding Data Sources

Used for creating locators (geocoding)

# Point Data

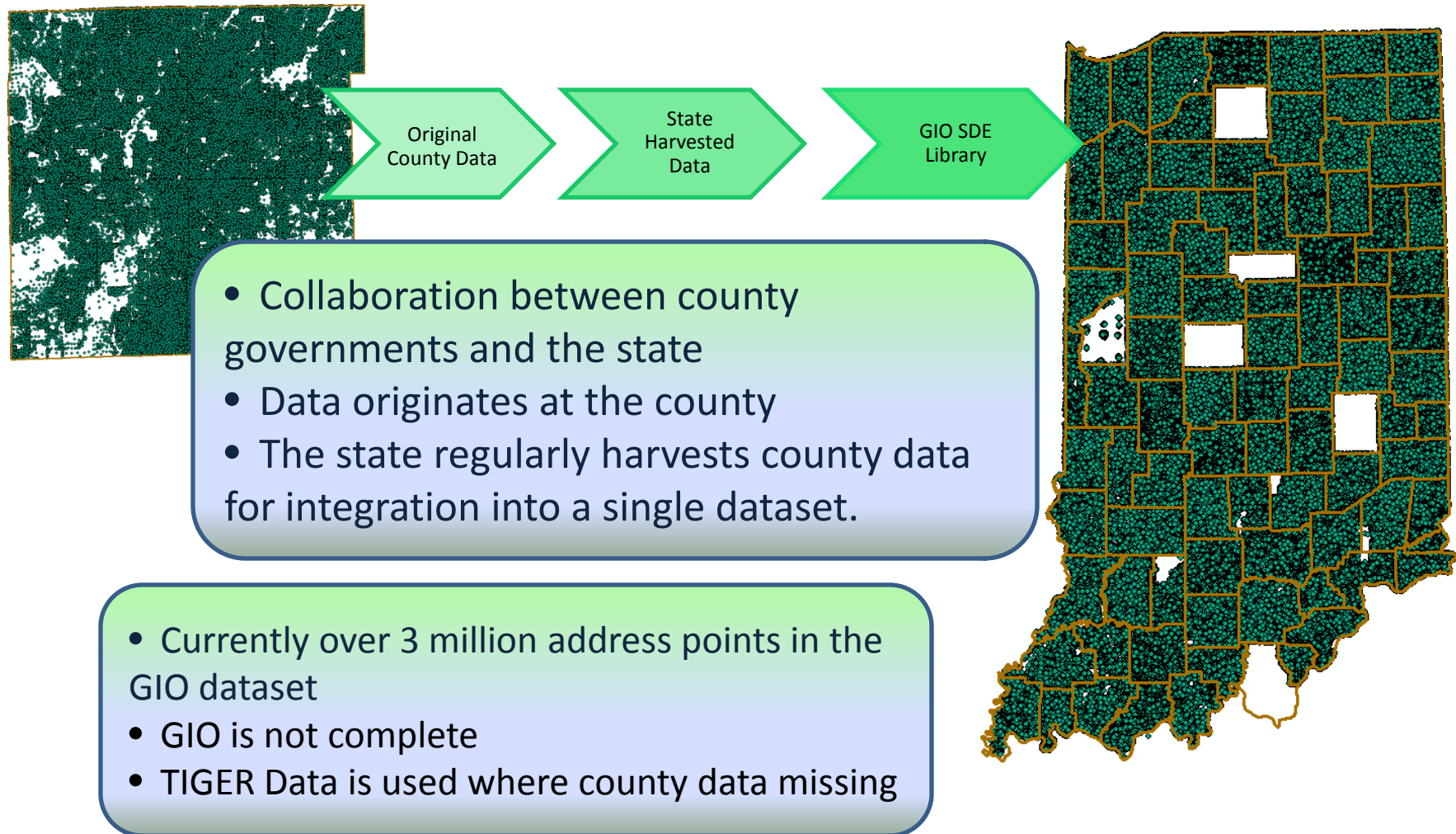
Represents the address location

- May be a point near to an exact location (Option A)
  - Roof-top accuracy
  - Driveway/entrance
  - Parcel Centroid
- May be approximate (Option B)
  - Interpolated from a street segment
  - Zip Code or Place centroid (Option C)





# Where does point data come from?



# “Cleaning up” Data

(AKA: Locator)

- Locator updated last fall
- <https://gis.in.gov/arcgis/services> (State)
- Currently being updated again
- Location data has multiple errors

## Errors:

- ✓ No data
- ✓ Incomplete Data
- ✓ Unusable Data
- ✓ Varied standardization

The screenshot shows the ArcCatalog interface with a table of address data. The table has the following columns: LOADDATE, FULL\_ADDRESS, ADDRESS\_NUMBER, ADDRESS\_SUFFIX, and ADDRESS\_TYPE. The data is organized into a grid with multiple rows and columns.

LOADDATE	FULL_ADDRESS	ADDRESS_NUMBER	ADDRESS_SUFFIX	ADDRESS_TYPE
12/19/2013	102 PINE ST	102	<Null>	<Null>
12/19/2013	127 PINE ST	127	<Null>	<Null>
12/19/2013	108 OAK ST	108	<Null>	<Null>
12/19/2013	127 OAK ST	127	<Null>	<Null>
12/19/2013	163 OAK ST	163	<Null>	<Null>
12/19/2013	417 E SECOND ST	417	<Null>	<Null>
12/19/2013	370 E SECOND ST	370	<Null>	<Null>
12/19/2013	416 E SECOND ST	416	<Null>	<Null>
12/19/2013	226 OAK ST	226	<Null>	<Null>
12/19/2013	260 W SECOND ST	260	<Null>	<Null>
12/19/2013	200 MEADOWVIEW 1	200	1	<Null>
12/19/2013	200 MEADOWVIEW 16	200	16	<Null>
12/19/2013	200 MEADOWVIEW 17	200	17	<Null>
12/19/2013	200 MEADOWVIEW 22	200	22	<Null>
12/19/2013	200 MEADOWVIEW 21	200	21	<Null>
12/19/2013	200 MEADOWVIEW 20	200	20	<Null>



# Improving Point Data

## The Standardization Process

- Addresses are reformatted
  - Use an in house algorithm (ISDH) developed for our GeoRunner web service
- Not all addresses standardize well
  - Addresses with ½
  - Streets with odd names
- Reformatted data is checked for accuracy

**Standardized data =  
better address locator**

Improves address  
matching rate

19544 Lake Site Drive

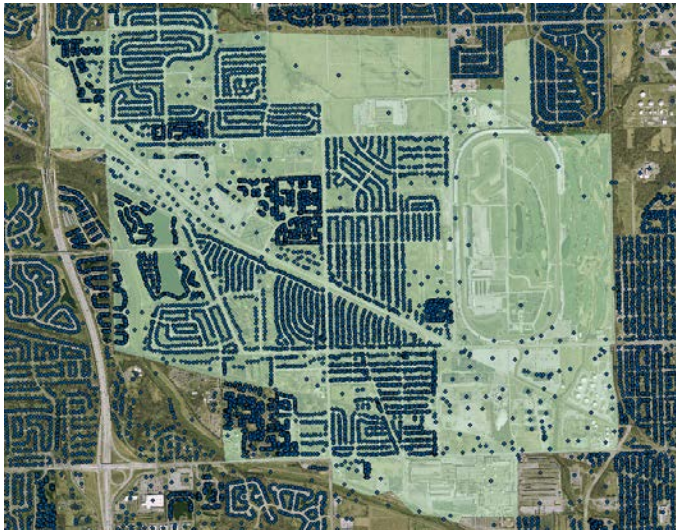
▶ 19544 E LAKE STE DR	19544	E		LAKE			STE DR
4323 W 700 S	4323	W		700	S		

# Enhancing Point Data

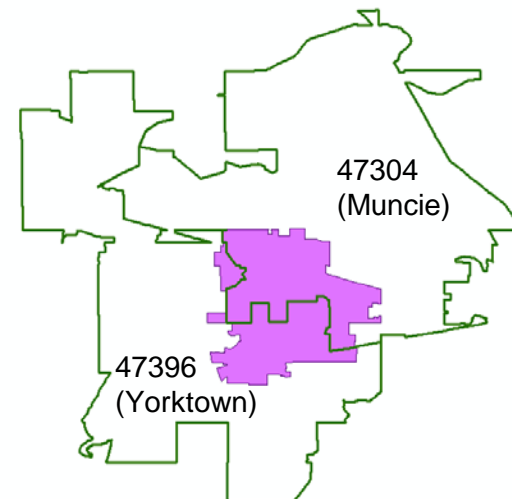
## Finding missing Data

- Spatial join with the county parcels (property address)
- Spatial join with census ZCTA (Zip Code Tabulated Area) data (2010)
- When ZCTA data is used the USPS preferred city is assigned
- Time management: Unusable data is deleted
- Usable data goes through the reformatting process
- Additional Information

## Alternate city names (Speedway)



## Alternate zip code names (Town of Yorktown)





# Understanding Street Data (Option B)

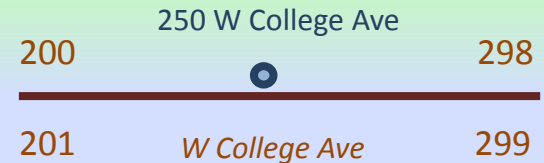
# What is Street Data?

## Street segments

- Split at each intersection.
- Contain and address range
- Locator interpolates the point
- Comes from current TIGER data
- Can have direction (to or from)

## Some required fields

- From Left
- To Left
- From Right
- To Right
- Street Name



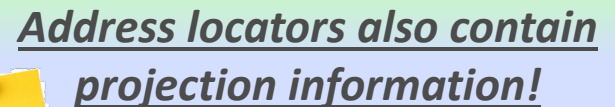
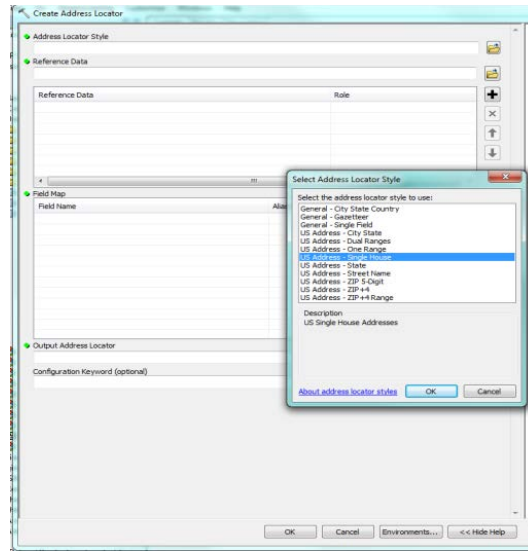
TGR12Adr

Left FROM HN	Left TO HN	Right FROM HN	Right TO HN	STREET NAME
10082	10204	10081	10205	Winchester Rd
10000	10084	10001	10085	N 350 W
10000	10084	10001	10085	Church Rd
10248	10498	10247	10497	N 350 W
10248	10498	10247	10497	Church Rd
9000	9498	9001	9499	N 350 W
9000	9728	9001	9729	N 400 W
4000	4182	4001	4155	W 900 N
3700	3998	3701	3999	W 900 N
3500	3598	3501	3599	W 900 N
352	398	345	399	Roeville Rd
3389	3331	3388	3330	W 750 S
1654	1486	1655	1487	E US Hwy 33
2088	2098	2097	2099	N US Hwy 33
2088	2098	2097	2099	N State Rd 101
201	299	200	298	E Washington St
759	579	750	578	Co Rd 500 N
759	579	750	578	W 500 N
759	579	750	578	500N
6998	6800	6999	6801	E 1150 N-1
		5803	5869	N 100 W
5973	5999	5974	5998	E 1050 N
5973	5999	5974	5998	E 1050 N-1



 <Type an address...>

- 
- The screenshot shows the ArcCatalog interface with the 'Catalog Tree' on the left and the 'Contents' pane on the right. The 'Catalog Tree' displays a hierarchical view of the project files, including folders like 'C:\', 'C:\GP Service Examples\Network Analysis', 'C:\Users\Jdelury', 'KA', 'LA', 'BackUp', and 'CensusData'. The 'Contents' pane shows a list of files and folders, including 'ASPEN', 'BA', 'QS', 'PHPERD\_Backup', 'Tables', 'TGR', 'SDECopy.gdb', 'TestSDECopy.gdb', 'Trans.gdb', 'AddressPHG', 'AddressPoint', and 'AddressLocatorOld'. A context menu is open over the 'AddressLocator' entry, showing options like 'Folder', 'File Geodatabase', 'Personal Geodatabase', 'Database Connection', 'ArcGIS Server Connection', 'Layer', 'Group Layer', 'Python Toolbox', 'Shapefile', 'Turn Feature Class', 'Toolbox', 'dBASE Table', 'LAS Dataset', 'Address Locator', 'Composite Address Locator', and 'XML Document'. The 'Address Locator' option is highlighted, and a tooltip for 'New Address Locator' is visible, stating 'Creates a new address locator'.



**NOTE**

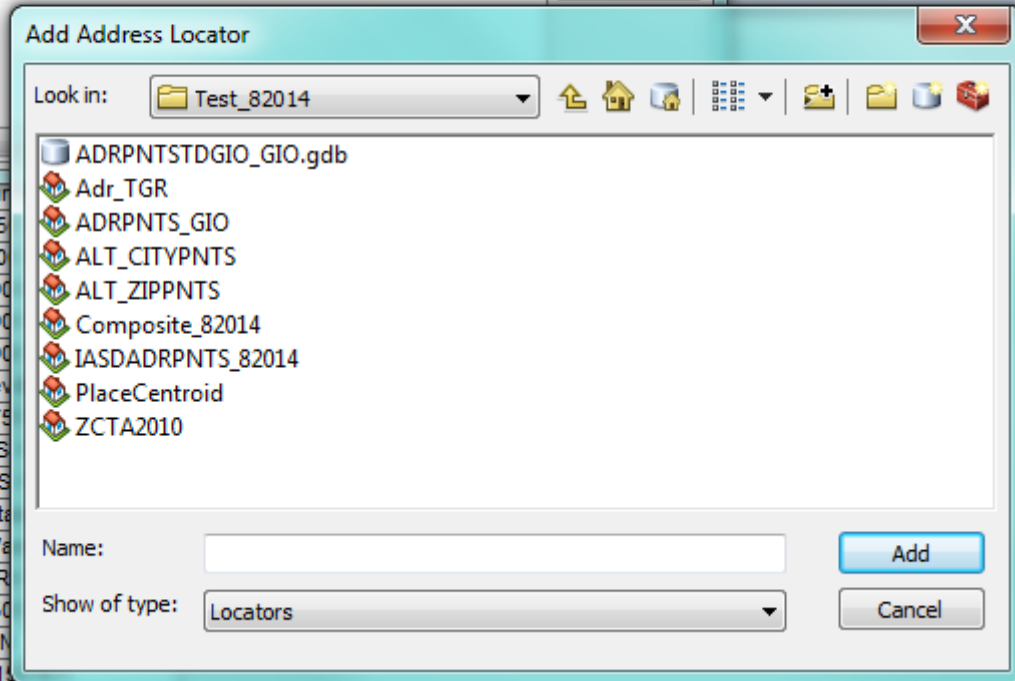
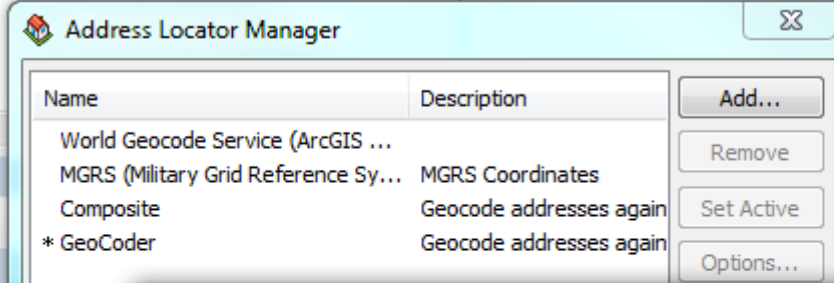
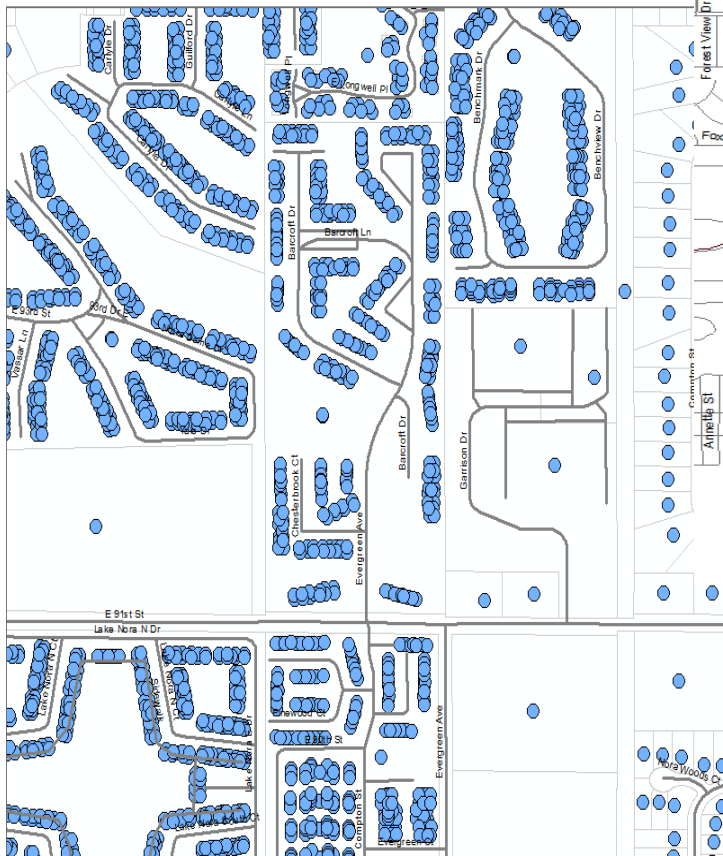
GeoCoder



<Type an address...>



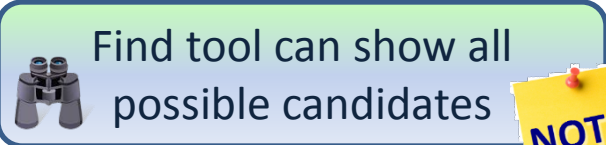
# Address Locators







- 
- Composite Address Locator Properties**
- Name: GeoCoder  
Description: EDW PHG GeoCoder
- Participating Address Locators**
- | Name  | Address Locator | Location | Out |
|---|-----------------|----------|-----|
| <input checked="" type="checkbox"/> AddressPHG    | AddressPHG      | -        | GCS |
| <input checked="" type="checkbox"/> AddressPoint  | AddressPoint    | -        | GCS |
| <input checked="" type="checkbox"/> AddressStreet | AddressStreet   | -        | GCS |
| <input checked="" type="checkbox"/> AddressZip    | AddressZip      | -        | GCS |
- Input Address Fields**
- The field containing: ☒ City ☒ State
- ☒ ZIP
- ☒ Calculate
- Output Fields**
- ☒ X and Y coordinates  
☒ Reference data ID  
☐ Standardized address  
☐ Percent along
- Output Spatial Reference**
- Name: GCS\_North\_American\_1983
- 
- ☒ Store relative path names
- 
- [About composite locator properties](#)



Find tool can show all possible candidates

**NOTE**

## Geocoding Addresses

### Why all the work?

\$\$\$\$\$

- Current cost for batch geocoding (ArcGIS online) is \$40/10,000
- In House = unlimited batch geocoding
- The ISDH geocodes ~ 5 million addresses in one year!
- Savings of \$20,000 based on current rates
- ISDH is one agency
- Multiple agencies & users = you do the math

\$\$\$\$\$

- Can make custom locator (ISDH Facilities)
- <https://gis.in.gov/arcgis/services> (State)

Now for geocoding...

# Parts needed for geocoding

Dataset  
With  
addresses

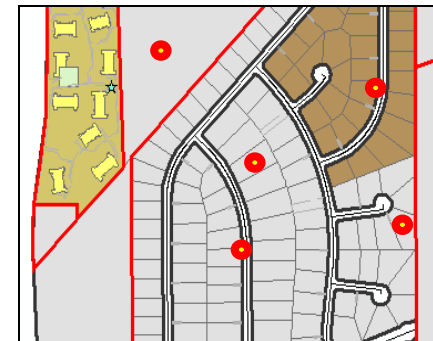


Address  
Locator



Point  
Feature  
Class

ID	ADDRESS_STREET1	ADDRESS_STREET2	ADDRESS_CITY	STATE	ZIP_CODE	COUNTRY
1014 E STREET E, AVENUE		LA PORTE	IN	46330		
10100 COLONY WOOD DR		HOWARDSDALE	IN	46029		US
1712 LEAPT 1100 NORTH		OSHAM	IN	46777		us
102 E 100 E		LAGANOVE	IN	46781		US
1077 CO RD 35		ASKLEY	IN	46785		US
1026 E 1011 W		LAGANOVE	IN	46781		US
1013 W 8TH S		BELL CREEK	IN	46585		
1014 E 800 S		LA PORTE	IN	46380		US
1001 E 800 S		LA PORTE	IN	46380		
1006 N 400 E		LAGANOVE	IN	46781		US
1411 S BRACKENFORTH DR		GREENSBURG	IN	47140		US
1402 W 1000 N		OSHAM	IN	46777		us
1002 W 200 S		LAGANOVE	IN	46781		US
1002 WALKWAY DRIVE W02		CLARKSVILLE	IN	47129		US
1015 W 1000 N		LAGANOVE	IN	46781		
1003 W 400 S		HAFFORD CITY	IN	47140		US
1004 W 100 S		HOLLCOTTVILLE	IN	46785		US
1006 W 100 S		LAGANOVE	IN	46781		US
1740 SOUTH 200 EAST		LAGANOVE	IN	46781		
1708 S 200 EAST		KNOX	IN	46540130		
1708 S 200 W		DECATUR	IN	46733		US
1712 W 200 NORTH		LA PORTE	IN	46380		US



# Address Matching Process

Add the  
address table to  
the map



Choose the  
Address Locator



Set the geocoding  
parameters

Match the  
Addresses

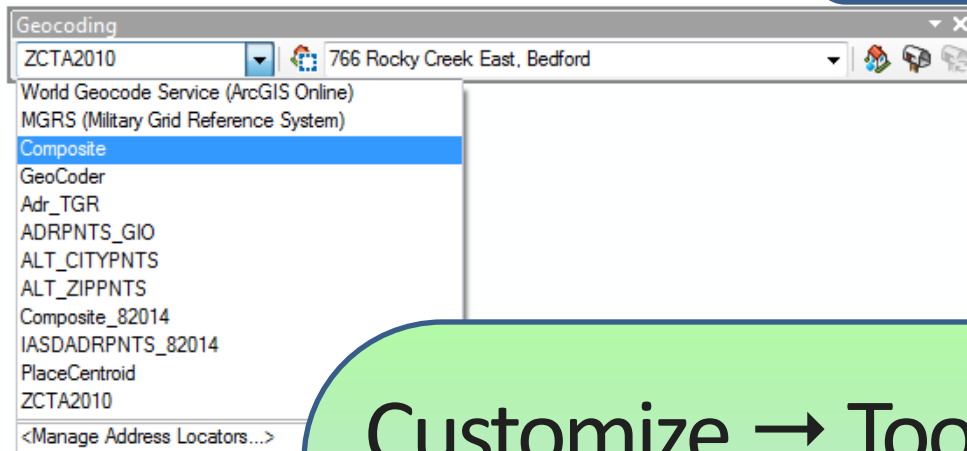
Adjust  
geocoding  
parameters



Geocoding can be done from  
ArcCatalog or ArcMap.

**NOTE**

# Geocoding Toolbar



## Customize → Toolbars → Geocoding

- Shows available address locators
- Use ArcGIS Online or local locators
- <https://gis.in.gov/arcgis/services> (State)
- Can use the Map Extent to limit search
- Quick way to search and view single address



## Table of Addresses

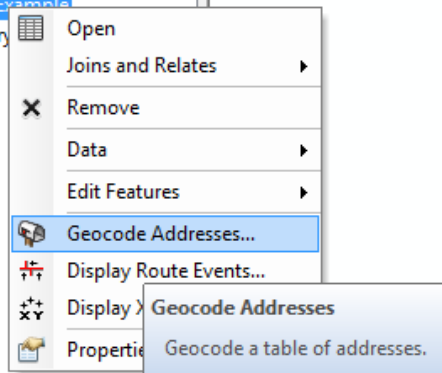
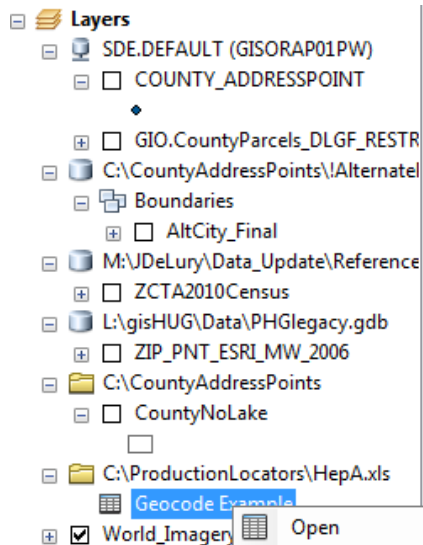
Can be any  
database table  
Common  
formats are:

- .xls, .xlsx,
- .dbf,
- .txt, .csv
- .mdb tables
- Oracle tables

[illegible]

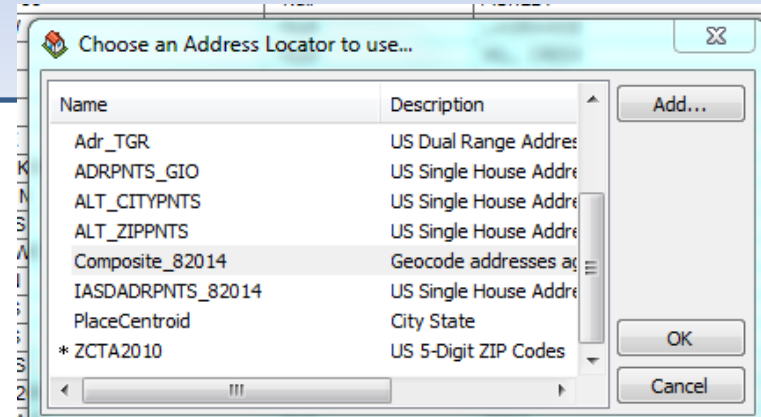
# Start Geocoding

Right-click → Geocode Addresses



## Choose Address Locator

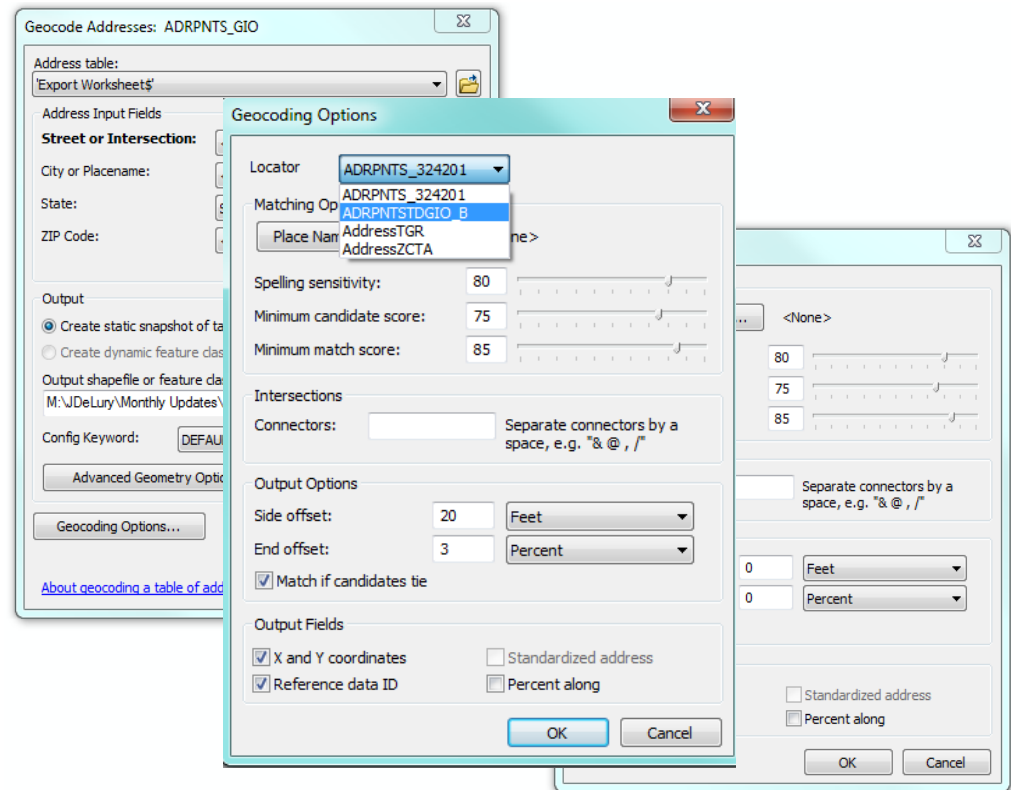
- State (<https://gis.in.gov/arcgis/services>)
- Local
- Custom
- ArcGIS On Line



Check  
Parameters

# Parameters

- Select the address table
- Choose Address Input Fields
- Defaults parameters will be set...they can be changed
- Advanced Geometry: Sets projection
- Geocoding Options:
  - Offsets set at 0
  - Check (✓) X and Y coordinates
  - Check (✓) Reference data ID if needed
  - Composite: Parameters set for each locator
  - Match ties only needed for street segments



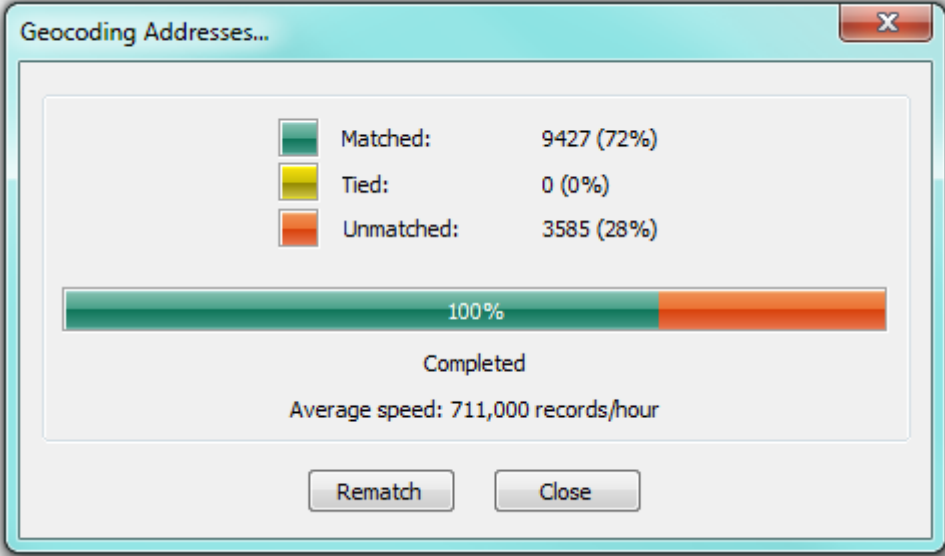
Geocoded feature class will have points only for matches and ties

NOTE

Some records will not have corresponding points because of errors in the data

## Unmatched Addresses

Unmatched addresses can be matched manually



**Interactive Match - Geocoding\_Result**

Show results: All Addresses Manage result sets... Refresh Rematch Automatically

Status	ADDRESS_ST	ADDRESS_1	ADDRESS_CI	STATE
U	4962 JONQUIL	76		IN
U	800 N UNION ST APT 308	APT 308		IN
U	312 MAJOR BAUMAN TERRACE			IN
U	2801 TOLEDO RD APT 917		ELKHART	IN
U	1505 LOCUST ST APT 109		ELKHART	IN
U	5418S NORTH HASTINGS		ELKHART	IN
U	1000 W MISHAWAKA RD APT 31		ELKHART	IN
U	1101 EDWARDSBURG AVE		ELKHART	IN
U	1432 PRESIDENT DT		ELKHART	IN
U	9923 S NORTHBROOK		FT WAYNE	IN
U	127 WATER TOWER CT		GOSHEN	IN
U	58043 JEMIAN DR		GOSHEN	IN
U	1460 SHERMAN ST		HAMMOND****	IN

Address: 9432 (of 13012)

---

**Candidate details:**

House	PreDir	PreType	StreetName	SufType	SufDir	City	State	ZIP	Ref_ID	X	Y	User_fid
2801			Toledo	Rd		Elkhart	IN	46516	228496	-85.926932	41.673833	0

Geocoding Options... Zoom to Candidates Pick Address from Map Search Match Unmatch Save Edits Close

**Some records may not be matched  
due to data entry errors !!!**





# Address Geocoding

## Contact GIO Office

# Questions???