

GIS MAPPING OF 7 MAJOR US CITIES, 1830-1930

Historical Urban Ecological (HUE) data set



Overview

- Baltimore, Boston, Brooklyn, Chicago, Cincinnati, New York, Philadelphia
- 1830-1930
- Components
 - Street Centerlines
 - Ward Boundary Histories
 - Ward level tabular data
 - Sewer & Water Infrastructure
 - Geocoded soldier residences



Motivation

- Urban health environment
- Context for UA Data
- Previous Data was limited



Previous Projects

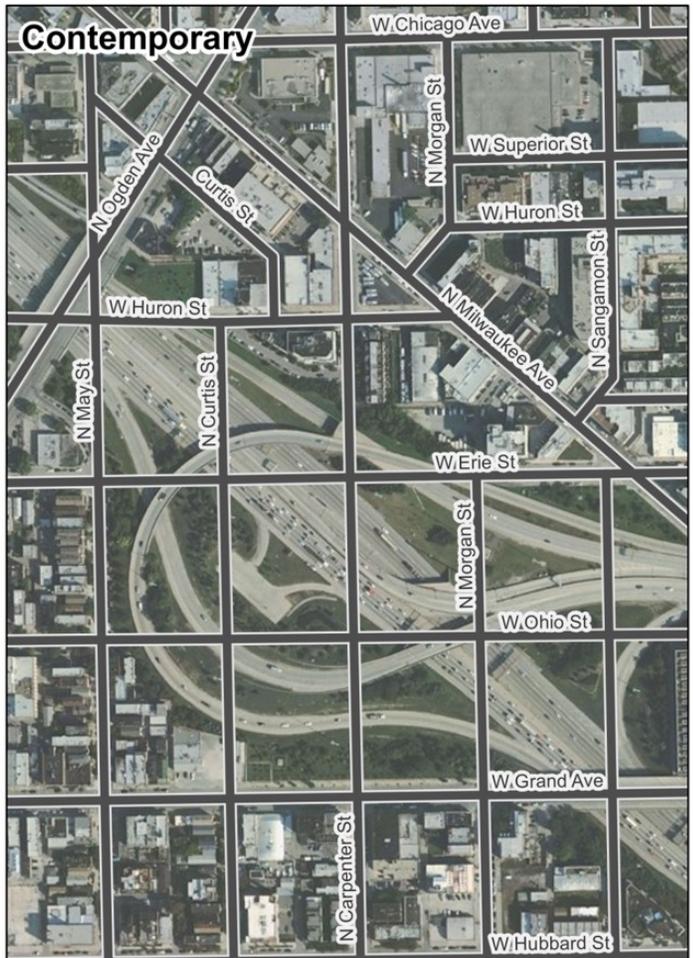
- National Scale, large geographies:
 - NHGIS (Fitch and Ruggles 2003)
 - Great Britain Historical GIS Project (Gregory et al. 2002)
 - Belgium HGIS (De Moor and Wiedemann 2001)
- Urban, single year:
 - Urban Transition Project, 1880 (Logan et al. 2011)
- Urban, single city:
 - London, ON (Gilliland and Lafreniere, ongoing)
 - Montreal (Gilliland, Olson and Gauvreau 2011)
 - Alexandria, VA (DeBats and Lethbridge 2005)



Street Centerlines

- Circa 1930
- Very different from present day
- Changes from 1830-1930 mostly additive
- Single map source
- Built from scratch or Census 2007 TIGER/Line files
- Checked against USGS National Map orthoimagery and TIGERLINE files (15 foot tolerance) and Sanborn fire insurance maps

Contemporary



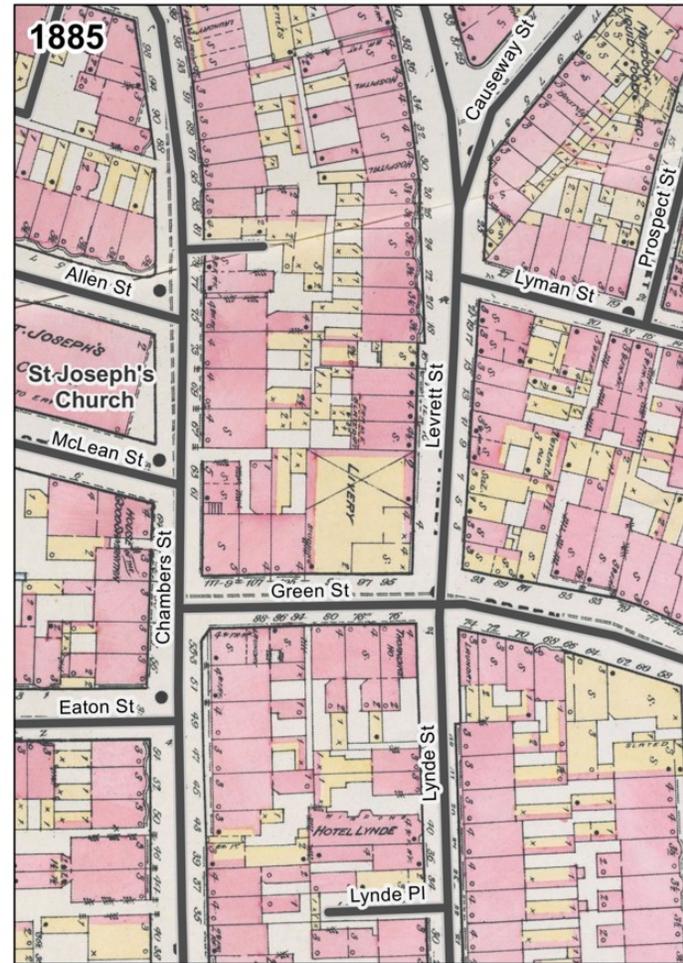
1939



Sources: CPE, 2013; USDA, 1938-1941; ESRI, i-cubed, USDA, USGS, AEX, Geo-Eye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

— HUE Street Centerlines, 1930





Sources: CPE, 2013; Sanborn Map Company, 1885; ESRI, i-cubed, USDA, USGS, AEX, Geo-Eye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

— HUE Street Centerlines, 1930

0 250 Feet



Street Centerlines

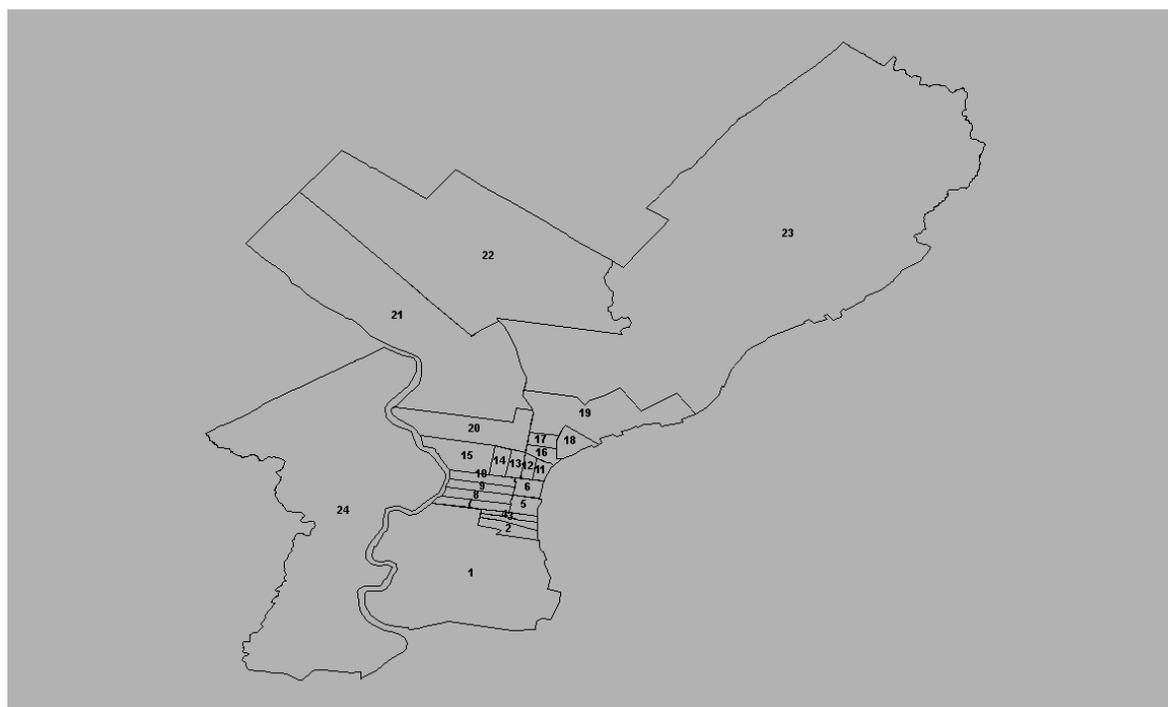
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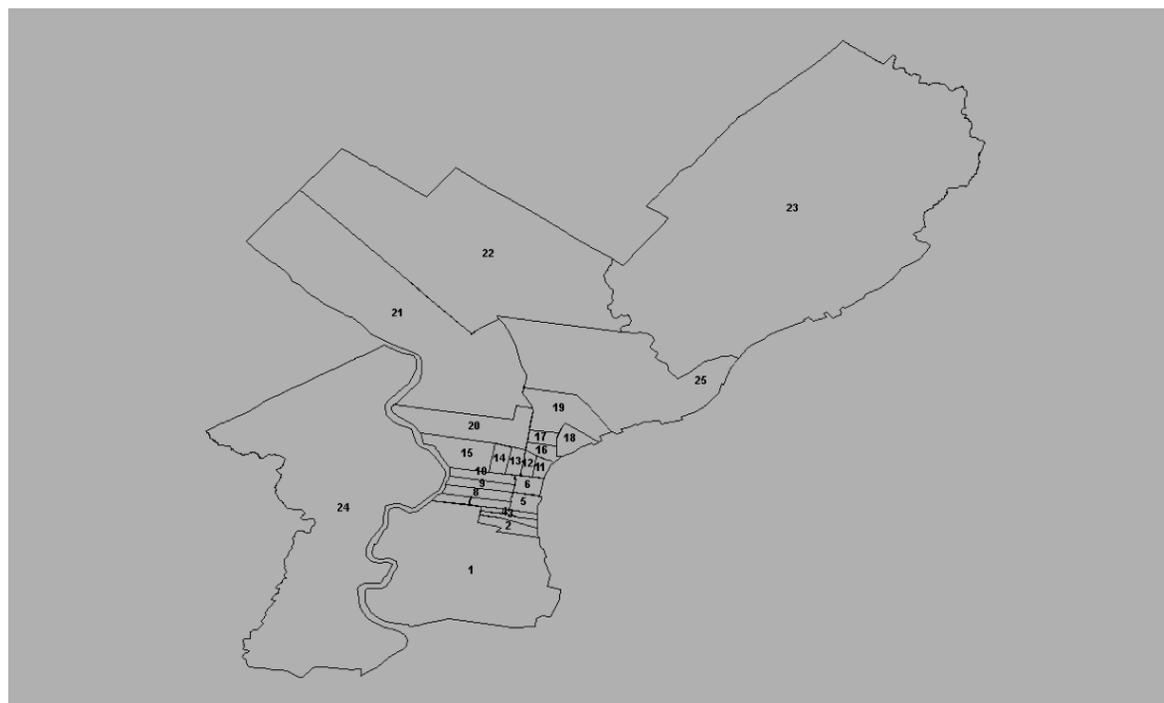
Ward Boundary Histories

- Redivision and annexing
- Text descriptions and Maps
- Built using our street centerline files
- Idiosyncratic patterns
 - Manhattan doesn't change after 1854
 - Boston and Baltimore CBD wards changed boundaries

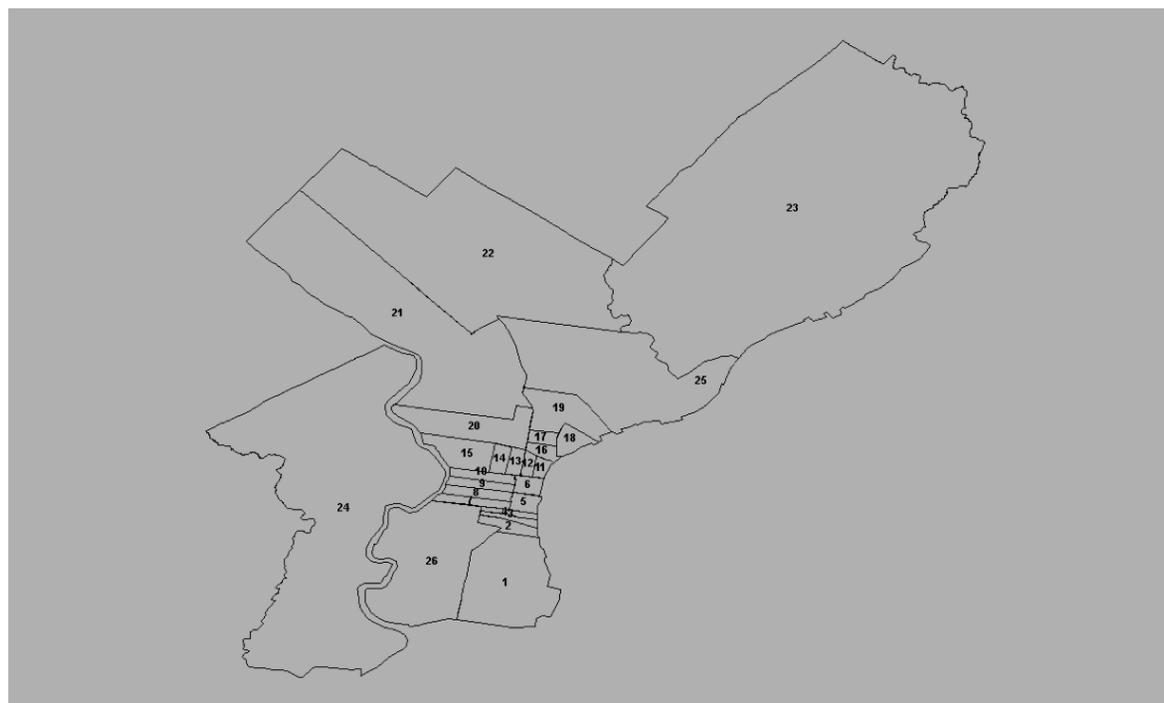
Philadelphia Wards 1855-1860



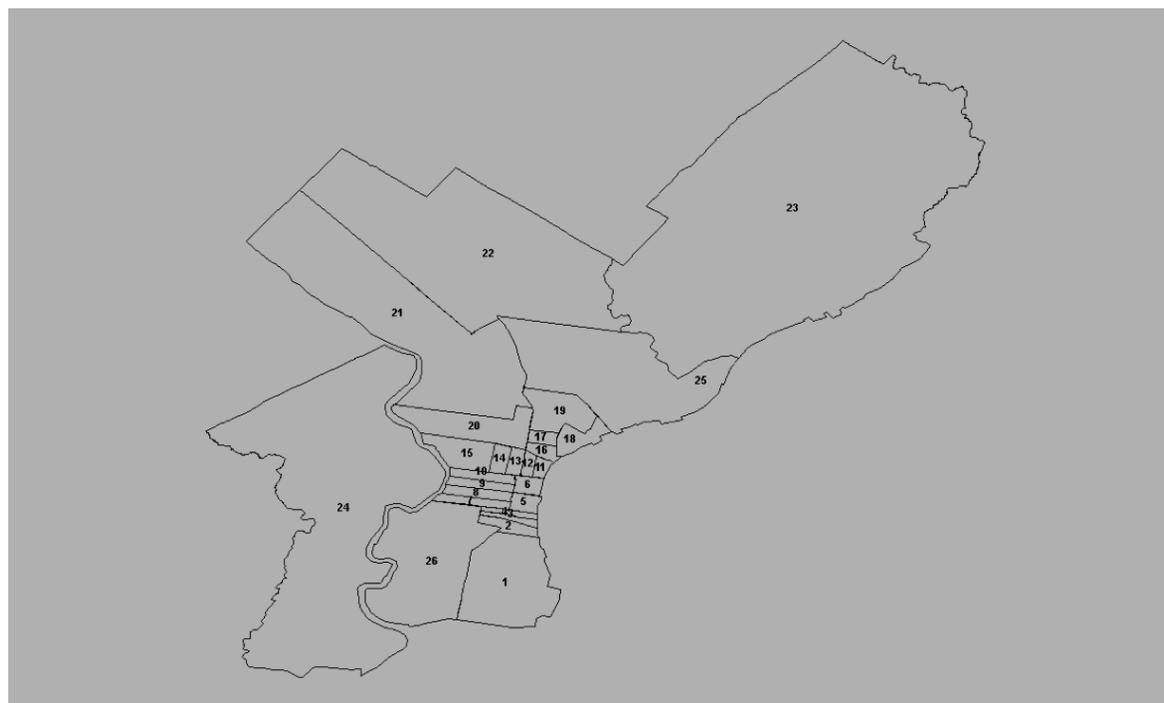
Philadelphia Wards 1861-1863



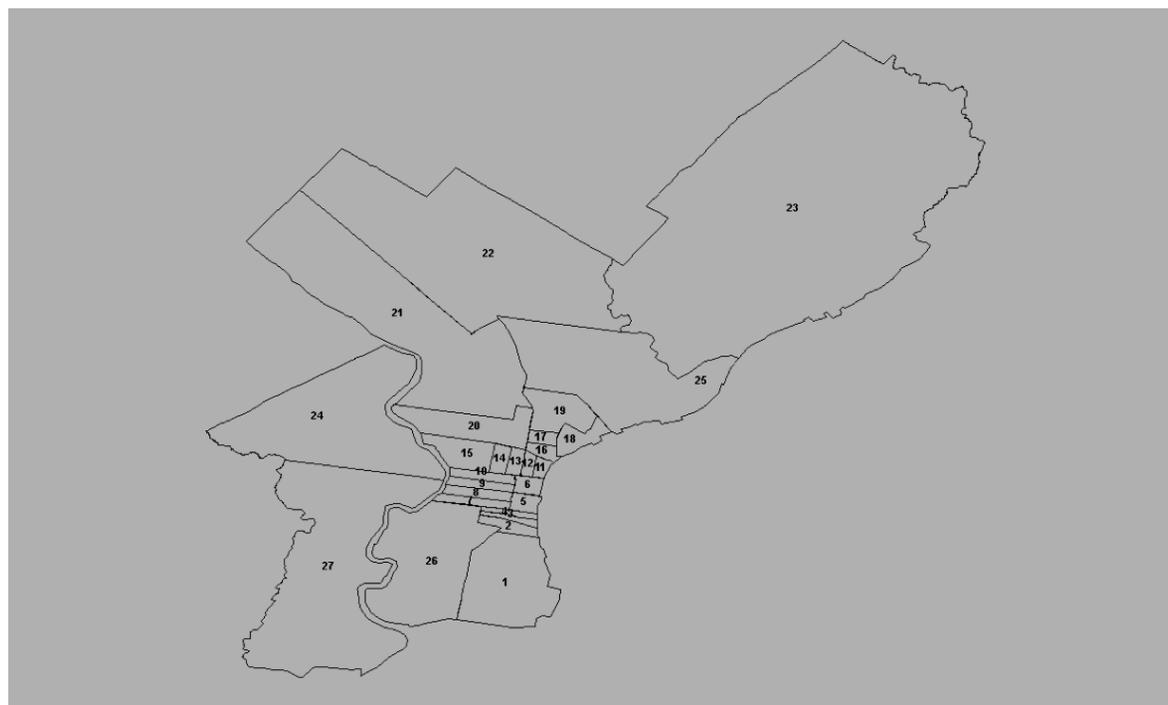
Philadelphia Wards 1864



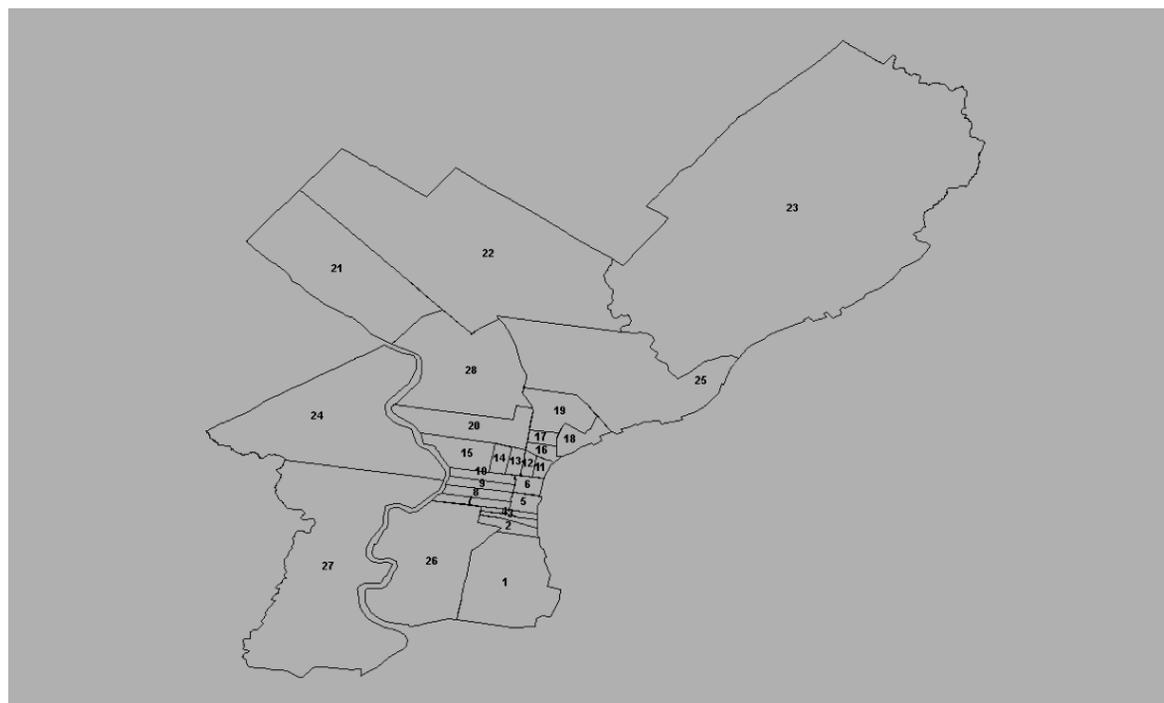
Philadelphia Wards 1865



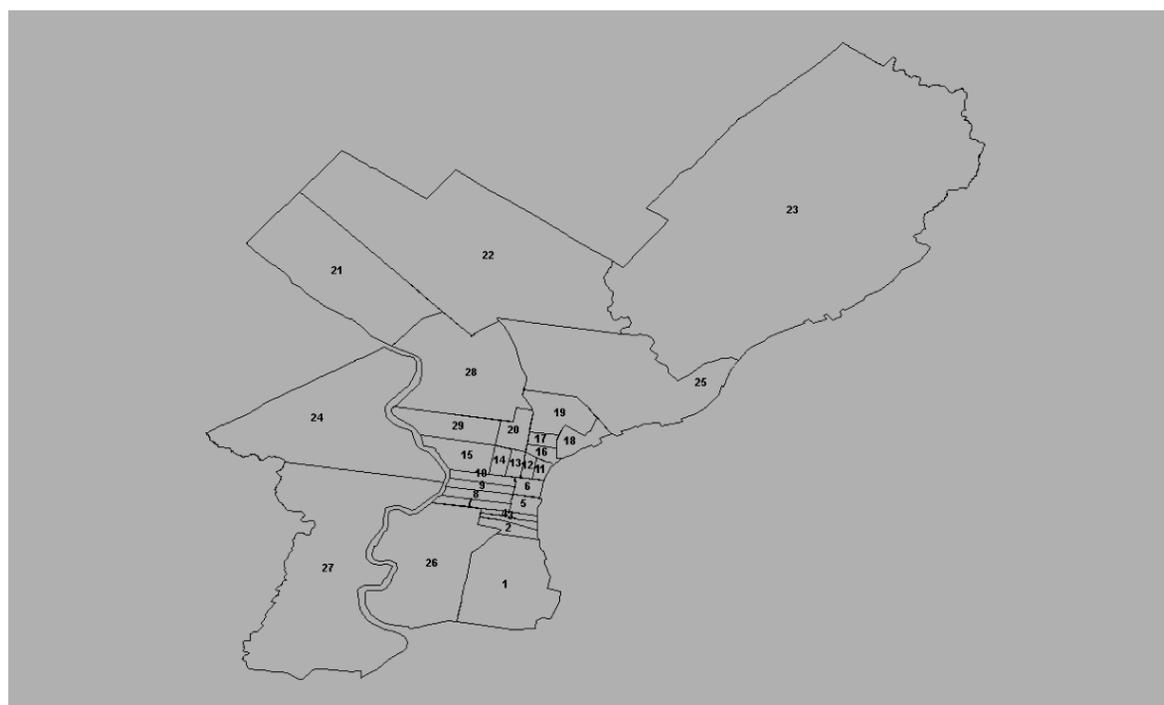
Philadelphia Wards 1866



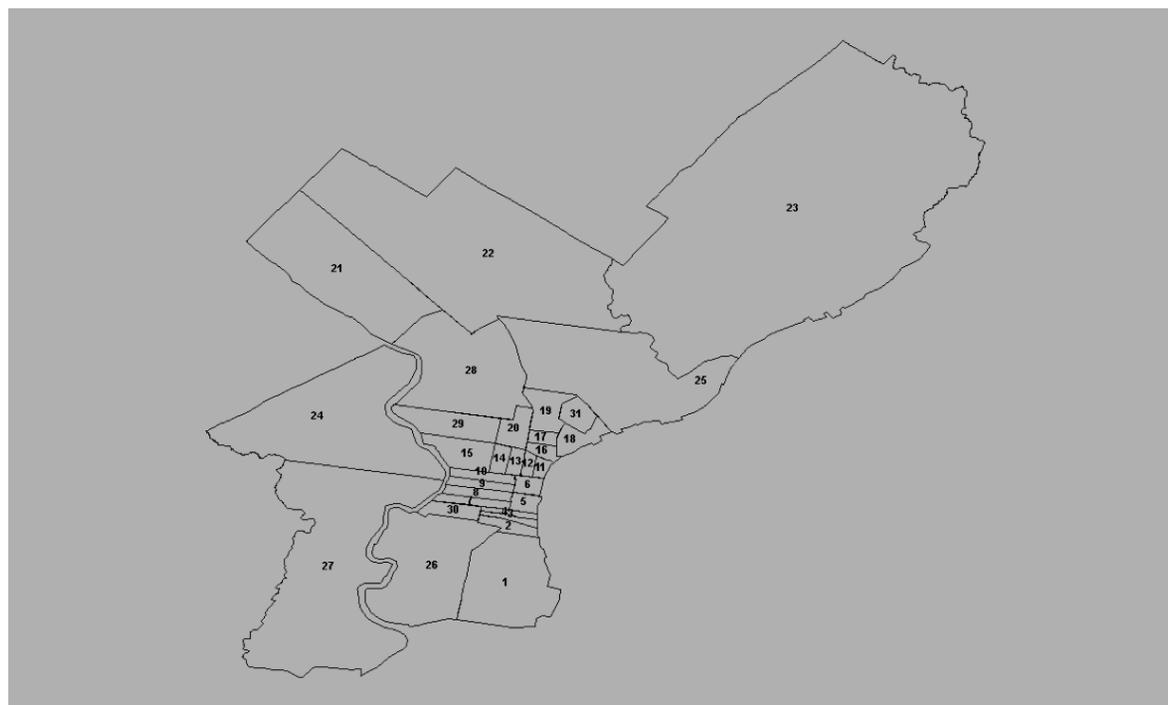
Philadelphia Wards 1867



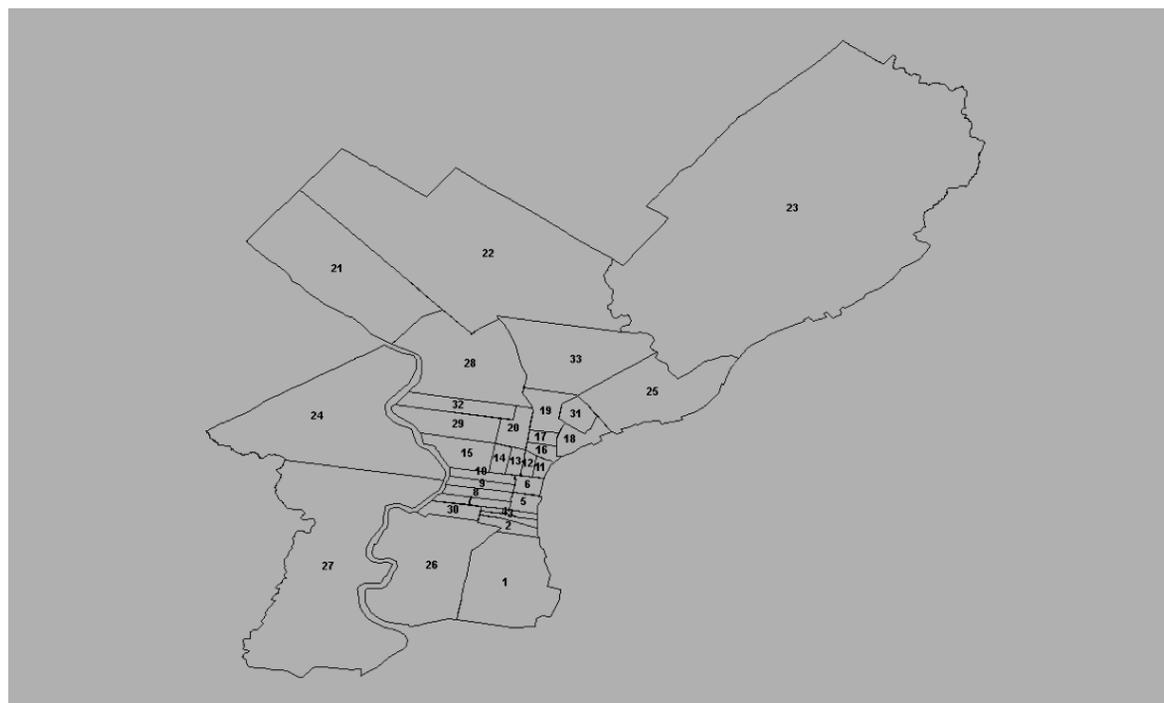
Philadelphia Wards 1871-1874



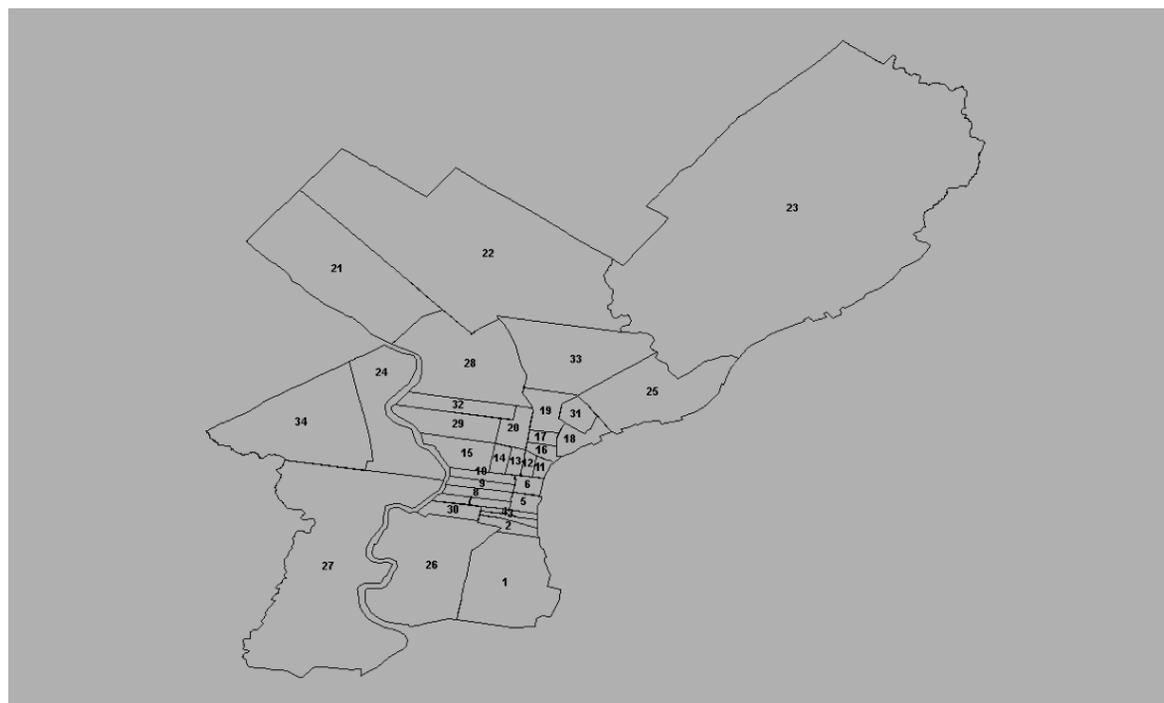
Philadelphia Wards 1875-1887



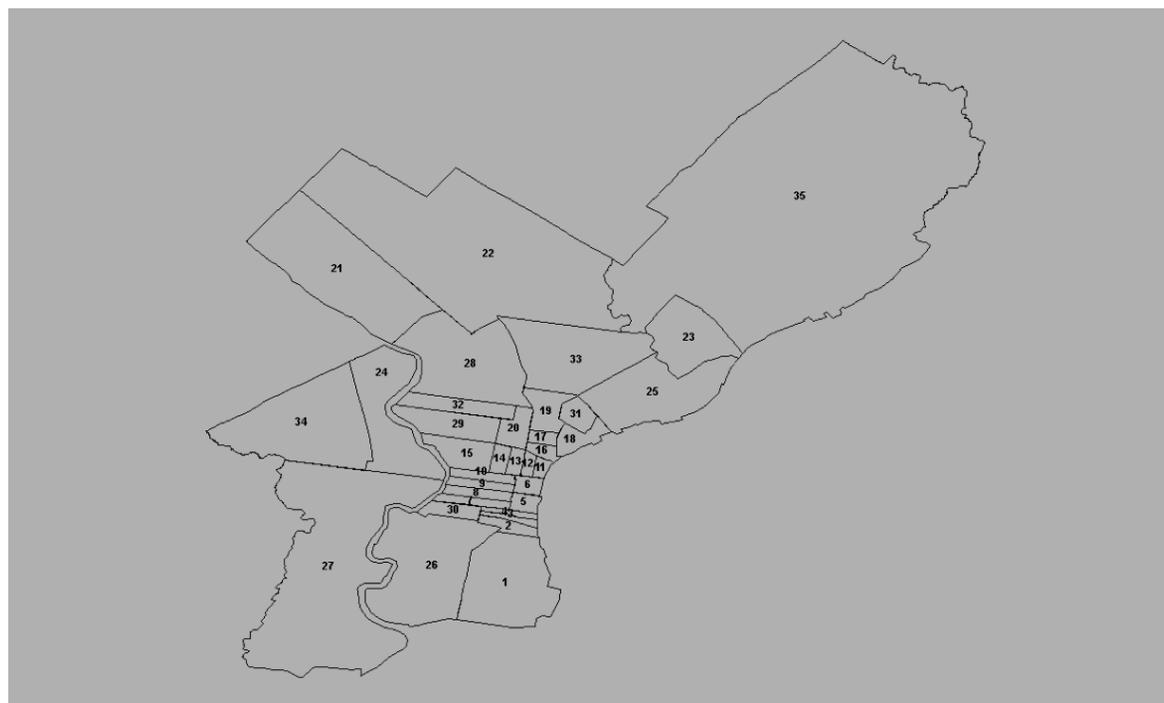
Philadelphia Wards 1888



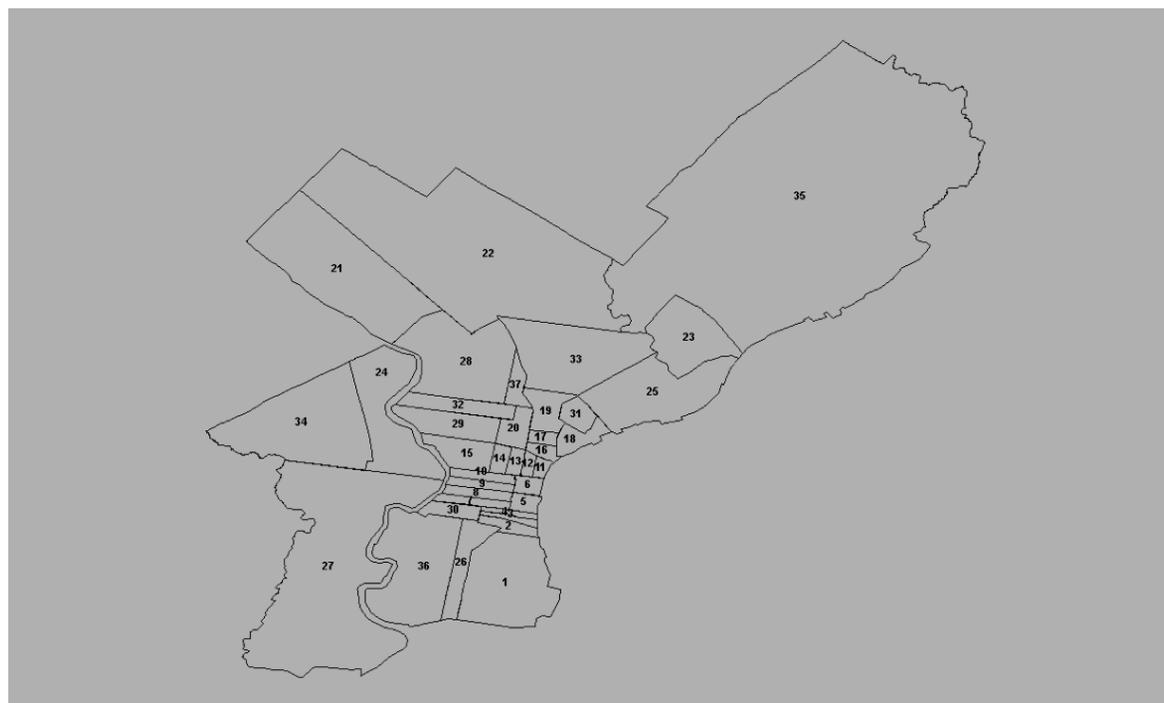
Philadelphia Wards 1889



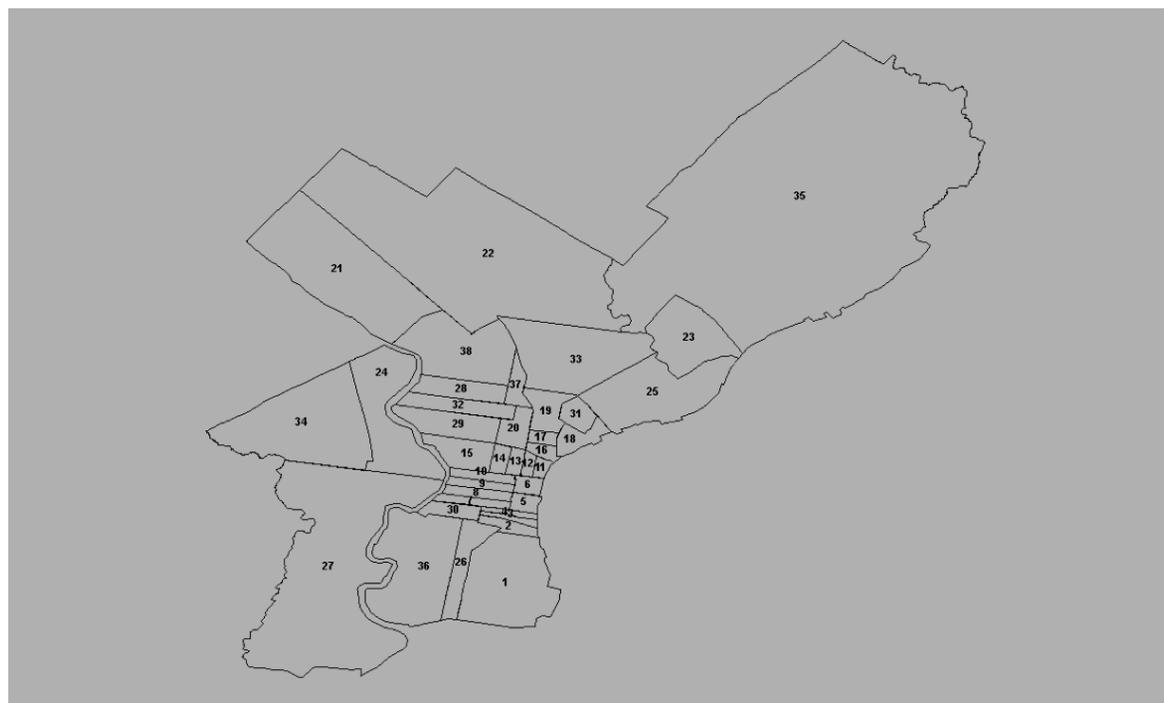
Philadelphia Wards 1890-1891



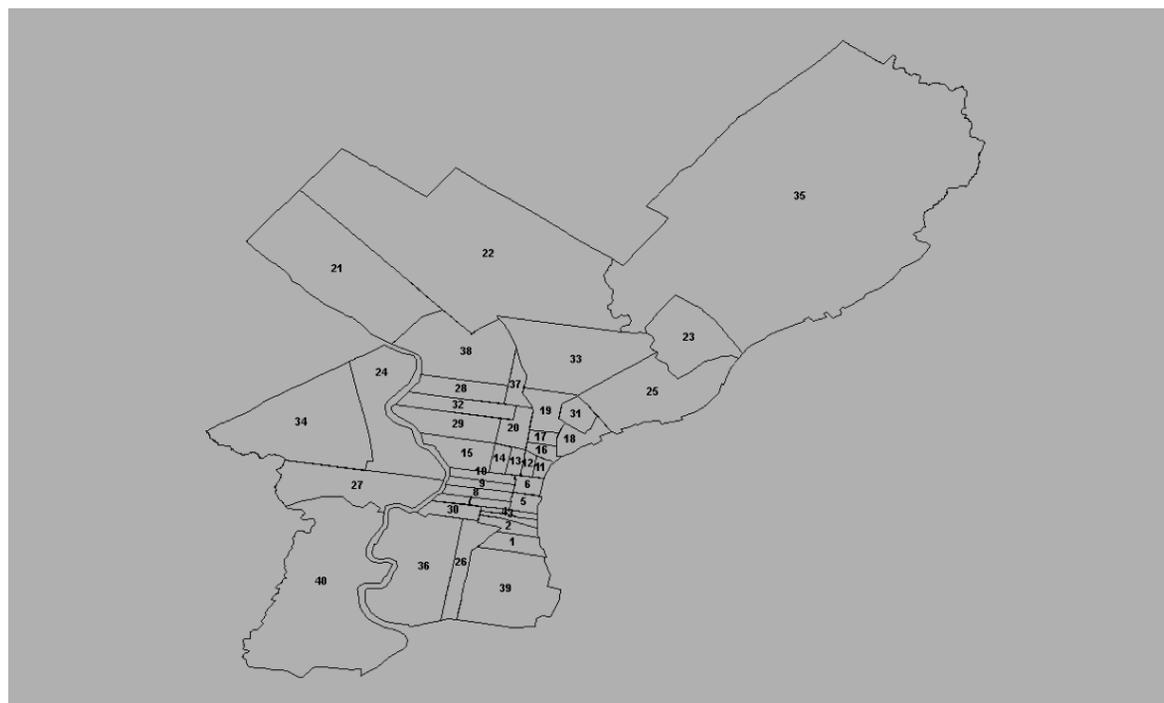
Philadelphia Wards 1892-1895



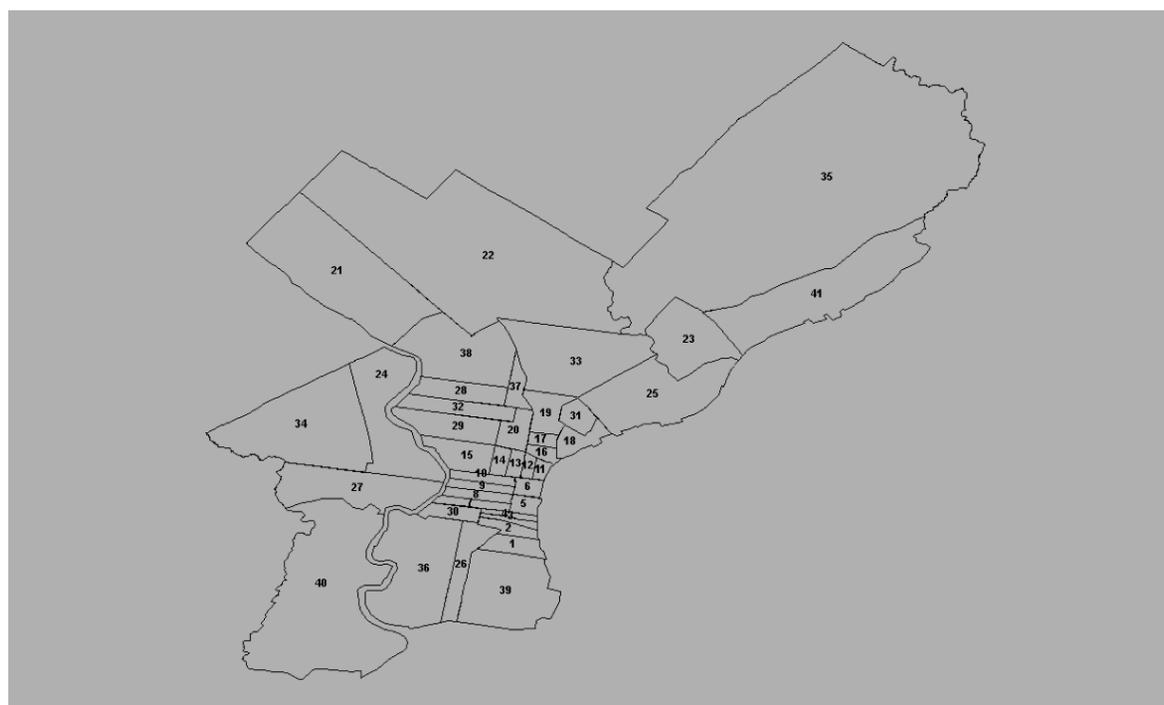
Philadelphia Wards 1896-1897



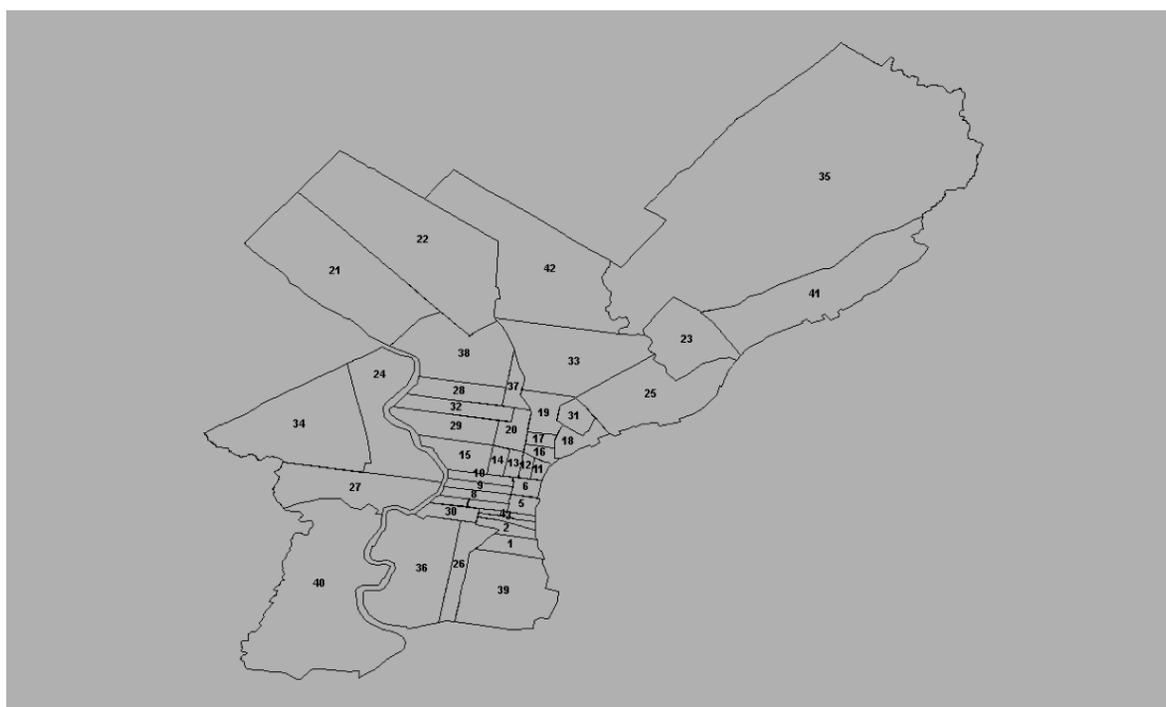
Philadelphia Wards 1898



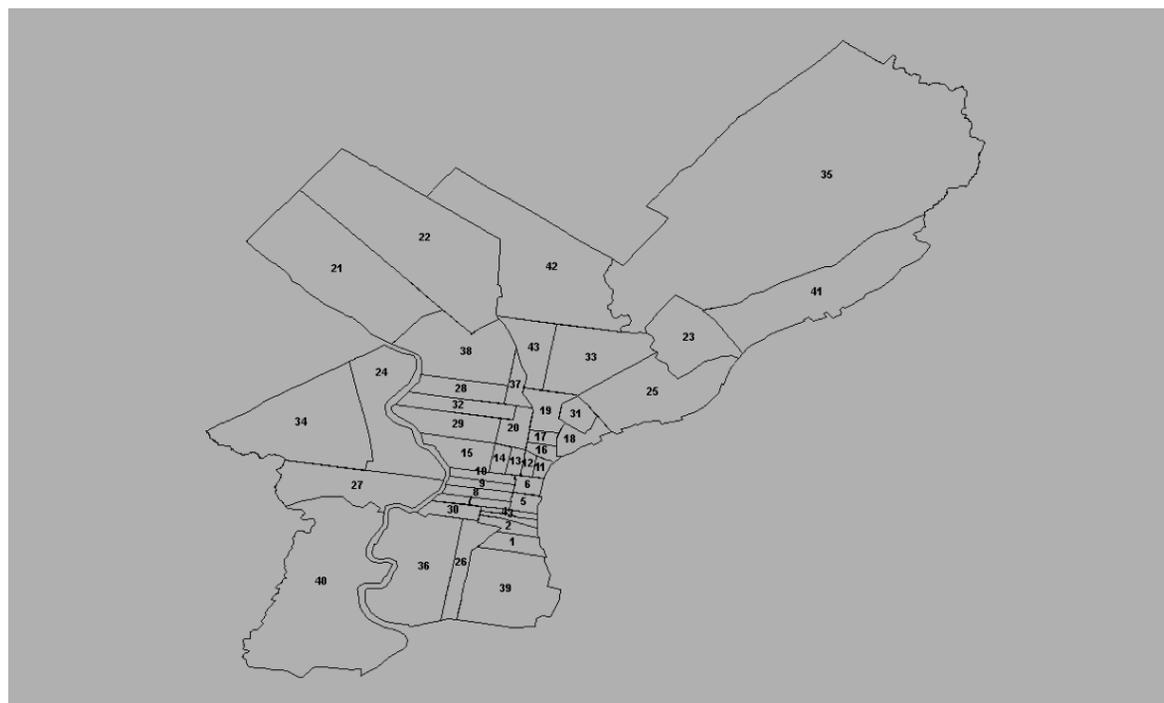
Philadelphia Wards 1899-1900



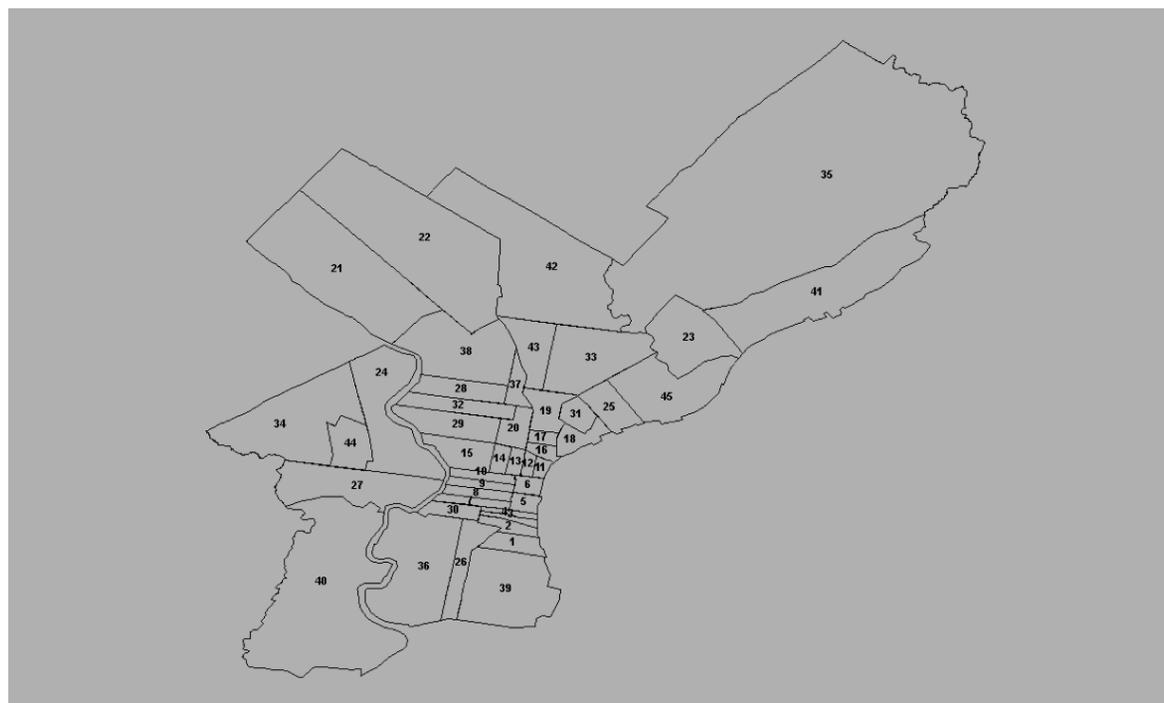
Philadelphia Wards 1901-1904



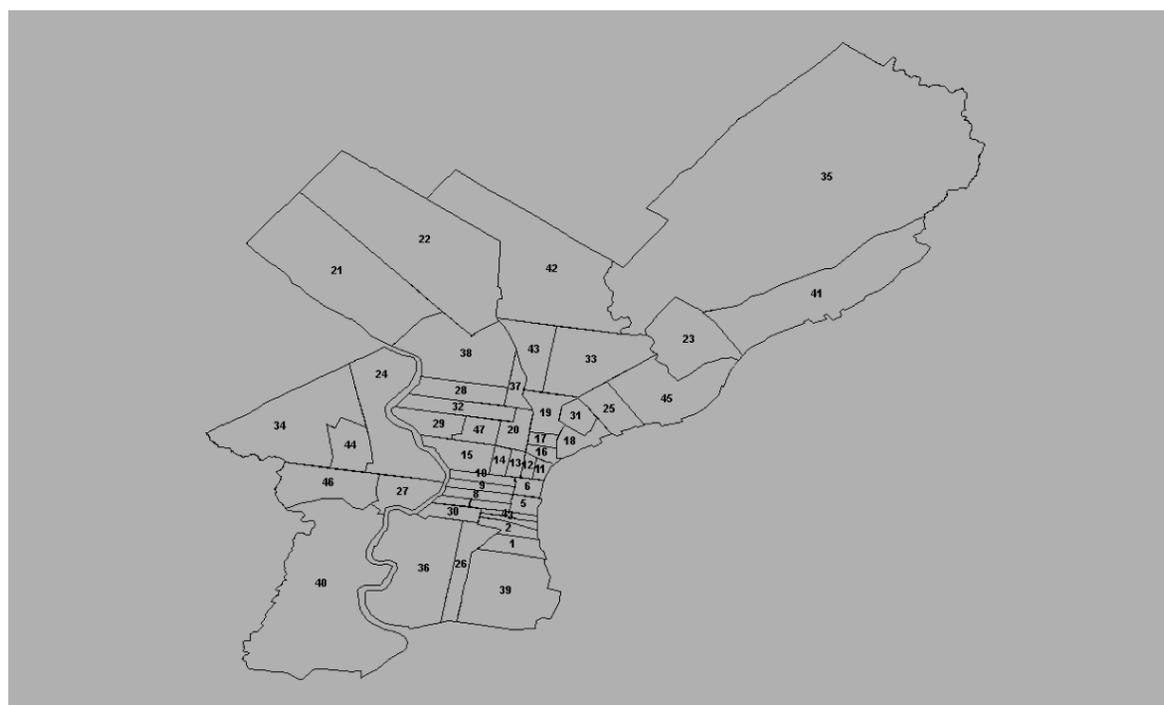
Philadelphia Wards | 1905



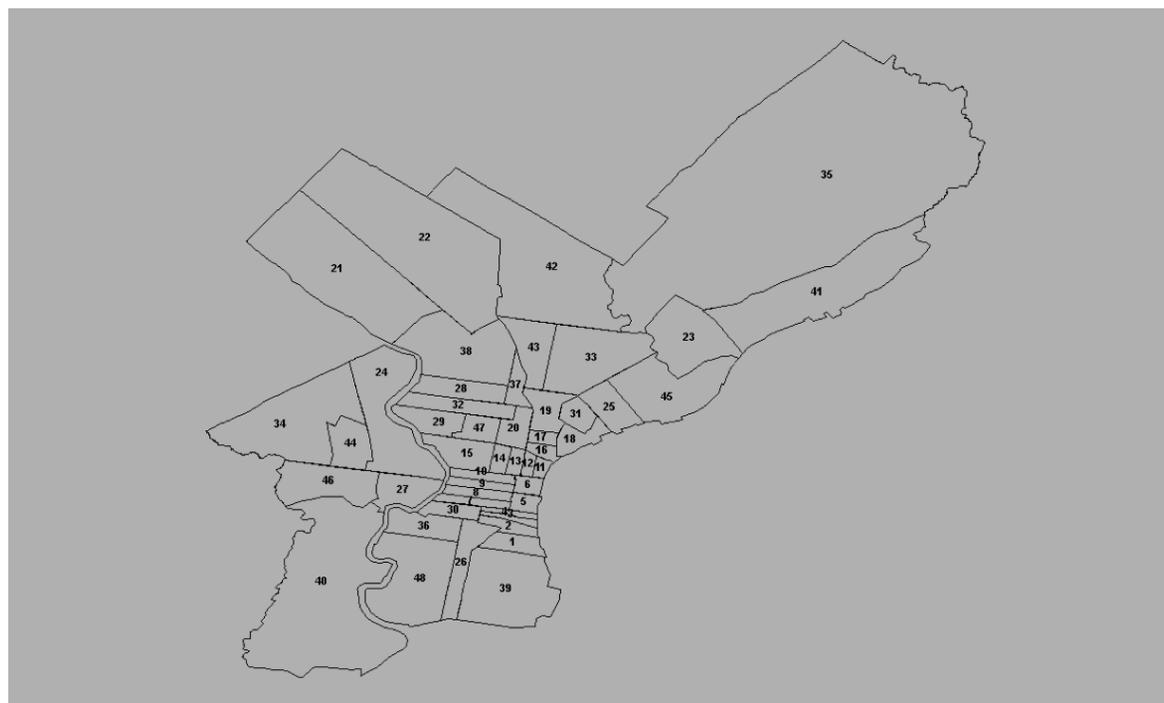
Philadelphia Wards | 1906



Philadelphia Wards 1907-1913



Philadelphia Wards 1914-1931



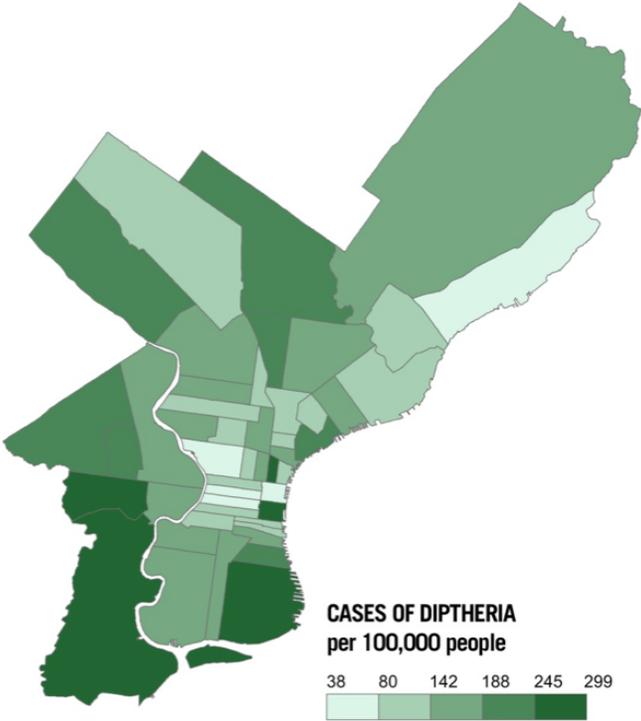
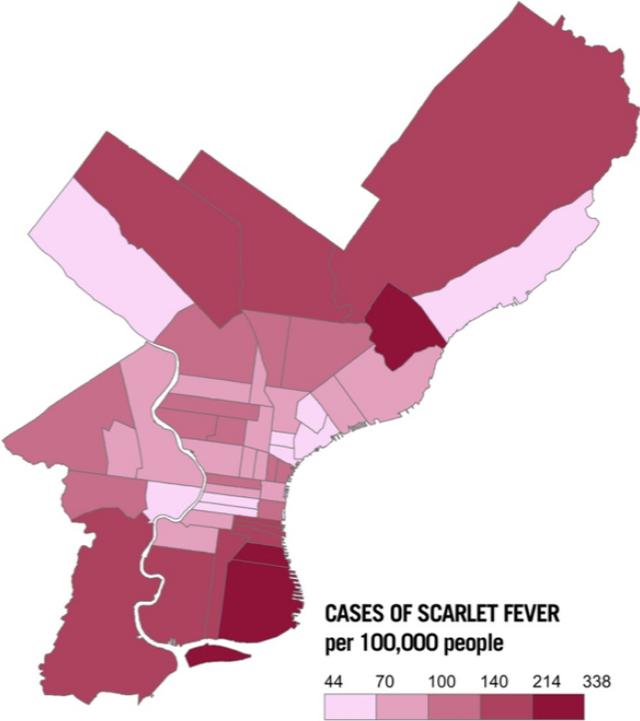


Tabular Ward-level Data

- Categories
 - Crime
 - Disease
 - Municipal
 - Property
 - Vital Statistics
- Data becomes more available over time
- Currently available as Excel spreadsheets with lookup by variable, city, and year

SCARLET FEVER AND DIPHTHERIA PREVALENCE

Philadelphia, 1914



0 5 Miles

Source: CPE, 2013



Sewer & Water Infrastructure

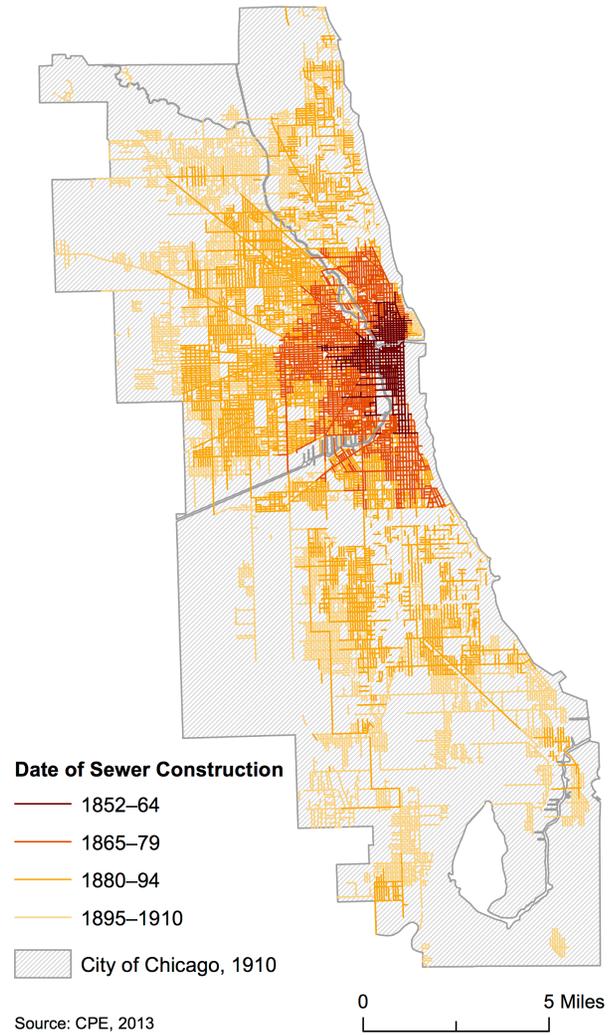
- To the street segment level
- Sourced from annual reports with tables or written descriptions about sewer and water construction
- Overlaid over street centerline files

Sewer Source Document

CONSTRUCTION OF SEWERS—(Continued.)

STREET.	BETWEEN.	CONTRACTOR.	LENGTH IN FEET.	INTERIOR DIAMETER IN INCHES.	PRICE PER LINEAL FOOT.	NO. OF BASINS.	
Fourth avenue....	Fifty-ninth street and 100 feet north of Sixty-ninth street, with curved branches on the westerly side for lateral sewers.....	Cunningham & Keyes.	1825 40 760 300	48 by 32 ell..... 24 inches cir..... 18 do..... 15 do.....	\$6 70	10	
Allen street.....	Stanton and Houston streets.....	J. Duffy, Jr.....	145	12 do.....			
Jane street.....	Eighth avenue and Greenwich av.....	P. Gibney.....	482 513	12 do..... 12 do.....			3 45 3 47
Forty-ninth street..	Eighth and Ninth avenues.....	M. Treacy.....	40 710 170	18 do..... 15 do..... 12 do.....			5 00
Fifty-third street... One Hundred and Twenty-eighth st., West street.....	Second and First avenues..... Third and Fourth avenues..... Horatio and Gansevoort streets.....	do..... do..... John Duffy, Jr.....	634 934 194	15 do..... 18 do..... 12 do.....	5 00 5 00 3 40	1	
Fifty-sixth street... Eleventh avenue... Ninth avenue.....	Eighth and Eleventh avenues..... Fifty-sixth and Fifty-ninth streets... One Hundred and Twenty-fifth and One Hundred and Twenty-sixth sts.	M. Treacy..... M. Treacy..... J. Cunningham.....	797 1035 1565 335	48 by 32 ell..... 18 inches cir..... 15 do..... 30 do.....	6 00 6 00 8 93		1
Seventieth street... Thirty-ninth street, Mission place..... Twentieth street... Gramercy park.... West street.....	Third and Fourth avenues..... Second avenue and crown between Second and First avenues..... Northeast corner of Worth street.... Southwest corner of Irving place.... Southwest corner..... On and near from Hoboken street to Hammond street.....	M. Treacy..... M. Gavin..... J. Everard..... do..... do..... do.....	420 39 30 370	12 do..... 15 do..... 12 do..... 12 do.....	4 50 7 90	1 1 1 27	
Total.....			39,025			108	

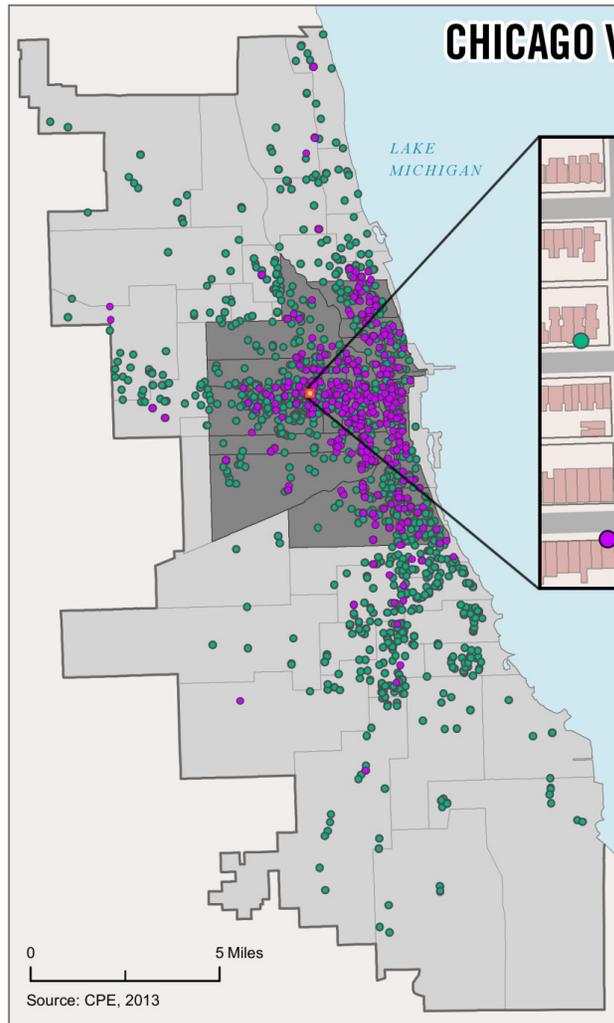
Chicago Sewer 1852-1910





Geocoding

- Any address level location for soldiers in target cities
 - Census
 - Pension
 - Surgeon's Certificates
- Urban sample of Union Army soldiers
 - Baltimore – 1,411 soldiers
 - Boston - 1,689 soldiers
 - Chicago – 1,606 soldiers
 - New York + Brooklyn – 5,016 soldiers
 - Philadelphia – 2,949 soldiers
- Any address level data can be geocoded using our street centerline files and sources



CHICAGO VETERAN RESIDENCES Before and After 1889



- Veterans, 1860–1888
- Veterans, 1889–1930
- Building footprints, c. 1915
- Chicago, 1888
- Chicago, 1930

Union Army Veterans lived in many parts of the city and may have moved during the research period. The UA data set allows us to place veterans in both time and space in order to analyze the interactions between spatial characteristics and health outcomes during a period of intensive urban growth.



Walter S Stebbins
626 Washington Blvd

Place of birth: New Haven, CT
Date of birth: October 1, 1841
Date of death: April 8, 1909

Hospitalized four times during service, diagnosed with syphilis and smallpox; awarded pension at age 50 for rheumatism

Served together in the 134th Illinois Infantry, Company A



P Foster Pettibone
1818 Warren Blvd

Place of birth: Mercer, PA
Date of birth: April 28, 1841
Date of death: April 14, 1916
Occupation: Stationer/printer

Rises from clerk to printer; living at address from 1880 to 1911, after which he moved nearer to downtown



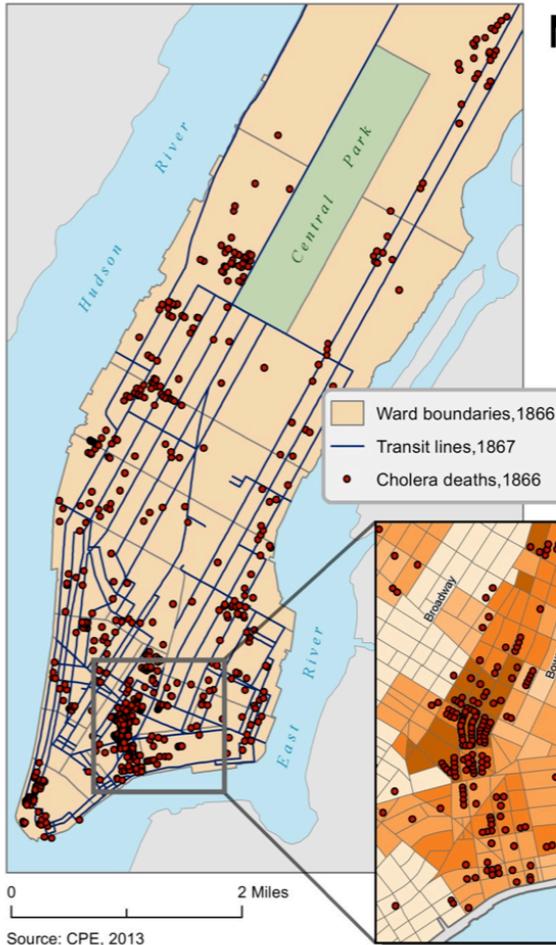
William Heineman
158 Warren Ave (1819 Warren Blvd)

Place of birth: Neustrelitz, Germany
Date of birth: January 30, 1843
Date of death: July 28, 1922
Occupation: Banker/broker

Marries Catherine Gross at Saint Paul's Church in Chicago in 1868; father of five children

NEW YORK CITY CHOLERA OUTBREAK of 1866

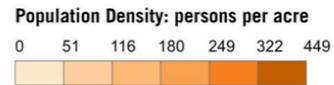
Point, line, polygon, and tabular data can be used individually or in concert to examine historical and epidemiological events. HUE GIS files support research in which spatialized historical data at many scales are required.



NEW YORK.—DEATHS FROM ZYMOTIC DISEASES.
Registered during the week ending Saturday, August 4, 1866.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping-cough.	Typhus fever.	Typhoid fever.	Cholera.
First									14
Second									1
Third							1		2
Fourth									2
Fifth									6
Sixth			1				1		1
Seventh				1					4
Eighth				2					6
Ninth			1						1
Tenth			2						2
Eleventh				2			2	2	66
Twelfth								1	4
Thirteenth									2
Fourteenth									4
Fifteenth									1
Sixteenth									94
Seventeenth									3
Eighteenth									4
Nineteenth									
Twentieth									
cases in all	5	12	7	2	1	5	9		239

Weekly mortality table from the 1866 Report of the Metropolitan Board of Health



Block-level population density was derived from a combination of historical density maps and ward-level population data available through the HUE extraction system.



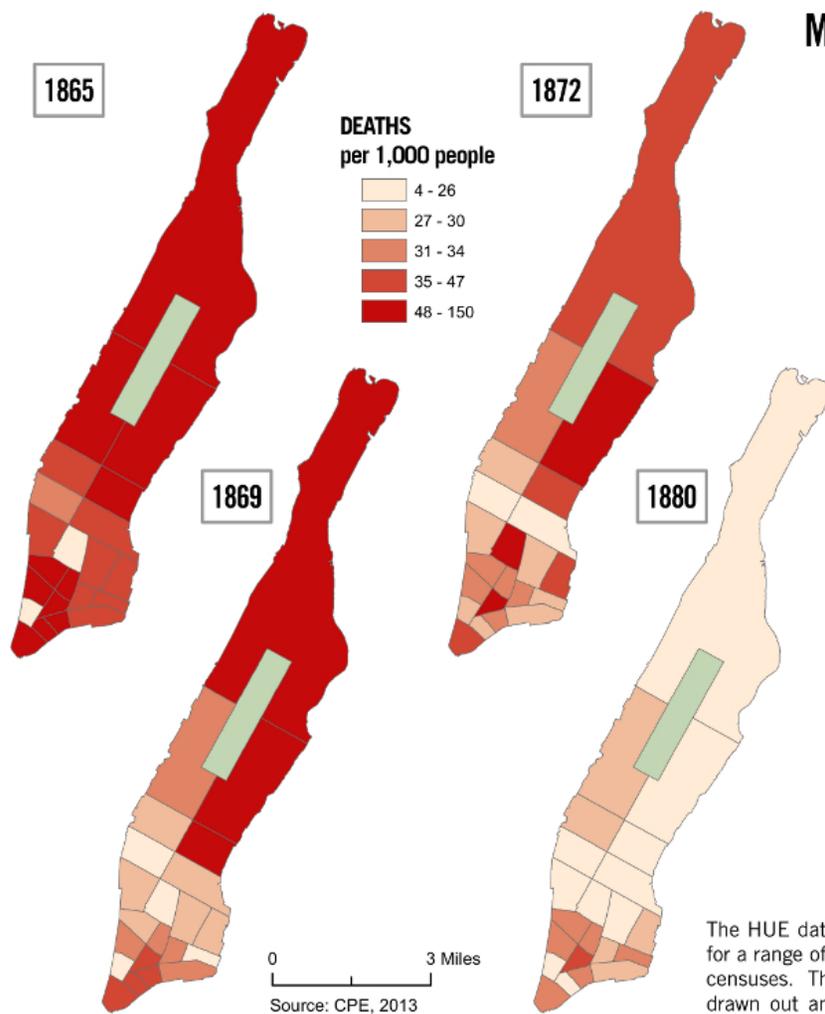
Things to keep in mind

- Uses GIS Data
- Data can't answer every question you want
- Each city's data is idiosyncratic

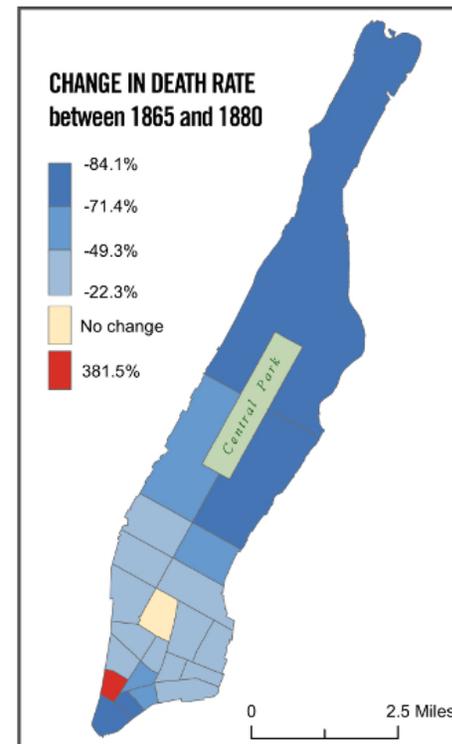


Opportunities

- Interactions within HUE
 - Time series
 - Interactions between variables
- Interactions with UA Data
- Interactions with outside data
 - Geocoded data
 - Census linked samples



MANHATTAN'S CHANGING MORTALITY 1865-1880



The HUE data set can be used to construct intra-censal time series for a range of variables, many of which are not included in decennial censuses. The mortality and urban disease environment can be drawn out and compared at close temporal and spatial resolution.



Current Use

- Carlos Villarreal - Long-run Impacts of Urban Growth
- Allison Shertzer - Immigration and Cities
- Hong, Cain, Villarreal - Intra-Urban Mortality
- Trevor O'Grady - Spatial Institutions in Urban Economies



THANK YOU FOR YOUR TIME!