



TEXAS TECH UNIVERSITY™

# Spatial Environmental Inequality in Lubbock, Texas

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## Introduction and Significance

The aim of this study is to identify which communities in Lubbock County exist with close proximity to environmental hazard sites.

Using GIS and spatial analysis, we examine the relationships between the spatial distributions of income, race, ethnicity educational attainment and distance to facilities releasing hazardous waste.







# Environmental Inequality

Environmental Inequality (Environmental Justice) – the notion that communities and groups (typically minority groups) are disproportionately located at a closer proximity to environmental health hazards, and potentially disadvantaged by this.

The field of “Environmental Justice” stemmed from the United Church of Christ’s 1987 report “Toxic Wastes and Race in the United States”. Academic works, spearheaded by geographer Laura Pulido emerged in the early 1990s.





## Pitfalls of Prior Research

- Inconsistent data and metrics - many papers disagree with what determines “environmental inequality”
- Inconsistent methods of spatial analysis – some papers use simple overlay and proximity analyses while others use spatial autocorrelation
- Multiple spatial scales are used – these not compatible with other studies/areas
- Attempt to prove causation or racism (intent to discriminate)
- Poor quality datasets or poor data collection methods
- People describe patterns and phenomena but do not measure how intense an inequality is or how clustered point data are
- A large regional bias and large-city bias exists. A city the size of Lubbock and in the South Plains Region has never been used to evaluate environmental inequality





## In Recent News...

# Chemical leak forces evacuation of north Lubbock neighborhood

*Posted: May 08, 2013 10:42 PM CDT*

*Updated: May 09, 2013 6:26 PM CDT*

By KCBD Staff - [email](#)



LUBBOCK, TX (KCBD) - An area in north Lubbock was evacuated Wednesday night in response to a chemical leak at Bayer CropScience at 103 Erskine near Interstate 27.

Around 7:40 p.m. Wednesday, employees at Bayer CropScience detected a leak from a faulty valve on a tank of hydrogen chloride gas and contacted authorities.

The Lubbock Fire Department established an isolation zone around the leak and began a small neighborhood evacuation.

Around midnight, changing weather conditions forced them to expand the isolation zone from Erskine crossing over I-27 south to Marsha Sharp near Avenue L, then back east to Mackenzie Parkway and back north to Erskine. Cars were allowed to travel down I-27 but Erskine remained closed.



People who live in this area are being told to evacuate. (Source: Lubbock Fire Department)






# EPA FRS Programs and Data

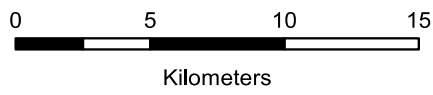
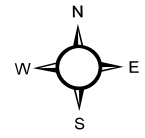


ACRONYM	PROGRAM	DESCRIPTION
FRS	Facility Registration System	A registry of facilities belonging to one or more of the following special regulatory programs
ICIS	Integrated Compliance Information System	Provides compliance tracking and assurance data for law enforcement, this is a secure system, <b>data is not public</b>
AFS	Air Facility System	In conjunction with the Clean Air Act, tracks facility compliance to reduce point source air pollution
NPDES	National Pollution Discharge Elimination System	In conjunction with the Clean Water Act, tracks facility compliance to reduce point source water pollution
LQG	Large Quantity Generators	Facilities that generate at least 1,000 kg per month of hazardous chemical waste
TRI	Toxic Releases Inventory	Facilities with regulated controlled releases of toxic materials
BROWNFIELD	Brownfields	Properties where redevelopment is complicated by contamination or significant hazardous pollution (Ex. former TRI facilities)
SSTS	Section Seven Tracking System	Mandated through Sec. 7 of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), facilities producing and/or releasing pesticides
TCEQ ACR	Agency Central Registry	Texas Commission on Environmental Quality - State operated database for state regulatory compliance tracking

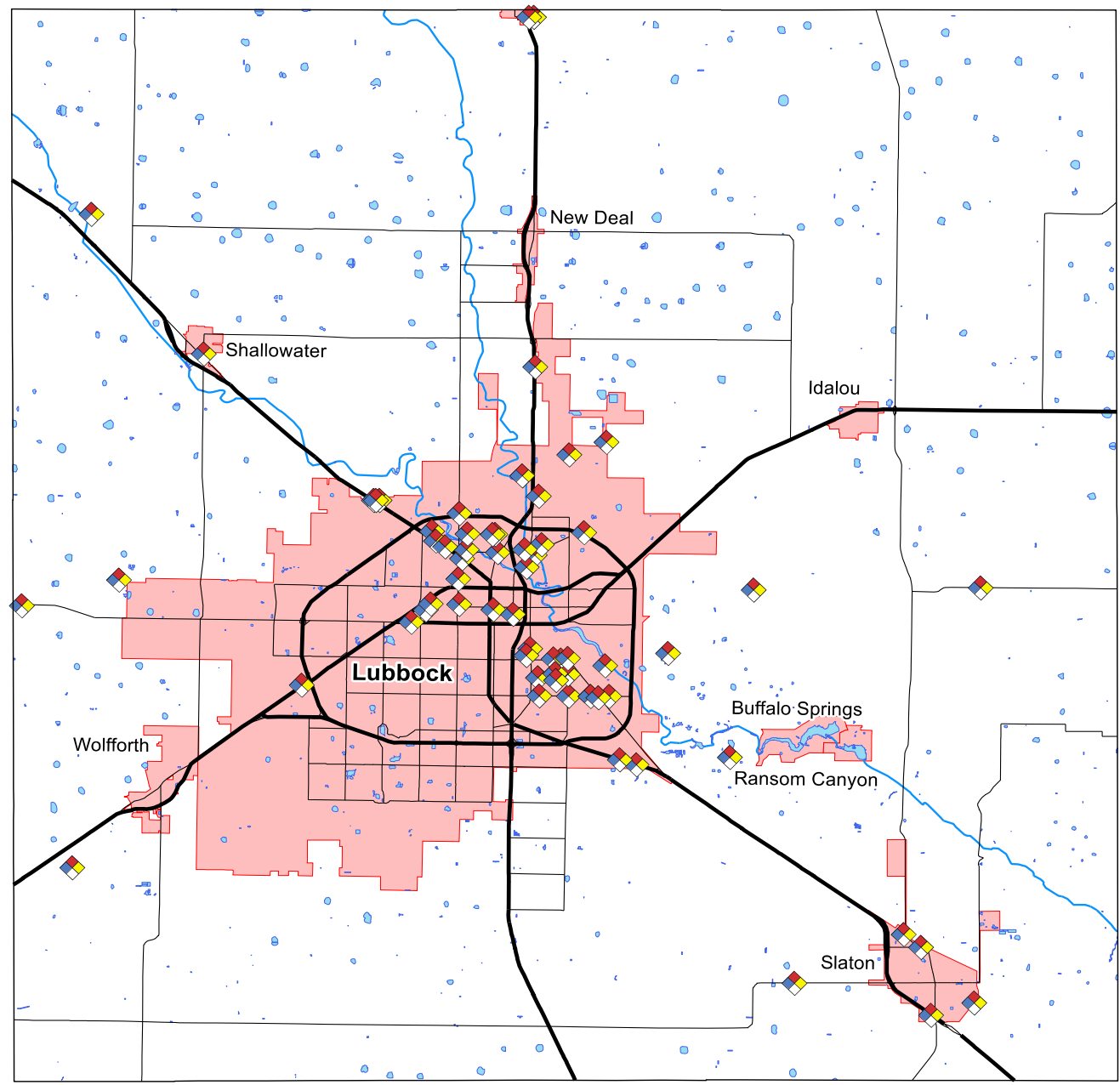
Number of study facilities in Lubbock County - 67

# EPA Special Regulatory Program Sites

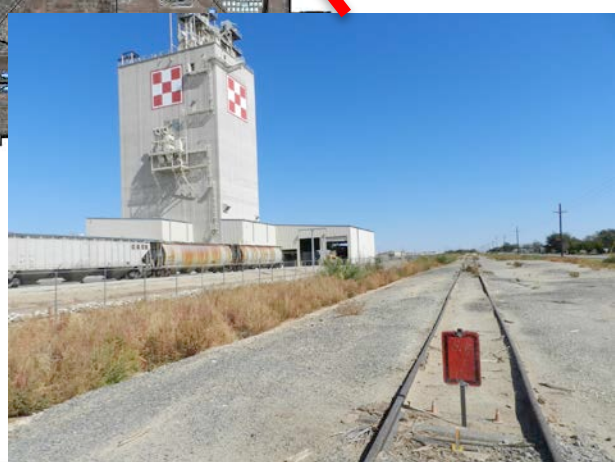
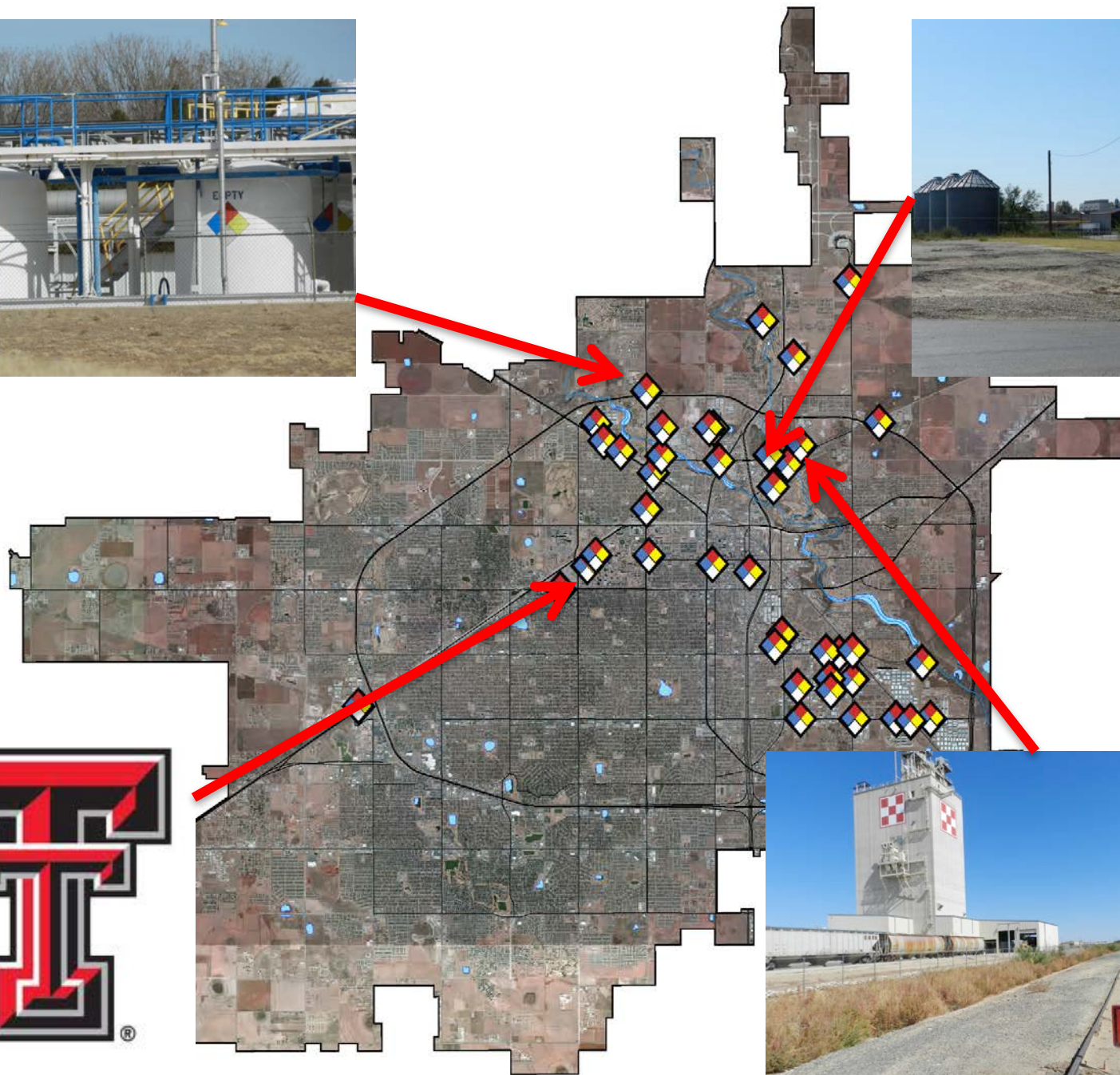
-  EPA Special Regulated Program Site
-  Divided Highway
-  Major Road
-  City
-  River
-  Lake



State Plane, NAD 83  
Texas North Central Zone, Meters







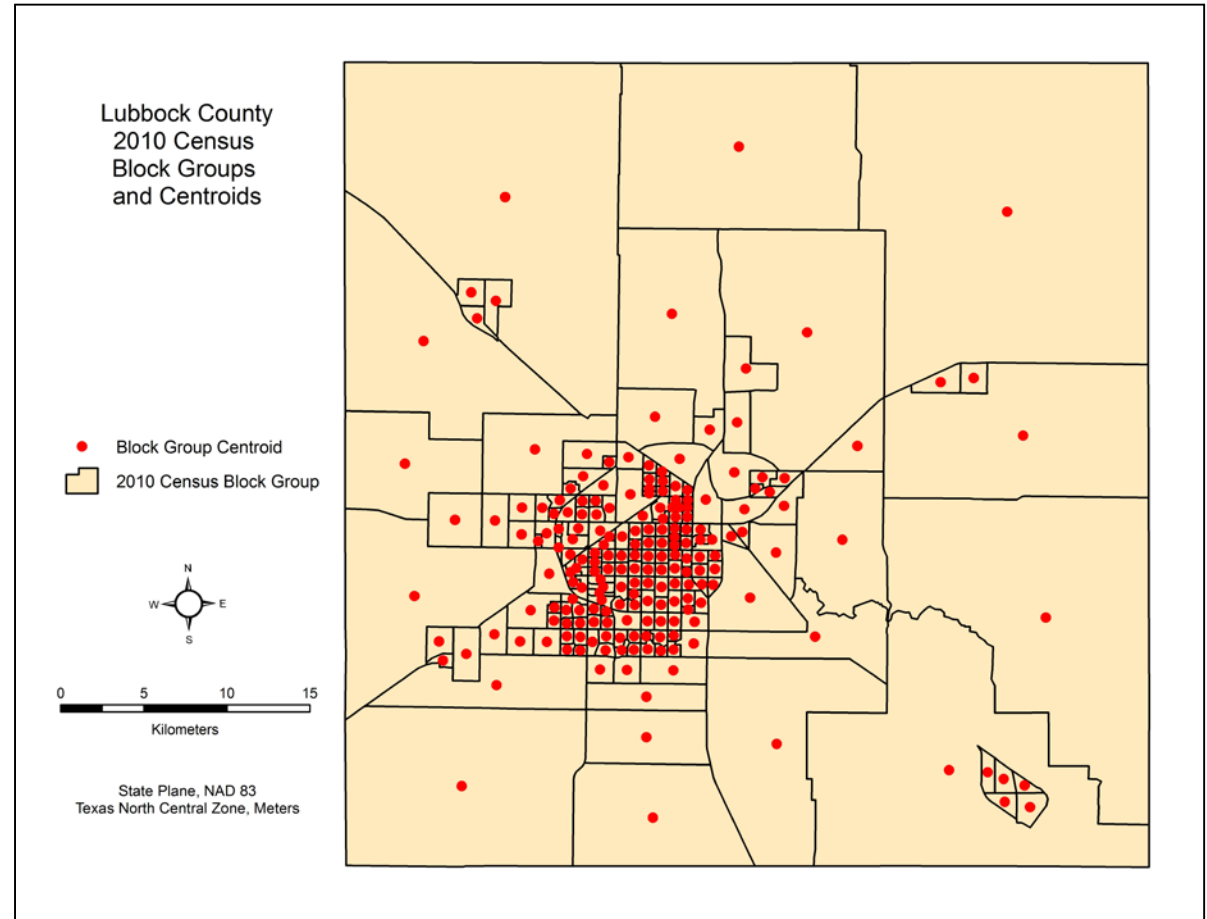


# 2011 5-year ACS and Decennial Census Data

ACS and Decennial Census data was available at the census block group level. This is the smallest scale of data available for the following variables:

- Median Household Income
- Race
- Ethnicity
- Educational Attainment (No HS, College Grad., etc)

An even smaller scale geography may violate residents' privacy.

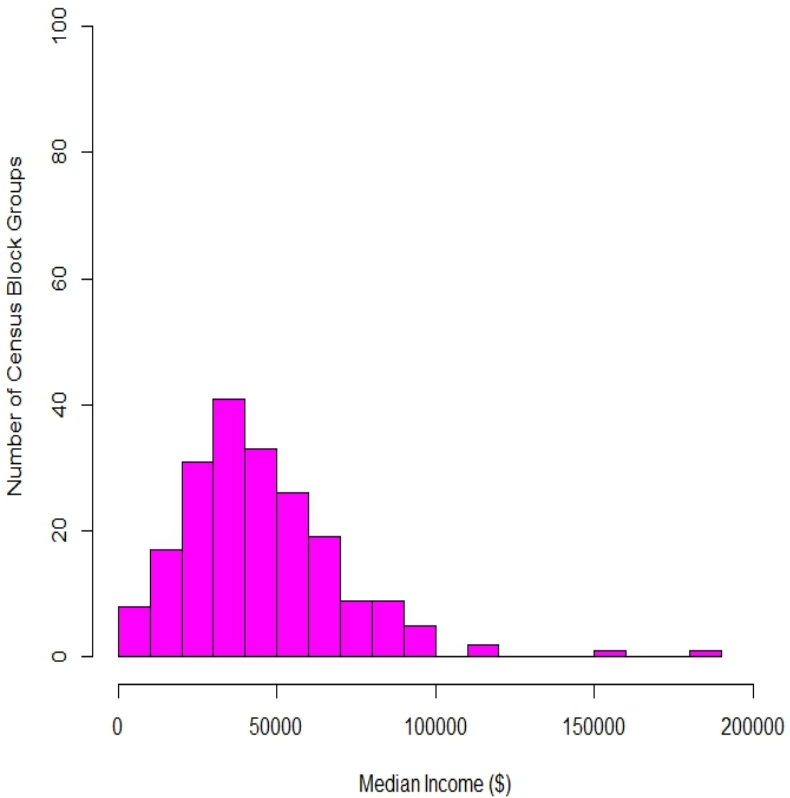


**There are 204 census block groups in Lubbock County**

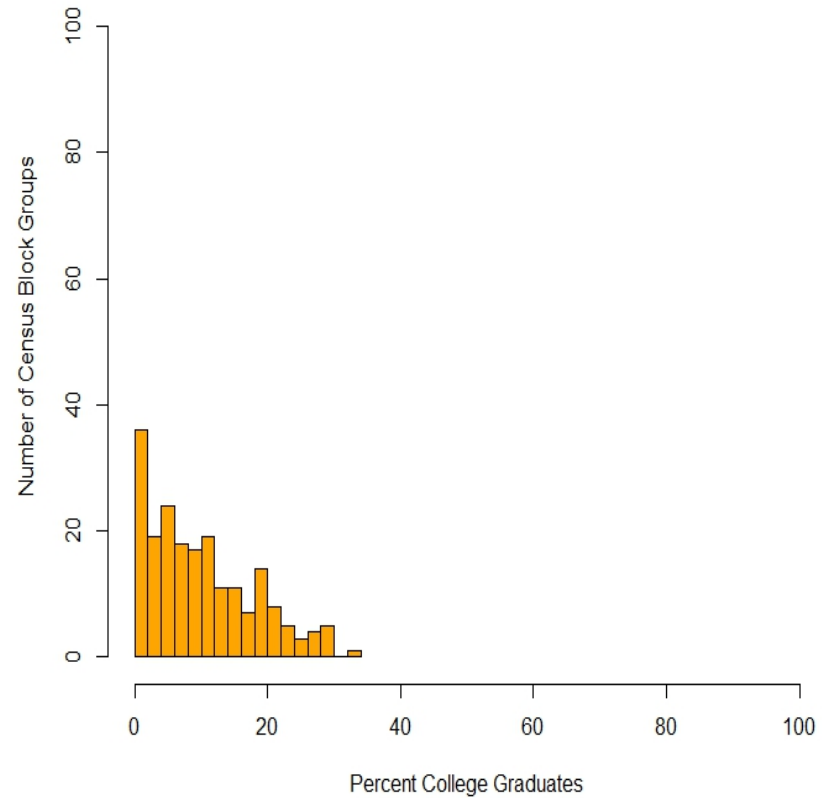


# 2011 5-year ACS and Decennial Census Data

### Lubbock County Median Income (2008-2012 5-year ACS)



### Percent of Population: College Graduate

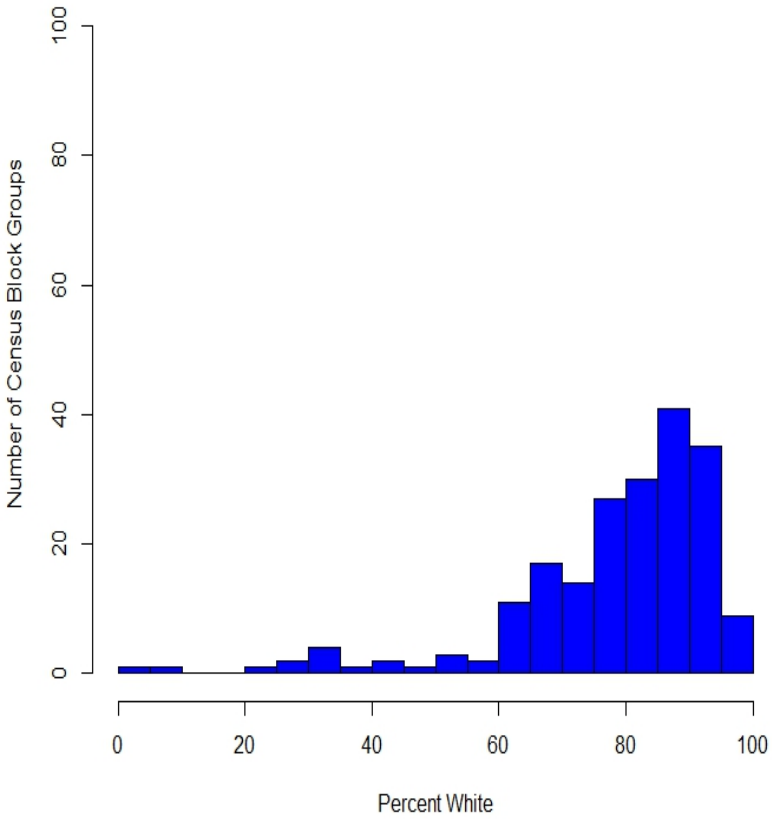




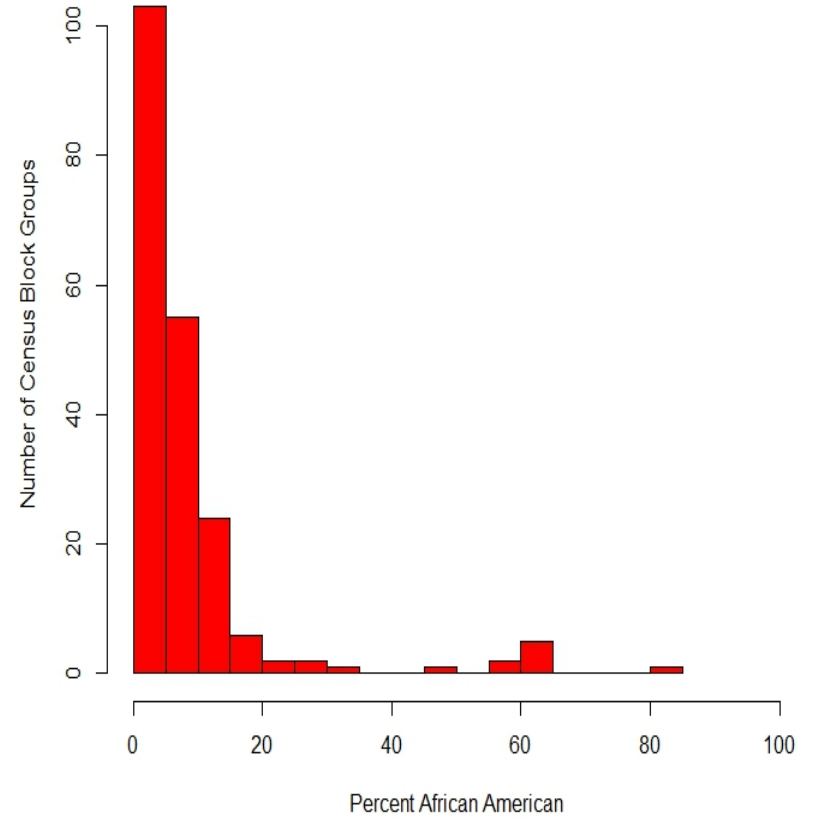


# 2011 5-year ACS and Decennial Census Data

Percent of Population: White



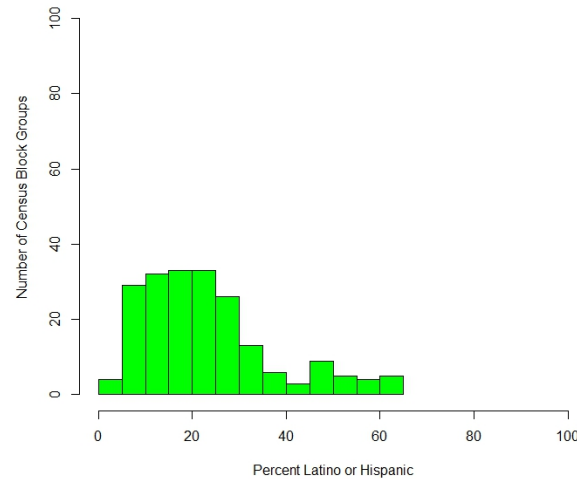
Percent of Population: African American





# 2011 5-year ACS and Decennial Census Data

Percent of Population: Latino or Hispanic



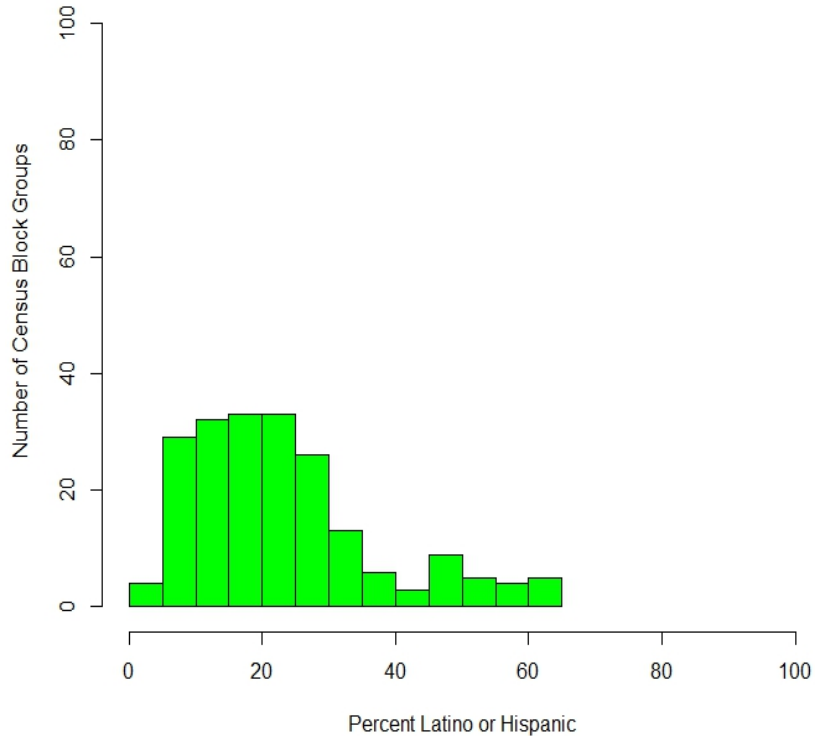
	Distance (m)	Percent Black	Percent Latino/Hispanic	Percent White
Min.	131.600	0.000	0.000	0.000
1st Quantile	1307.100	2.446	13.580	72.070
Median	2572.700	4.864	20.610	83.790
Mean	3037.700	8.649	23.180	78.260
3rd Quantile	4184.500	9.031	28.900	88.930
Max.	17288.900	83.798	63.360	97.830

	Percent College Grad	Median Income (\$)	Log(Percent Black)	Log(Latino/Hispanic)
Min.	0.000	\$0.00	0.000	0.000
1st Quantile	3.444	\$28,760.00	1.237	2.680
Median	8.466	\$41,489.00	1.769	3.073
Mean	10.057	\$45,257.00	1.836	3.018
3rd Quantile	15.207	\$56,353.00	2.306	3.398
Max.	33.696	\$184,083.00	4.440	4.164

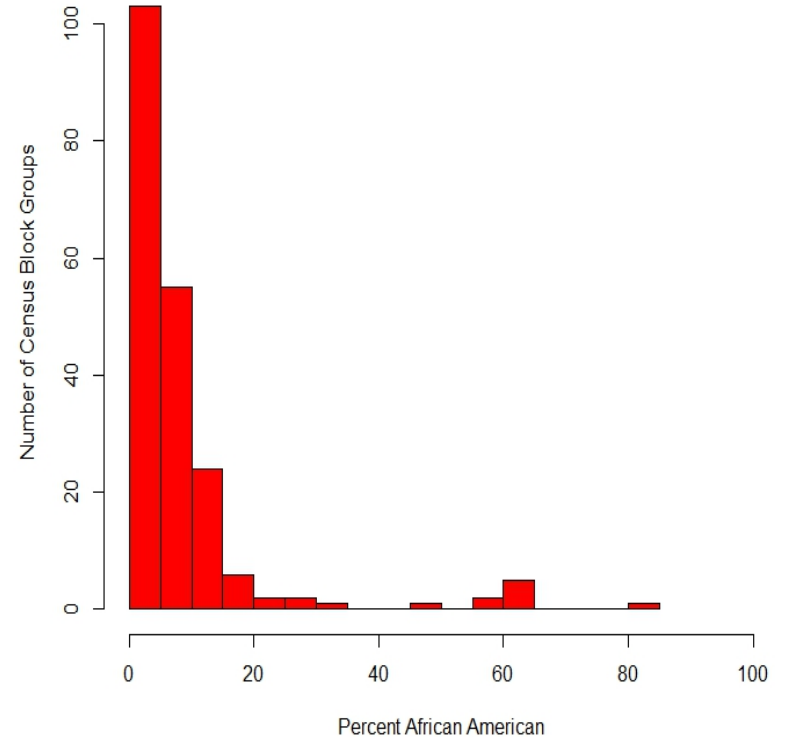


# 2011 5-year ACS and Decennial Census Data

Percent of Population: Latino or Hispanic



Percent of Population: African American



Latino/Hispanic and African American populations were very skewed. In the predictive regression, a log transformation was applied to these variables.











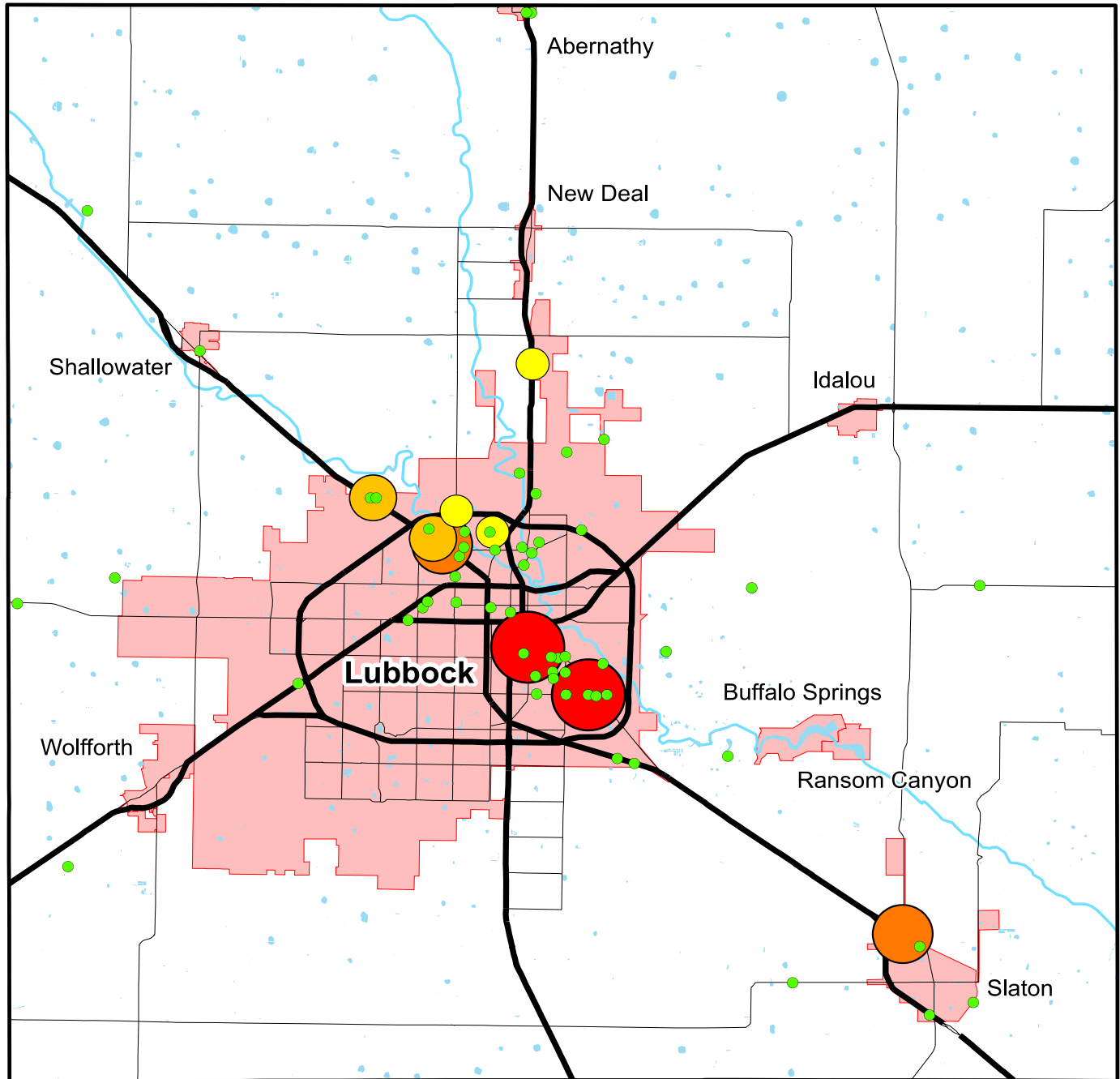
# 2012-2013 Lubbock Facility Toxic Air Releases

Chemical	Adverse Health Effects in Humans	Total Releases in 2012 (Kg.)	Total Releases in 2012 (lbs.)
1,2,4-Trimethylbenzene	Not Evaluated - Standards Not Based on Human Effects	26.85718232	59.21
Ammonia	Nasal bleeding and ulceration, eye irritation, respiratory distress, respiratory tract damage, muscle weakness	1456.03032	3210
Benzene	Cell and DNA mutation, rapid cell growth, carcinogen, blood leukemia, tumorogenic, lymphoma, Hodgkin's Disease, depression, nausea, vomiting, muscle weakness, skin irritation, changes to leukocyte count	60.25062536	132.83
Chromium	DNA damage	340.194	750
Cyclohexane	Not Evaluated - Standards Not Based on Human Effects	8.87679544	19.57
Hydrogen Fluoride	cough, respiratory distress, eye and nasal irritation, cardiac arrhythmia, renal failure, renal necrosis	188.24068	415
Lead	Gastrointestinal distress, liver damage, paralysis, hallucinations, muscle weakness, neurological degeneration, hormonal changes, spermatogenic disruption,	4.592619	10.125
N-Hexane	Headache, nausea, vomiting, respiratory distress, nerve damage	63721.18929	140481.29
Styrene	eye irritation, lymphocyte mutation, DNA damage, neuromuscular blockage, paralysis, headache, nausea, vomiting, ataxia, muscle weakness, changes in urine composition	1591.200736	3508
Sulfuric Acid	Tooth damage, eye irritation, neurological damage, cough, respiratory distress, respiratory tract irritation, dyspnea	15.87572	35
Toluene	Headache, eye irritation, nausea, vomiting, olfactory changes, bone marrow damage, ataxia, neurological disorder, tearing, muscle weakness, hallucinations, depression, urine composition change	424.0586249	934.89
Xylene	DNA damage, nervous system/brain degeneration, inhibition of metabolism, inhibition of motor activity, irritability, ataxia	3093.987319	6821.08

Sources:	CDC National Institute of Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) and 2012 EPA TRI Report for Lubbock County
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




# Toxic Air Releases (lbs) For The 2012 EPA Inspection Cycle

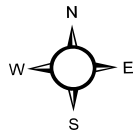
- hwy
- Major Road
- City
- Lake
- River



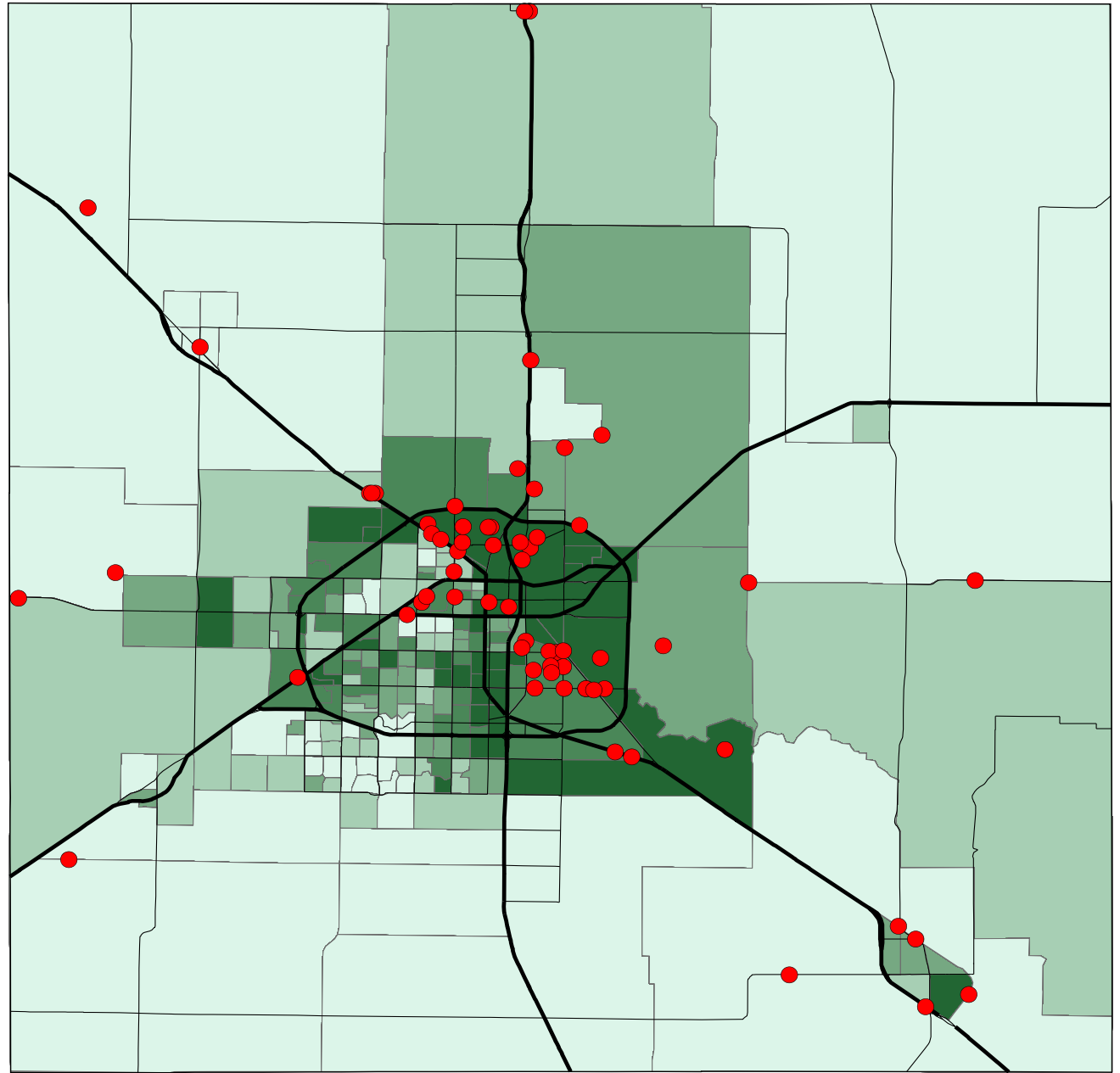
State Plane, NAD 83  
Texas North Central Zone, Meters

# Lubbock County African American Population

-  EPA Special Regulated Program Site
-  Divided Highway
-  Major Road
-  0% - 2.03%
-  2.04% - 4.1%
-  4.11% - 6.6%
-  6.61% - 10.33%
-  10.34% - 83.8%











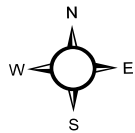
State Plane, NAD 83  
Texas North Central Zone, Meters



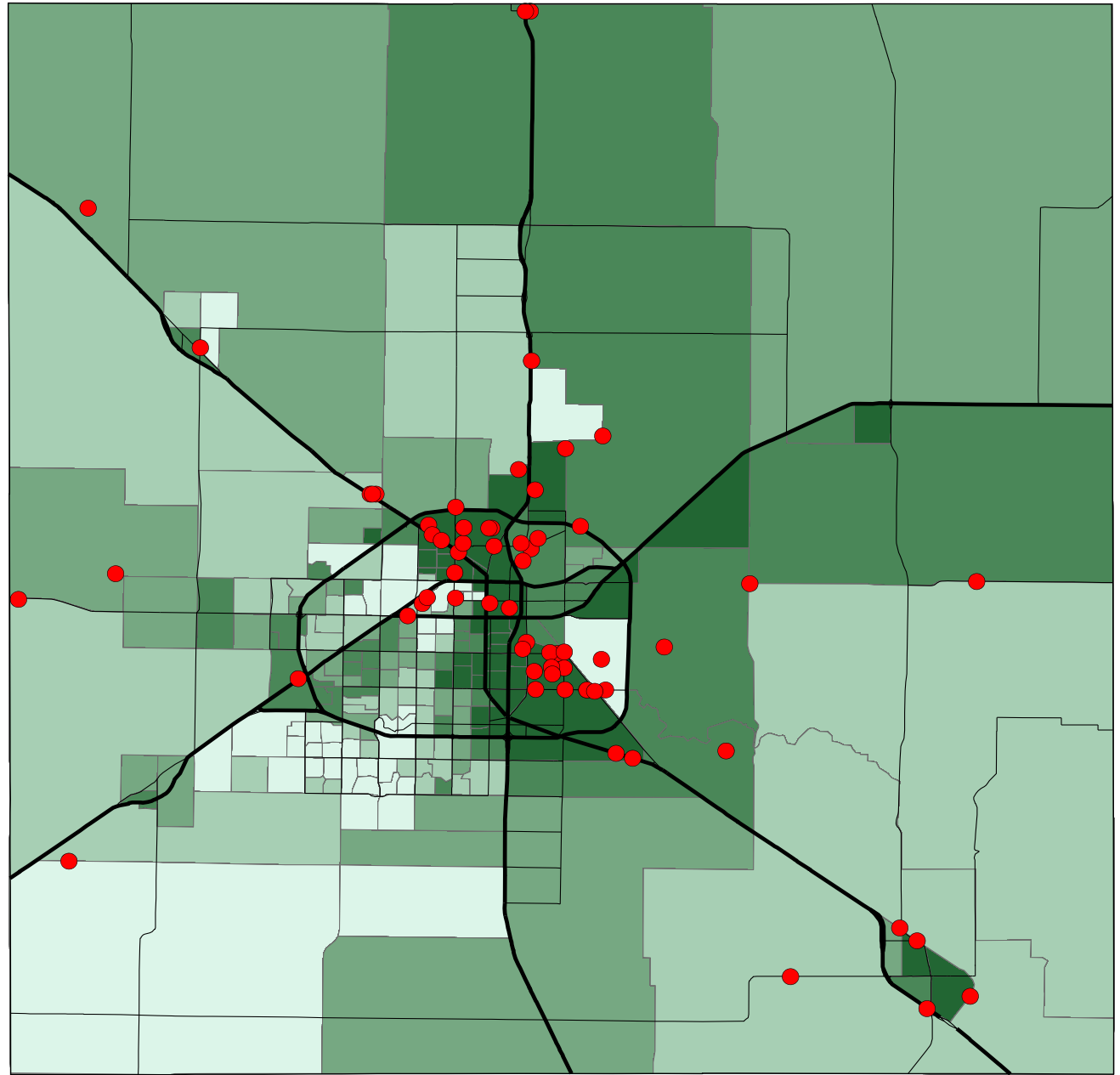


# Lubbock County Latino and Hispanic Population









-  EPA Special Regulated Program Site
-  Divided Highway
-  Major Road
-  0% - 11.97%
-  11.98% - 17.14%
-  17.15% - 23.73%
-  23.74% - 32%
-  32.01% - 63.36%

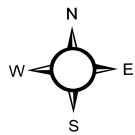


State Plane, NAD 83  
Texas North Central Zone, Meters

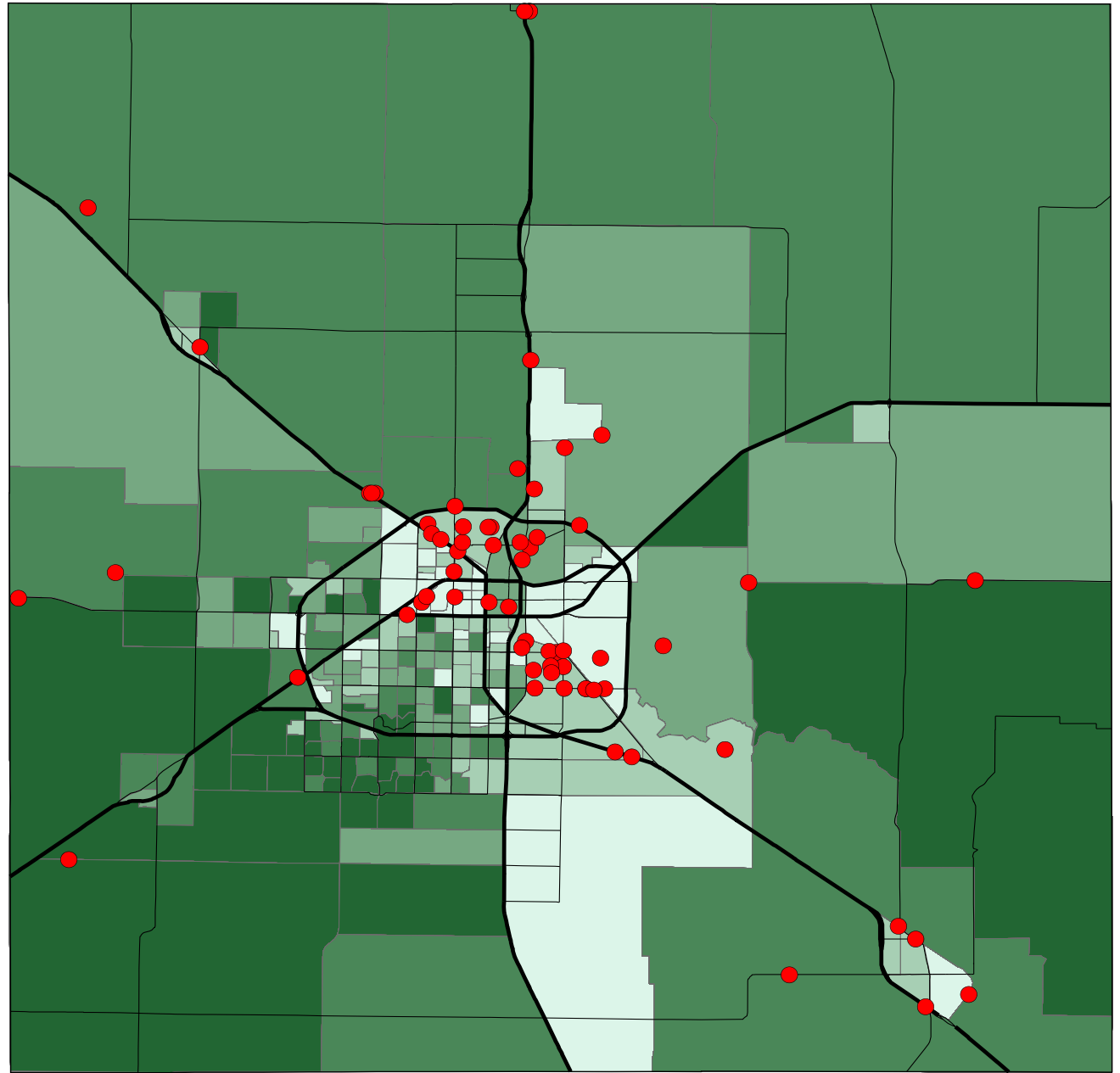


# Median Income Lubbock County

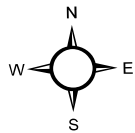
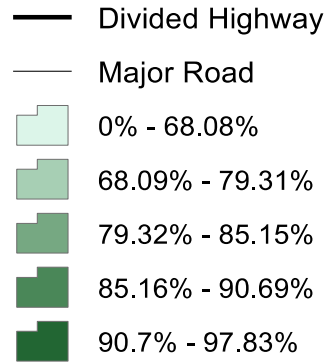
-  EPA Special Regulated Program Site
-  Divided Highway
-  Major Road
-  \$0.00 - \$26,700.00
-  \$26,700.01 - \$37,349.00
-  \$37,349.01 - \$46,250.00
-  \$46,250.01 - \$62,527.00
-  \$62,527.01 - \$184,083.00



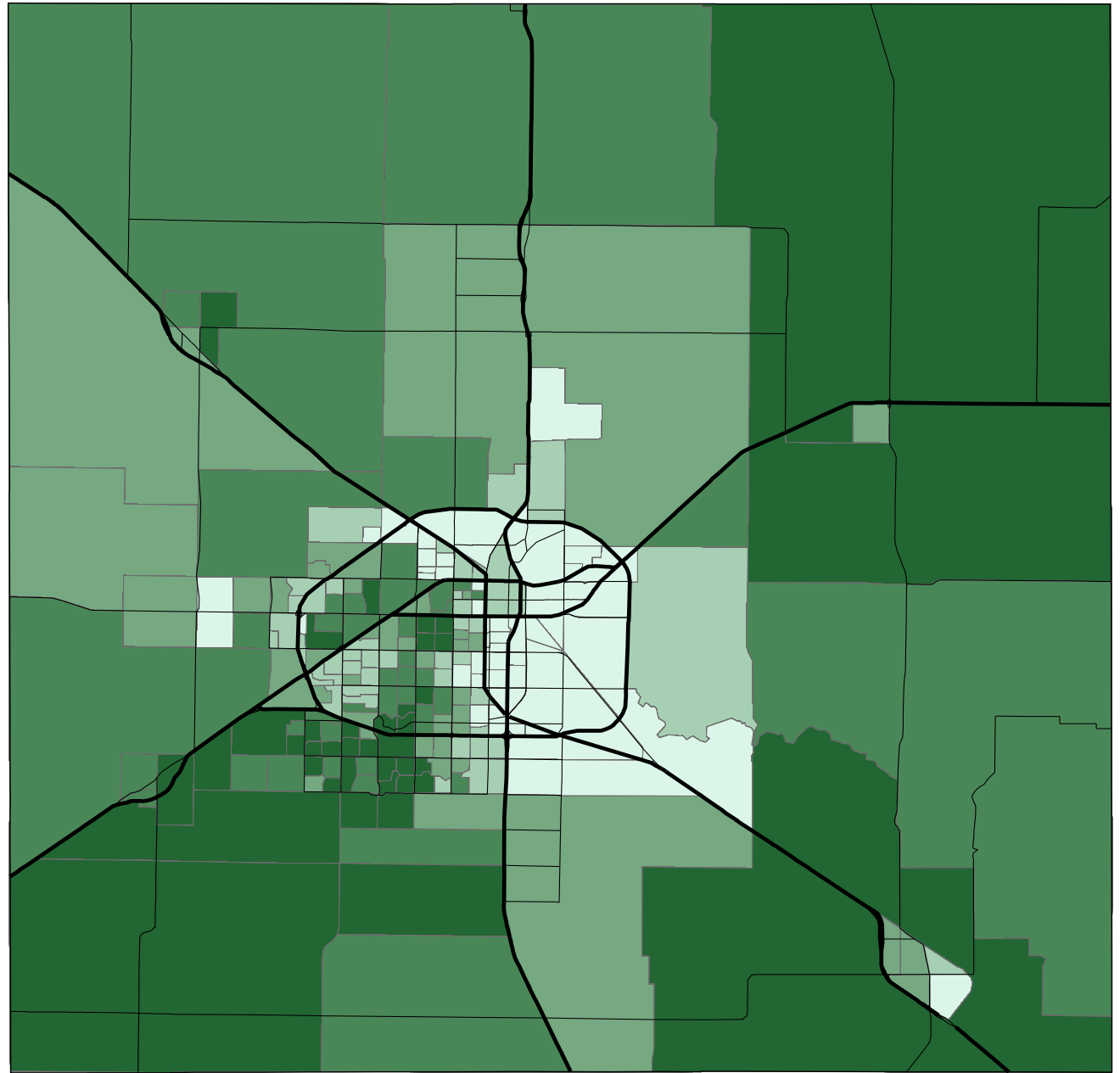
State Plane, NAD 83  
Texas North Central Zone, Meters



# Lubbock County White Population

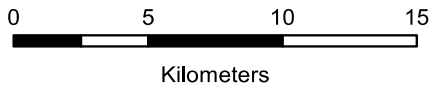
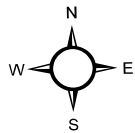


State Plane, NAD 83  
Texas North Central Zone, Meters

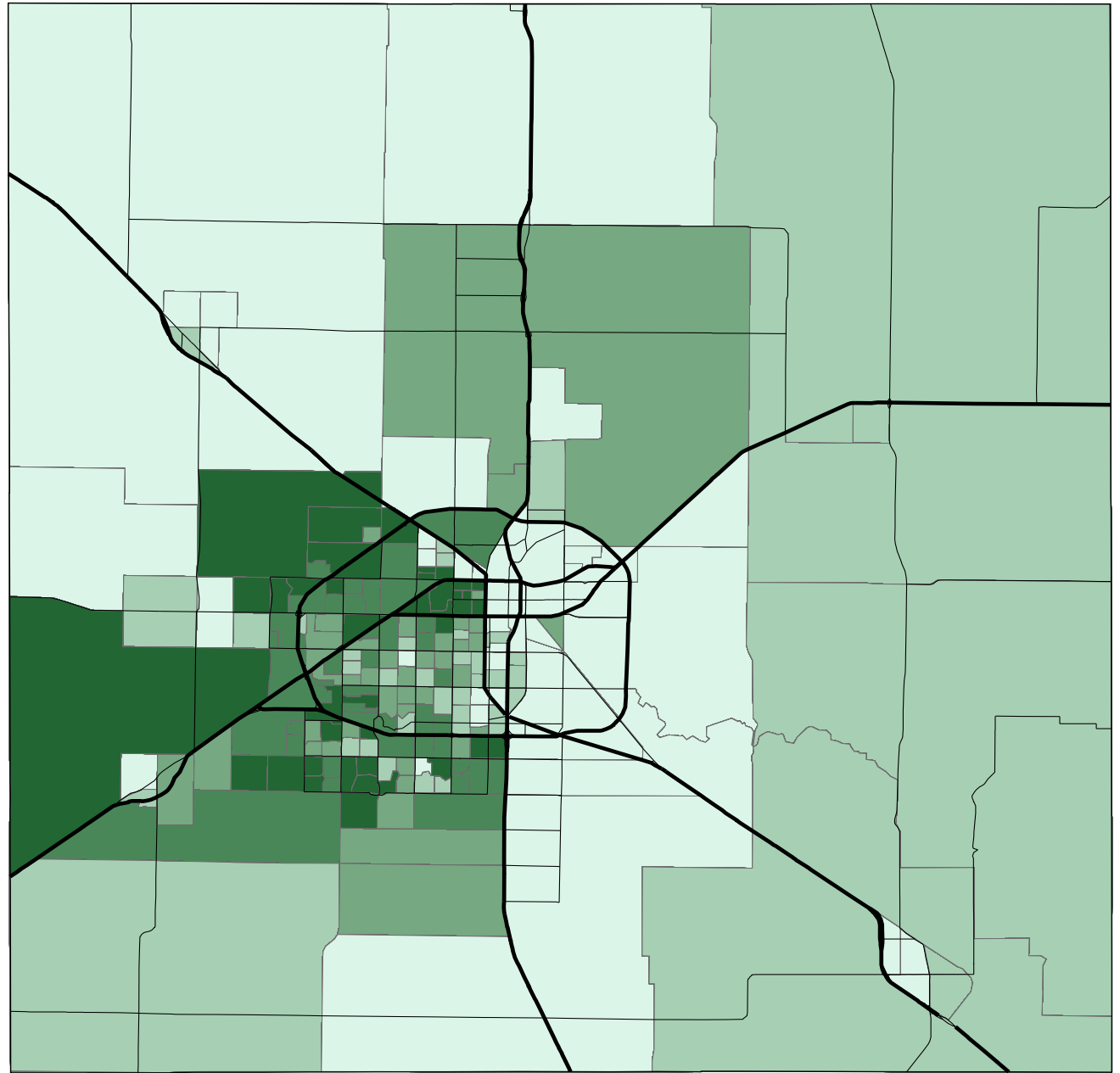


# Lubbock County Asian Population

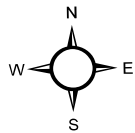
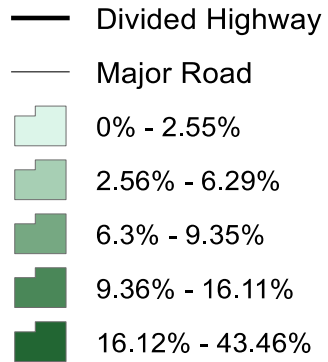
- Divided Highway
- Major Road
- 0% - 0.43%
- 0.44% - 1.01%
- 1.02% - 1.74%
- 1.75% - 3.31%
- 3.32% - 23.12%



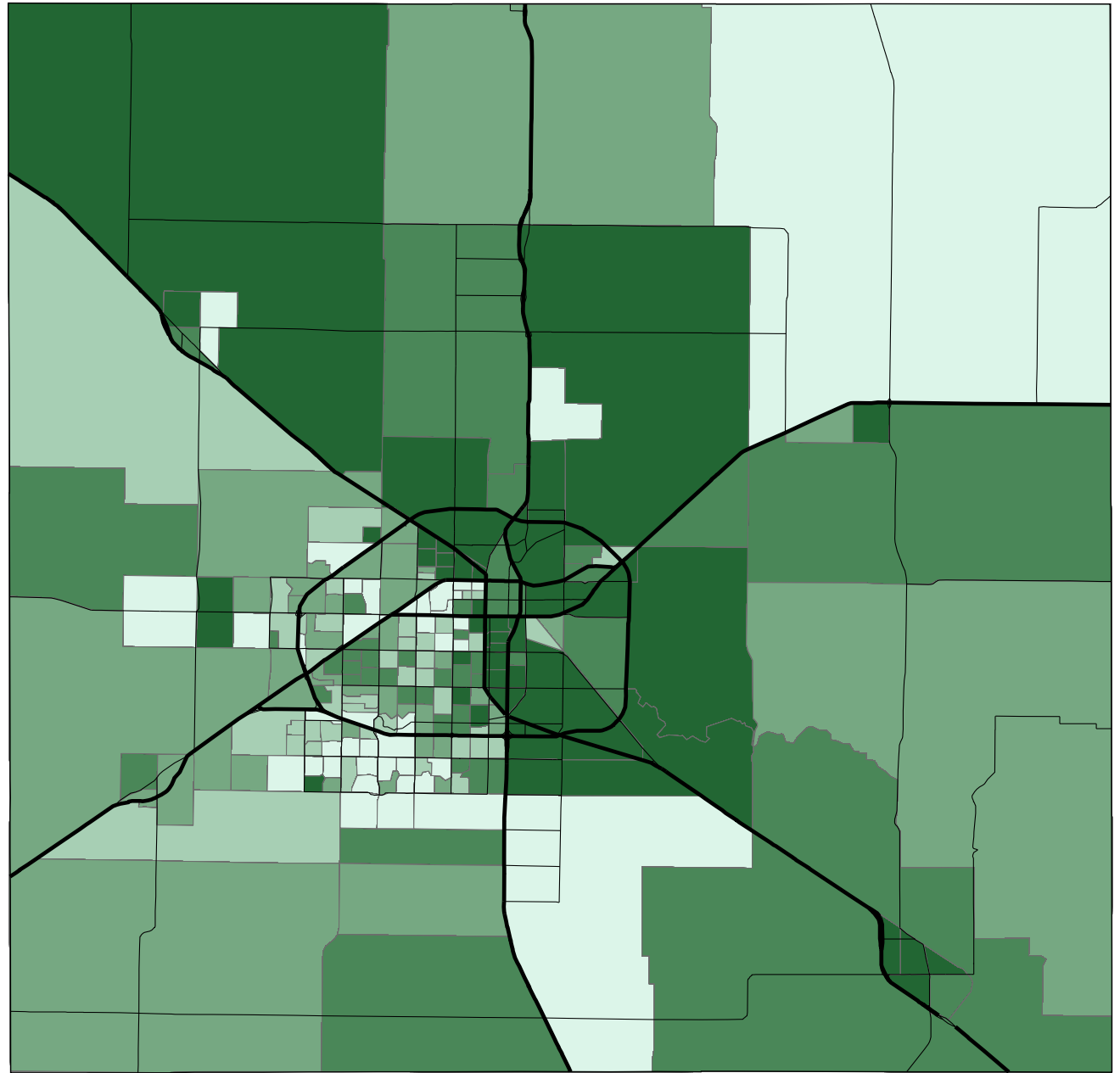
State Plane, NAD 83  
Texas North Central Zone, Meters



# Lubbock County Population Without A High School Education

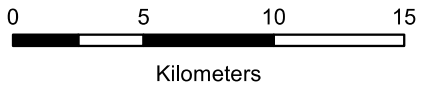
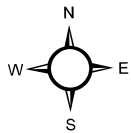
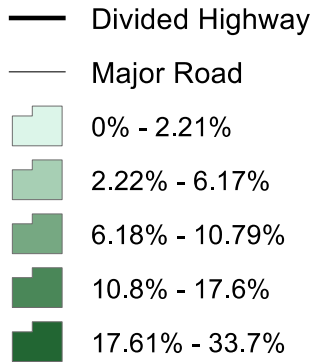


State Plane, NAD 83  
Texas North Central Zone, Meters

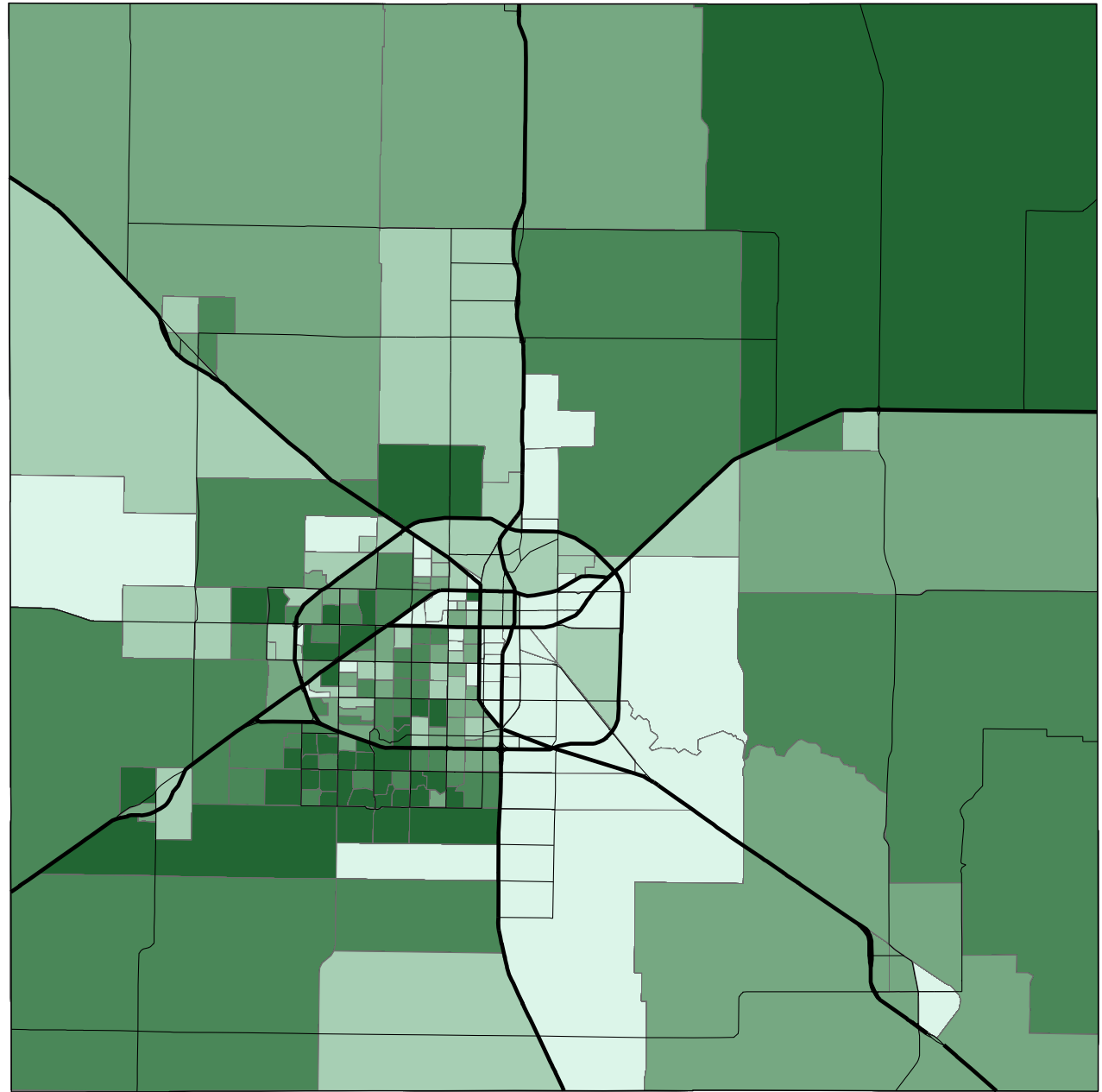




# Lubbock County Population With A College Degree



State Plane, NAD 83  
Texas North Central Zone, Meters



# Statistical and Spatial Analyses



Ripley's K – A test measuring how clustered point pattern data is within a given geography (ex. County)

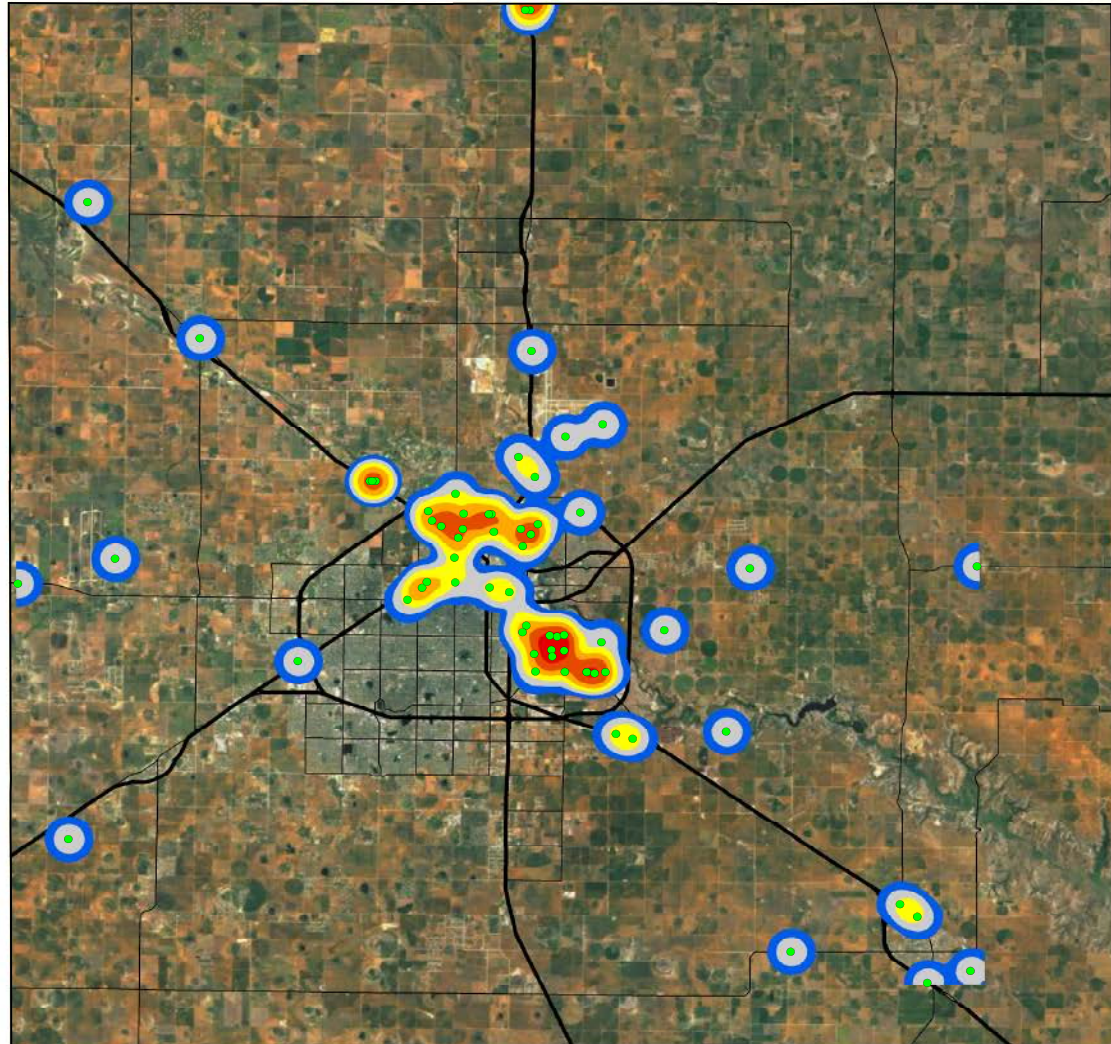
Predictive Regression – A test measuring the predictive ability and association between demographic variables and nearest-neighbor distance between Census block group centroids and environmental health hazards (facilities)

Kernel Density Analysis – A visual analysis that creates a raster (grid) dataset of probability values. These values reflect the probability that a facility is located in a given cell. Grid cells in areas with a high density of facilities have a higher residual probability that a facility will be located there.

# Kernel Density



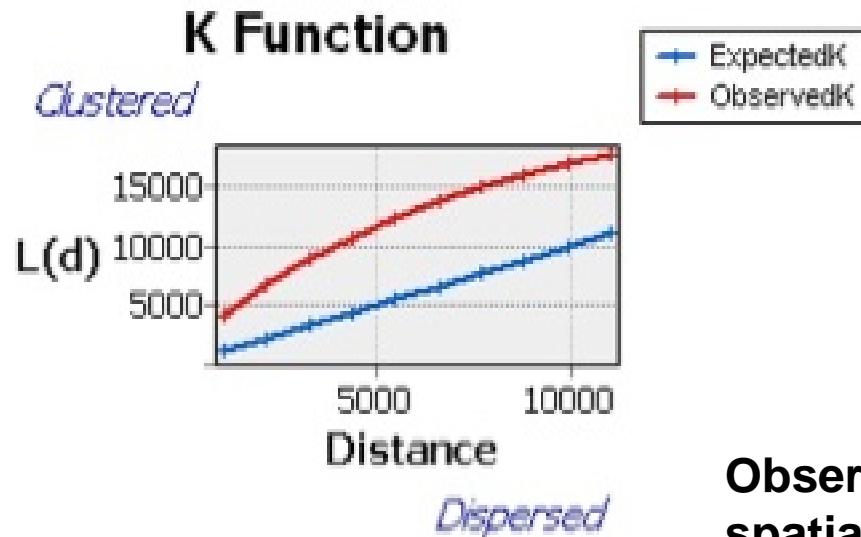
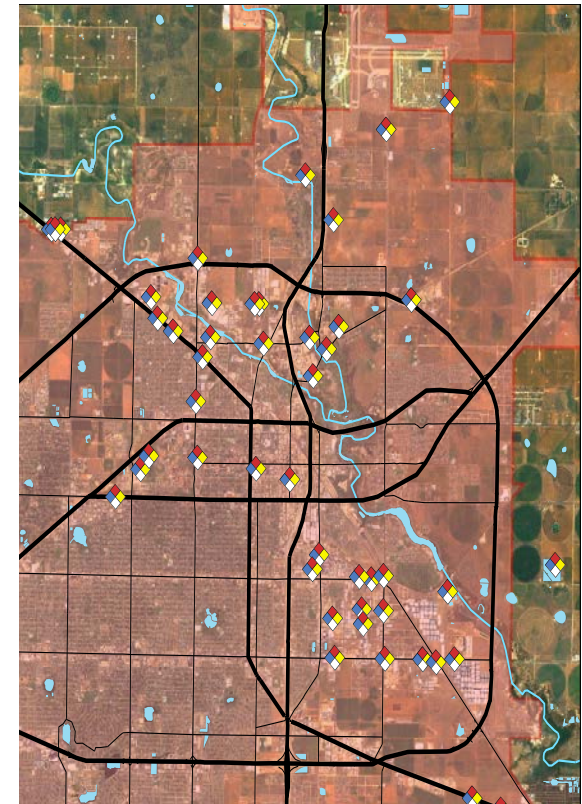
ensity Analysis:  
EPA Special  
Regulatory Program  
Sites





# Ripley's K

Object ID	ExpectedK	ObservedK	DiffK
1	1103.57349059000	4073.79435513000	2970.22086453000
2	2207.14698119000	6844.19353431000	4637.04655312000
3	3310.72047178000	8871.08871711000	5560.36824533000
4	4414.29396238000	10539.67709750000	6125.38313516000
5	5517.86745297000	12276.01625260000	6758.14879964000
6	6621.44094357000	13737.18717730000	7115.74623373000
7	7725.01443416000	15021.62944730000	7296.61501309000
8	8828.58792476000	16088.53480420000	7259.94687945000
9	9932.16141535000	16907.86936380000	6975.70794847000
10	11035.73490590000	17674.15605630000	6638.42115030000



**Observed values deviated significantly from spatial randomness (Expected Values)**



# Predictive Regression

## Dependent Variable:

Mean distance between block group centroids and the nearest neighbor hazardous waste facility.

## Predictive Variables:

Percent African American Population

Percent Latino/Hispanic Population

Educational Attainment (Percent of Population with a College Degree)

Median Income

	Estimate	Std. Error	t value	Pr(> t )	Significant
Distance	3037.7	140.9	21.565	<2e-16	Y
Percent Black (log)	-568.1	176.7	-3.215	0.00152	Y
Percent Latino/Hispanic (log)	119.5	178.8	0.668	0.50462	N
Percent College Grad.	346.6	211.8	1.636	0.10338	N
Median Income	617.2	210.8	2.929	0.00381	Y

Multiple R-squared value: 0.2807



## Regression Results (continued)



Block groups with a high density African American population are located at average of 568.1 m. (1863.8 ft.) **CLOSER** to toxic waste releasing facilities, than the average for all block groups in the county.

Block groups with a high density of Latino/Hispanic population are located at a distance very similar to the average for all block groups. This suggests there is no inequality.

Block groups with a higher median income are located 617.2 m. (2024.9 ft.) **FURTHER** than the average block group in the county.

# Lubbock City Ordinance 225 (8 March 1923)



110

than \$200 and each transaction or days residence shall constitute a separate offense.

## APPENDIX 1

### Section 4.

ORDINANCE NO. 225. The fact that negroes and persons of African descent and persons containing as much as one-eighth negro blood are residing in various portions of this city and their residents is dangerous to the health and pollutes the earth and atmosphere, creates an emergency and necessity that the removal of the charter requiring an ordinance to be read at two several meetings

No negro or persons containing as much as one-eighth negro blood shall rent or reside thereon in any part of this city except that part lying South of 16th St. and East of Avenue C, and no person shall rent or lease to any such negro or person of African descent or one containing as much as one-eighth negro blood outside of the territory limits, as above,

### Section 2.

Section 1 shall not apply to bona fide servants living on the premises of their employer; provided that such servant or servants shall receive living quarters as a part of their compensation and that such servants shall be employed the major portion of their time by the family or person on whose premises they reside.

### Section 3.

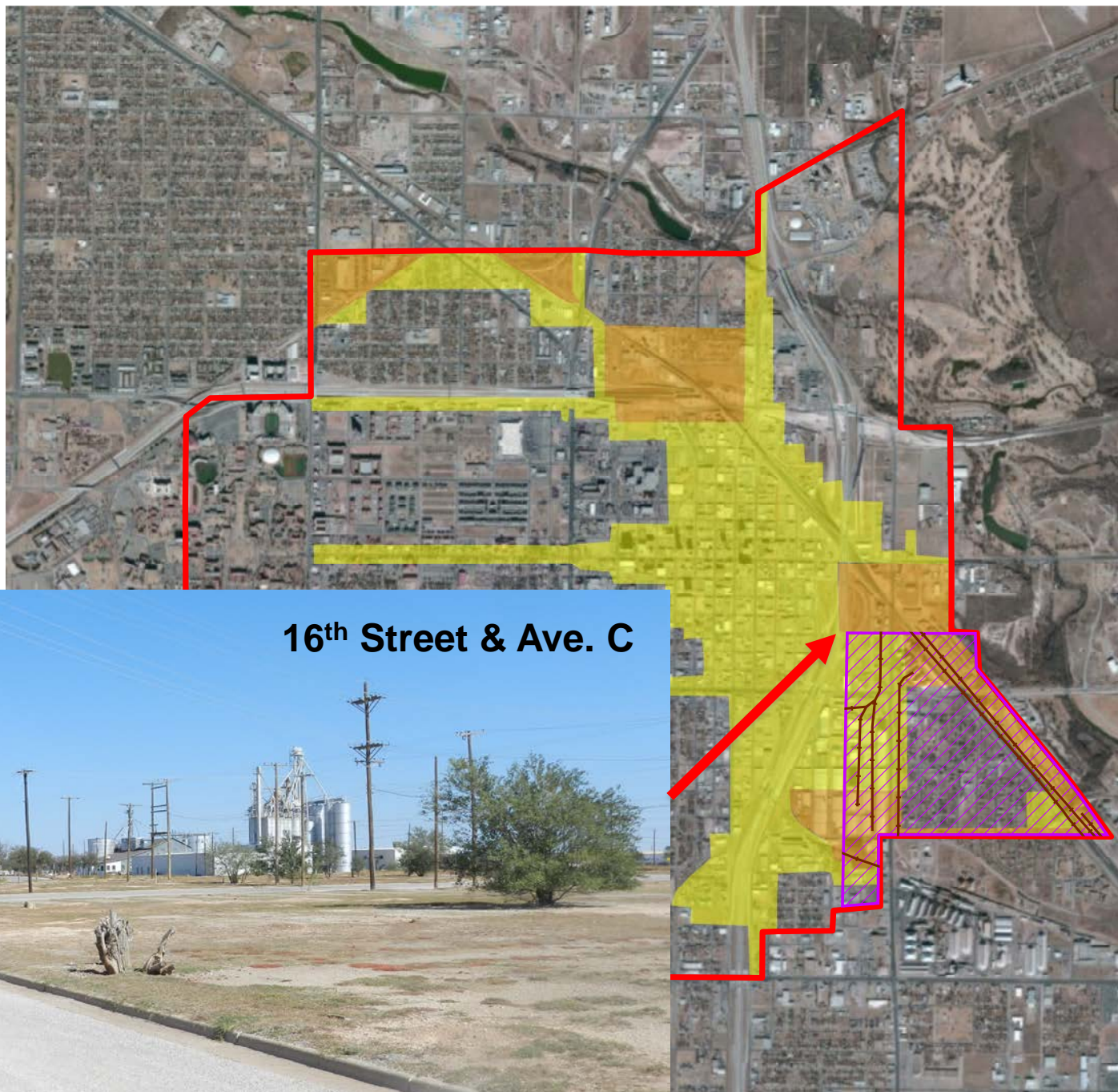
Any person violating any part of this Ordinance shall upon conviction, be punished by a fine of not more

109

Approved as to form. R. A. Sowder, City Attorney.



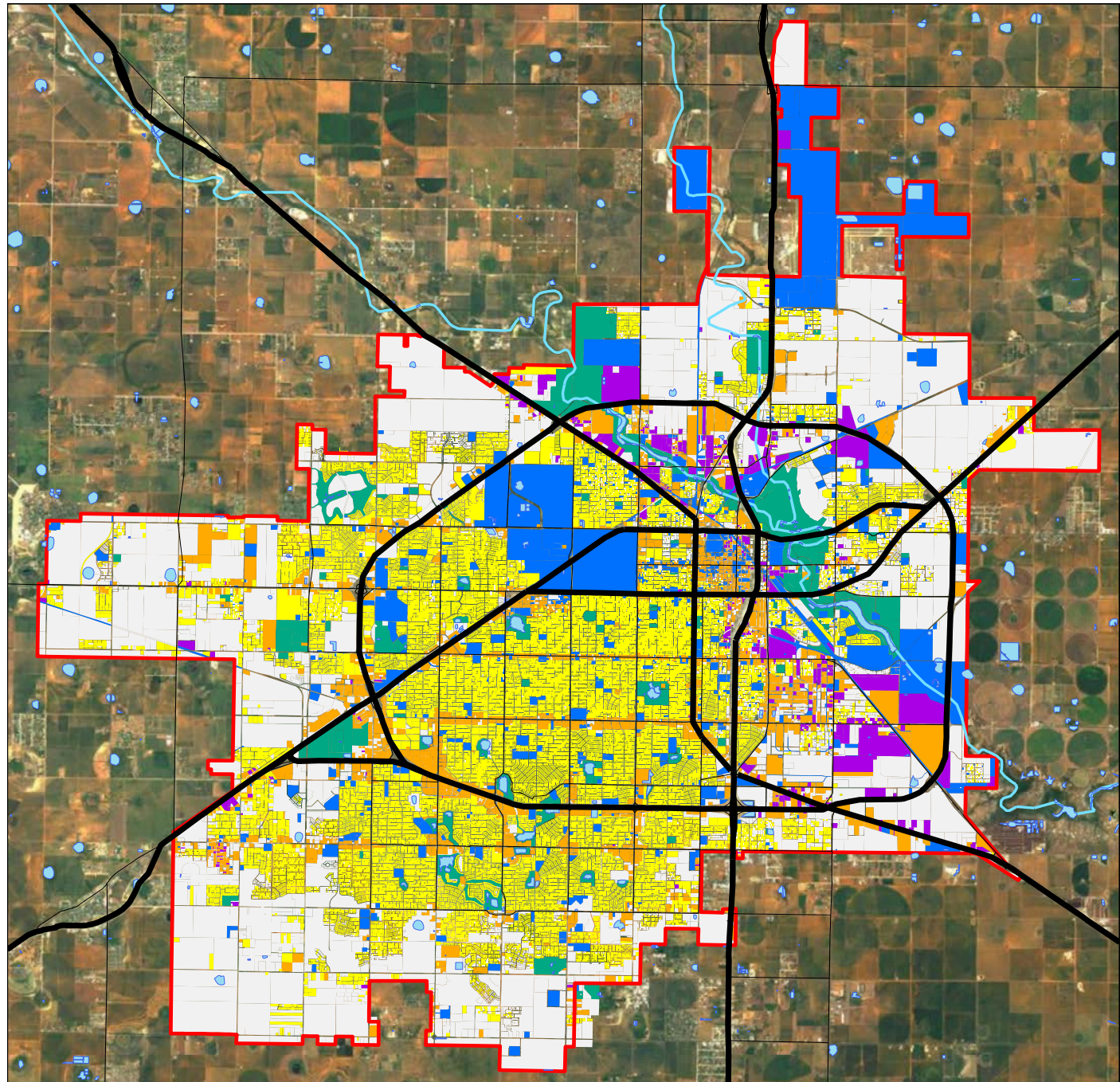
and Uses  
1943 City Plan



**16<sup>th</sup> Street & Ave. C**



City of Lubbock  
Land Use (2013)





# Implications

Communities located at a closer proximity to toxic waste releasing facilities may experience higher rates of exposure symptoms and related health effects.

Identifying which communities are located closer to health hazards may aid in emergency response and resource allocation.

Knowledge of what lies beyond your backyard. People have a right to know the hazards they are being exposed to. There are legal, health and moral implications. Often, city officials are unaware of these issues.



Image courtesy of Lubbock Avalanche Journal 2013





# Environmental Justice vs. Environmental Racism

Just because an inequality or spatial pattern exists does not mean that:

a) A community is actually “disadvantaged”

b) The pattern is due to implicit racism

Further historical investigation is required to understand how the issue came to be



# Research Statement

This project maps changes in the development and severity of segregation and environmental inequality in Lubbock over time.

A mixed-method approach consisting of historical mapping, remote sensing, archival research and fieldwork, provides a means of analyzing the development of environmental justice issues in Lubbock.

# Context

In the context of prior work, this project studies which came first, the people or the hazard. Also, this project seeks to identify the time period when the issue became “racialized”. Lastly, this project examines whether current patterns and signs of lag causation are the result of implicit racism or coincidence.

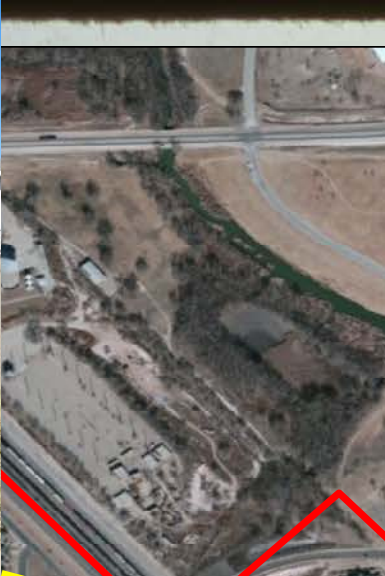











# Oral Histories, Interviews and Unsubstantiated Claims

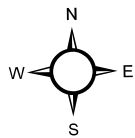
- Foster, R.L. *Black Lubbock: A history of Negroes in Lubbock, Texas to 1940*. Texas Tech University Department of History, 1974.
- Paradis, R.L. *Comparison of physical fitness scores of Anglo, Latin-American and Negro students of equal socioeconomic level*. Texas Technological College Department of Education, 1967.
- Both of these works offer interviews, oral histories, hearsay and unsubstantiated claims (ex. Newspaper editorials). How do we substantiate, validate and quantify these?



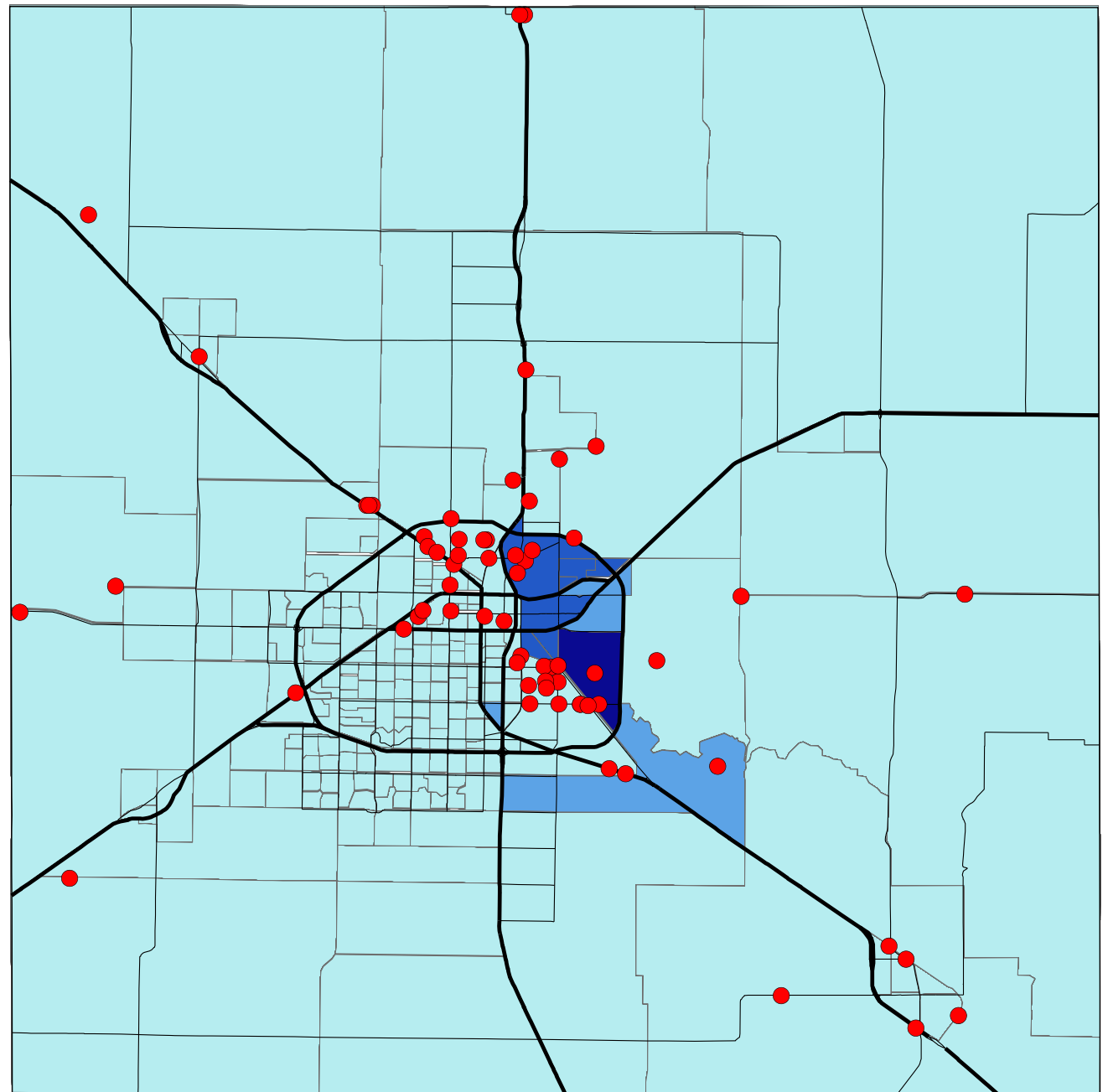


# Lubbock County African American Population

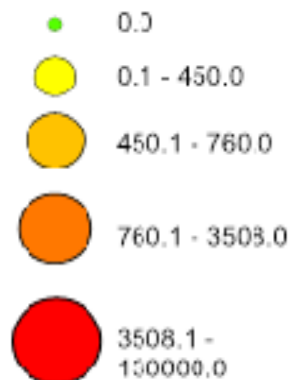
-  EPA Special Regulated Program Site
-  Divided Highway
-  Major Road
-  0% - 25%
-  26% - 50%
-  51% - 75%
-  76% - 100%



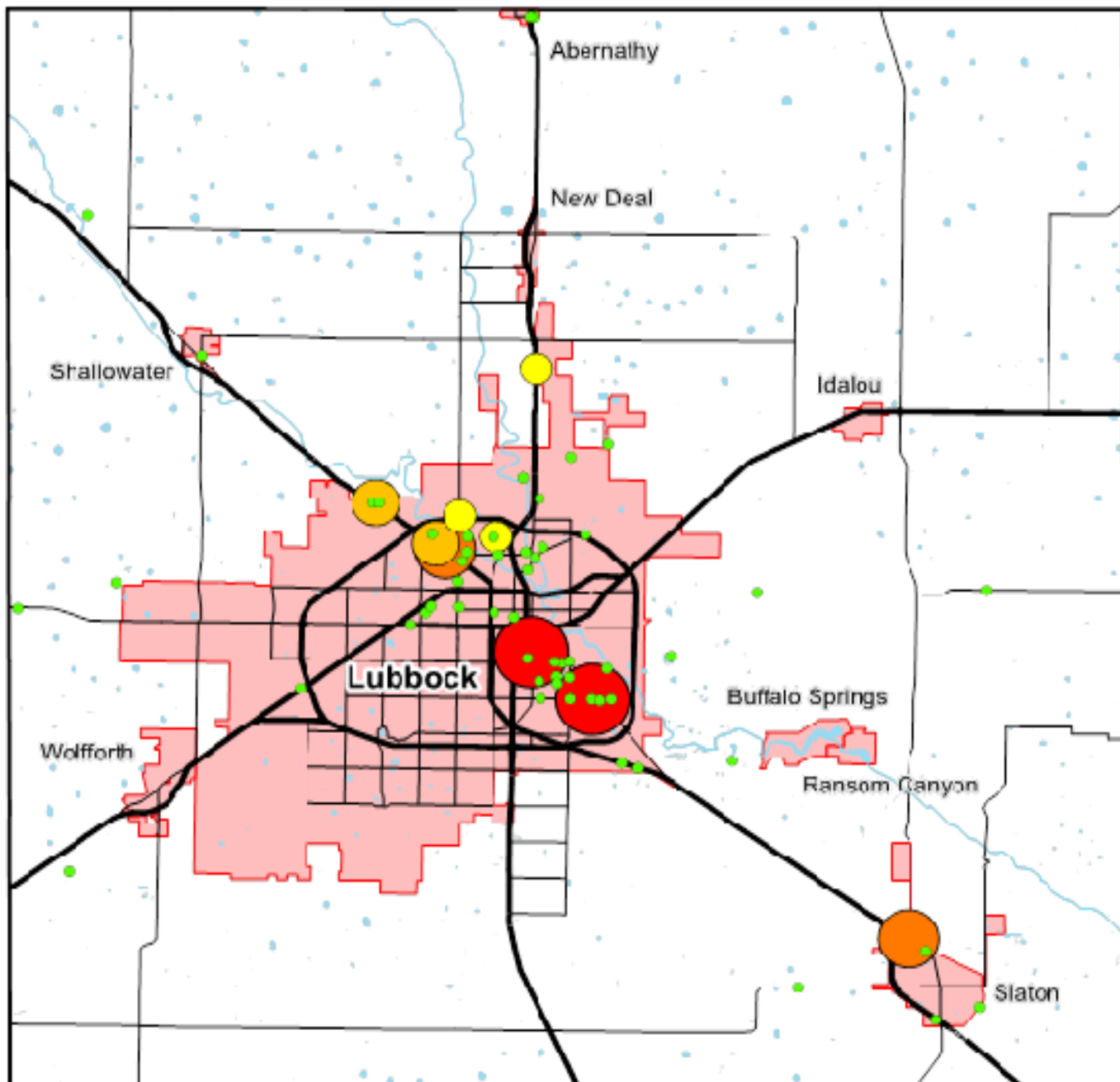
State Plane, NAD 83  
Texas North Central Zone, Meters



# Toxic Air Releases (lbs) For The 2012 EPA Inspection Cycle



State Plane, NAD 83  
Texas North Central Zone, Meters





ORDINANCE NO. [PENCILED "223"]

An Ordinance prescribing that portion of the City of Lubbock within which negroes and persons of African descent, containing as much as one-eighth negro blood, shall reside, except bona fide servants residing on the place where employed; forbidding persons to sell property outside of such district to negroes or persons containing as much as one eighth negro blood; forbidding the rental of property outside such district to persons containing as much as one-eighth negro blood, providing penalties and declaring an emergency account of negroes living in other districts and causing danger to health and pollution of the atmosphere.

The fact that negroes and persons of African descent and persons containing as much as one-eighth negro blood are residing in various portions of this city and their residents is dangerous to the health and pollutes the earth and atmosphere, creates an emergency and necessity that the removal of the charter requiring an ordinance to be read at two several meetings be suspended and this ordinance been acted at the meeting of its introduction and effective upon publication.

Approved this "8" day of "March" 1923.

/s/ Percy Spencer

Mayor.

City of Lubbock, Texas.



# Ordinance 223

- This ordinance effectively restricted African Americans to an area bound by 16<sup>th</sup> street (North) and Avenue C (West). The exceptions were servants, who were allowed to live in servants quarters. These will be shown in the South Overton map.
- The ordinance lists the African American population as the environmental hazard! They are “causing a danger to the health and pollute the atmosphere”.

# 1943 City Plan

The 1943 Lubbock City Plan identifies “undesirable” neighborhoods to preserve Lubbock’s aesthetic regulations. The area to the East and to the North of the present business district has been pre-empted by the Santa Fe Railroad right-of-way tracks and yards. Immediately beyond this industrial area the attendant development is principally for Negro and Mexican families. This can not be considered as desirable potential property for white residential development excepting probably the area on the heights to the East of the Mackenzie State Park. The prospective developments to the East and North, then, under such circumstances could not be expected to encourage the extension of the central business district in those directions.

first zoning Ordinance 223) oned



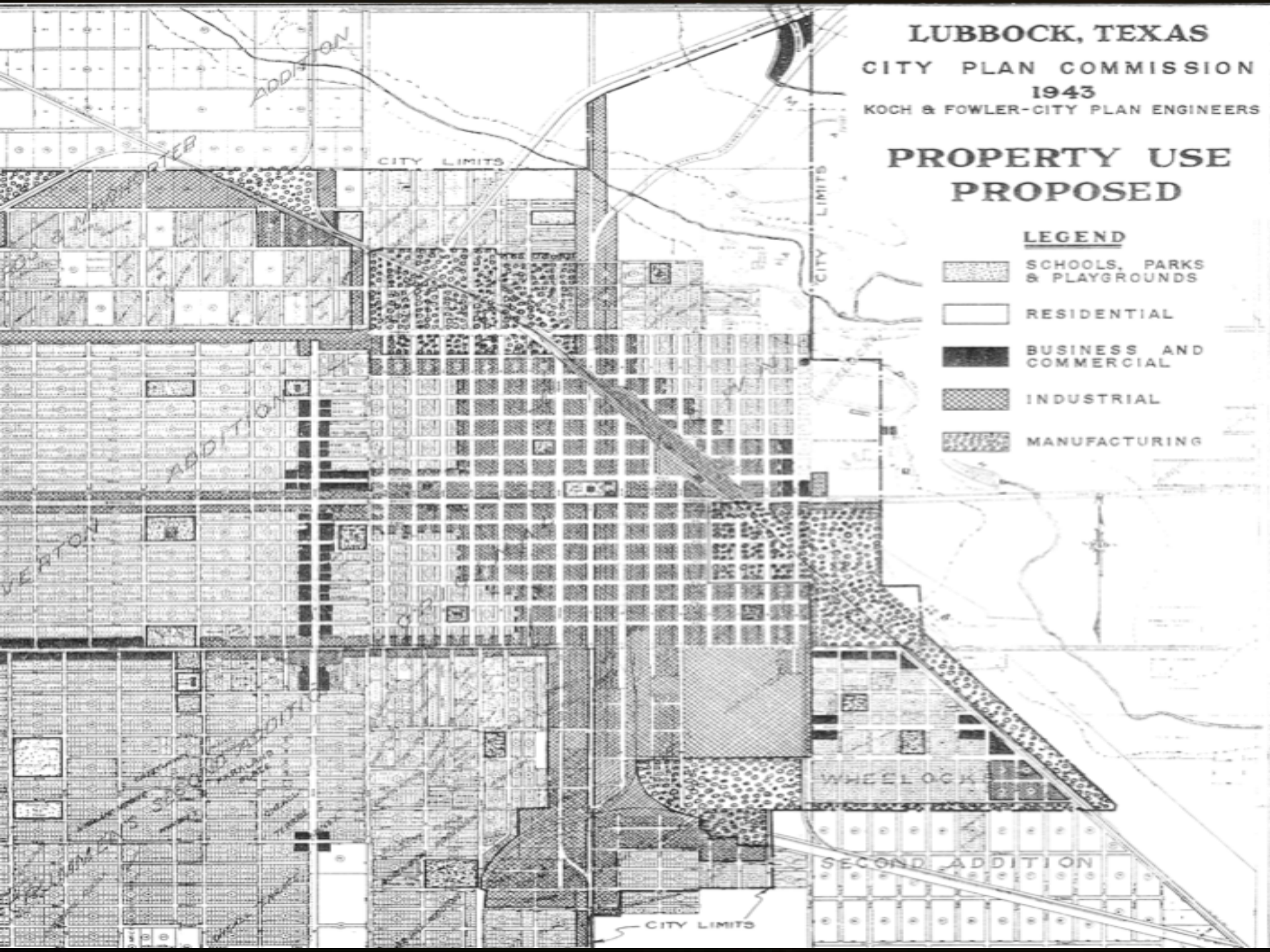


LUBBOCK, TEXAS  
CITY PLAN COMMISSION  
1943  
KOCH & FOWLER-CITY PLAN ENGINEERS

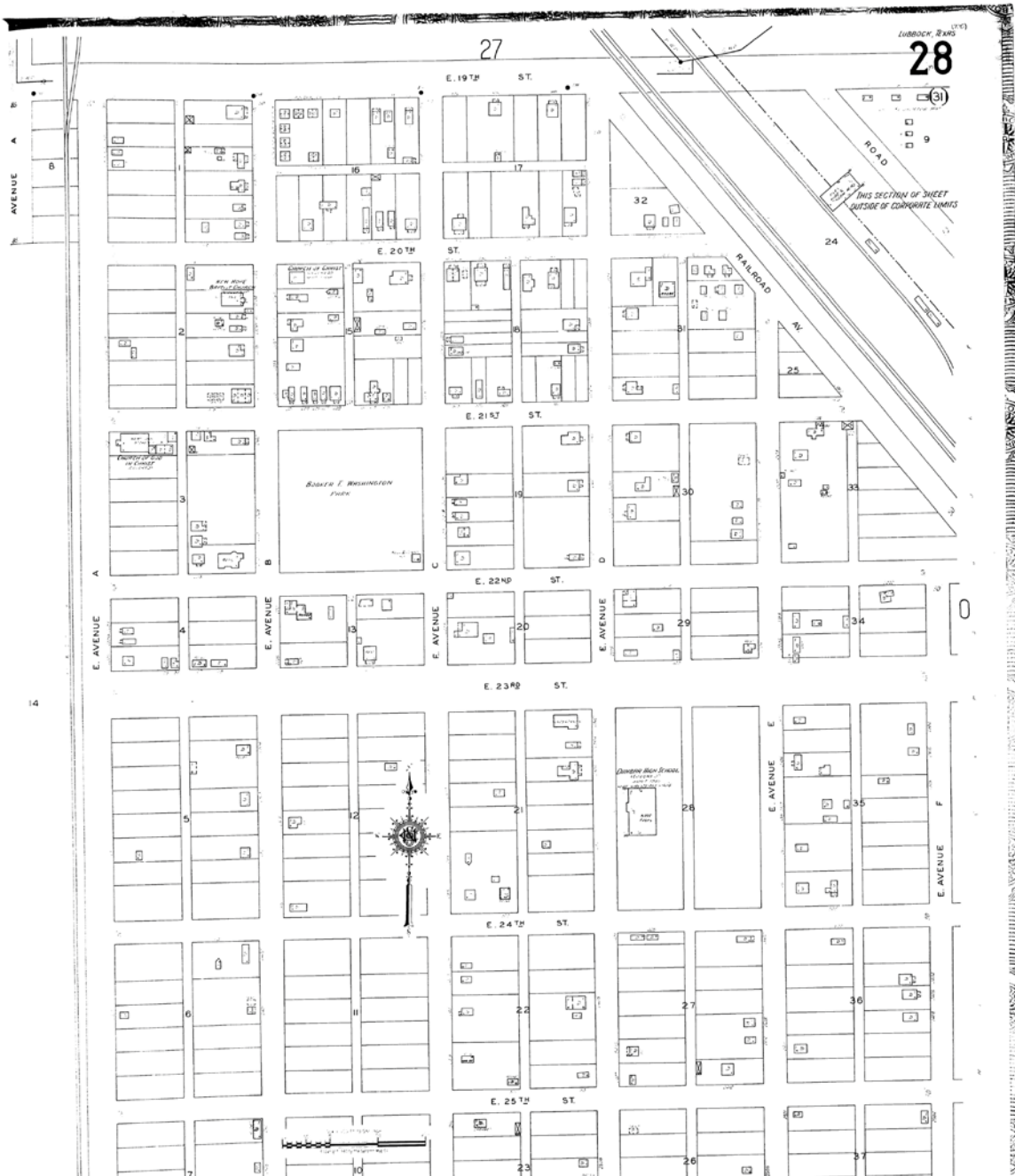
PROPERTY USE  
PROPOSED

LEGEND

-  SCHOOLS, PARKS & PLAYGROUNDS
-  RESIDENTIAL
-  BUSINESS AND COMMERCIAL
-  INDUSTRIAL
-  MANUFACTURING







# KEY

- MASSIVE ROOF
- BRICK OR PLASTER
- ADOBÉ
- HEIGHT OF BUILDING IN FEET FROM GROUND TO ROOF LINE
- (C. BR)
- (C. B)
- (CONC)
- (TILE)
- NUMBER OF STORIES
- TWO STORIES AND OVER COMPOSITION ROOF
- FRAME BRICK LINED
- BRICK 1ST
- FRAME BRICK LINED
- FLAT STORE
- DWELLING
- AUTO IN SHED
- LOFT
- (ASB CL)
- NON-COMBUSTIBLE ROOF COVERING OF METAL SLATE OR ASBESTOS SHINGLES
- SKYLIGHT LIGHTING TOP STORY ONLY
- SKYLIGHT LIGHTING THREE STORIES
- WIND BLAST SKYLIGHT
- FIRE WALL REINCHES ASBESTOS
- WATER TANK
- DRIVE WAY
- STABLE
- (C. BR)
- (C. B. BR)
- (C. B. BR CONST)
- (C. B. BR CONST) (BR FACED)
- (C. B. BR CONST)

- Fire proof construction. (OR FIRE RESISTIVE CONSTR)
- Adobe building
- Stone building
- Concrete, lime, cinder or cement brick
- Hollow concrete or cement block constn
- Concrete or reinforced concrete constn
- Tile building
- Brick building with frame cornice
- " " " " stone front
- " " " " frame side
- (DIVIDED BY FRAME PARTITION)
- Brick veneered building
- " and frame building
- Frame building brick lined
- " " metal clad
- Frame building
- Iron building
- ten building occupied by various manufacturing or occupancies
- Frame building covered with asbestos
- Brick building with brick or metal cornice
- Fire wall 6 inches above roof
- " " 12 " " "
- " " 18 " " "
- " " 36 " " "
- Figures 8, 12, 16 indicate thickness of wall in inches
- Wall without opening and size in inches
- Wall with openings on floors as designated
- Opening with single iron or tin clad door
- " " double iron " " doors
- " " standard fire doors
- Openings with wired glass doors
- Drive or passage way
- Stable
- Auto. House or private garage
- Solid brick with interior walls of C.B. or C.B. and brick mixed
- Mixed construction of C.B. and brick with one wall of solid brick
- Mixed construction of C.B. and brick with one wall faced with 4" brick
- Mixed construction of C.B. and brick throughout

- Window opening in first story
- Window openings in second and third stories
- Window openings in second and fourth stories
- Windows with wired glass
- Windows with iron or tin clad shutters
- Window openings tenth to twenty-second stories
- Open elevator
- Frame enclosed elevator
- " " " " with traps
- " " " " self closing traps
- Concrete block enclosed elevator with traps
- Tile enclosed elevator with self closing traps
- Brick enclosed elev. with wired glass door
- Block number
- Vertical steam boiler
- Gasoline tank
- Vertical pipe or stand pipe
- Automatic fire alarm
- Independent electric plant
- Automatic sprinklers
- Automatic chemical sprinklers
- Automatic sprinklers in part of building only
- Reference to adjoining page
- Outside vertical pipe on fire escape
- Fire alarm box
- Single hydrant
- Double " "
- Triple " "
- Quadruple hydrant of the High Pressure Fire Service
- Fire alarm box of the High Pressure Fire Service
- Water pipes of the High Pressure Fire Service
- and hydrants of the High Pressure Fire Service as shown on key map
- Water pipes and size in inches
- Water pipes of private supply
- House numbers shown nearest to buildings are official or actually up on buildings
- Old house numbers shown furthest from building

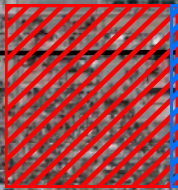
## CODING OF STRUCTURAL UNITS FOR FIREPROOF AND NON-COMBUSTIBLE BUILDINGS

FRAMING		FLOORS		ROOF	
CODE	STRUCTURAL UNIT	CODE	STRUCTURAL UNIT	CODE	STRUCTURAL UNIT
A.	Reinforced Concrete Frame.	1.	Reinforced Concrete, Reinforced Concrete with Masonry Units, Pre-cast Concrete or Gypsum Slabs or Planks.	a.	Reinforced Concrete, Reinforced Concrete with Masonry Units, Reinforced Gypsum Concrete Pre-cast Concrete or Gypsum Slabs or Planks.
B.	Reinforced Concrete Joists, Columns, Beams, Trusses, Arches, Masonry Piers.	2.	Concrete on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, and Cellular, Ribbed or Corrugated Steel Units.	b.	Concrete or Gypsum on Metal Lath, Incombustible Form Boards, Paper-backed Wire Fabric, Steel Deck, and Cellular, Ribbed or Corrugated Steel Units.
C.	Protected Steel Frame.	3.	Open Steel Deck or Grating.	c.	Incombustible Composition Boards with or without Insulation, Masonry or Metal Tiles.
D.	Individually Protected Steel Joists, Columns, Beams, Trusses, Arches.			d.	Steel Deck, Corrugated Metal or Asbestos Protected Metal with or without Insulation.
E.	Indirectly Protected Steel Frame.				
F.	Indirectly Protected Steel Joists, Columns, Beams, Trusses, Arches.				
G.	Unprotected Steel Frame.				
H.	Unprotected Steel Joists, Columns, Beams, Trusses, Arches.				
O.	Masonry Bearing Walls.				

- The coding for framing, floor and roof structural units as shown above is used in describing the construction of fire-resistive buildings. In addition, reports for fire-resistive buildings will show the date built and wall construction when other than brick.
- P P buildings have masonry floors and roof; concrete and/or directly or indirectly protected steel framing; and clay brick, stone or poured concrete walls.
- P X buildings are P P buildings with inferior walls such as concrete block, cement brick, metal or glass panels, etc.
- N C buildings have unprotected steel framing and fire-resistive but non-masonry floors and roof.
- F-D-1962 (CONC) A-1-a A fire-resistive building built in 1962 with concrete walls and reinforced concrete frame, floors and roof.
- F-X-1962 (MASONRY) A-1-a A fire-resistive building built in 1962 with metal panel walls, indirectly protected steel floors and roof, and concrete masonry walls, noncombustible ceilings.
- NC-1962 (C.B.) H-2-a A noncombustible building built in 1962 with concrete block walls; unprotected steel columns and beams; concrete floors of metal lath and steel deck roof.



82



1

South Overton 2

27

East Lubbock 1

East Lubbock 2

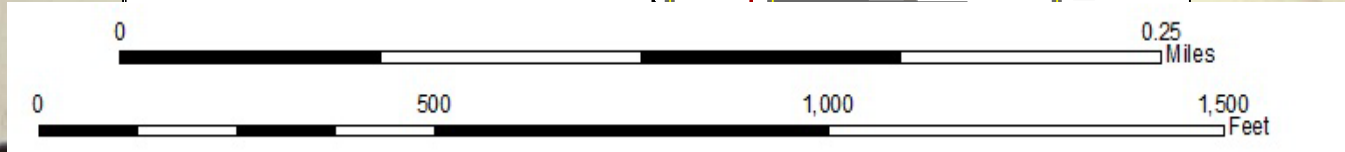






1:1900

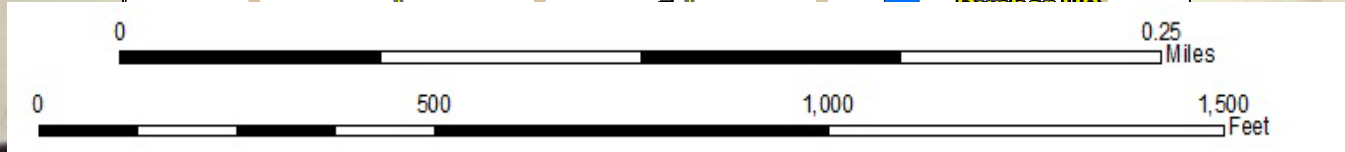
- Fire Hydrant
- Barn/Stables/Coop
- School
- Church
- Frat House/Apts/Boarding/Rooms
- Garage/Shed/Other
- Store/Restaurant
- Residence
- ~ Alley

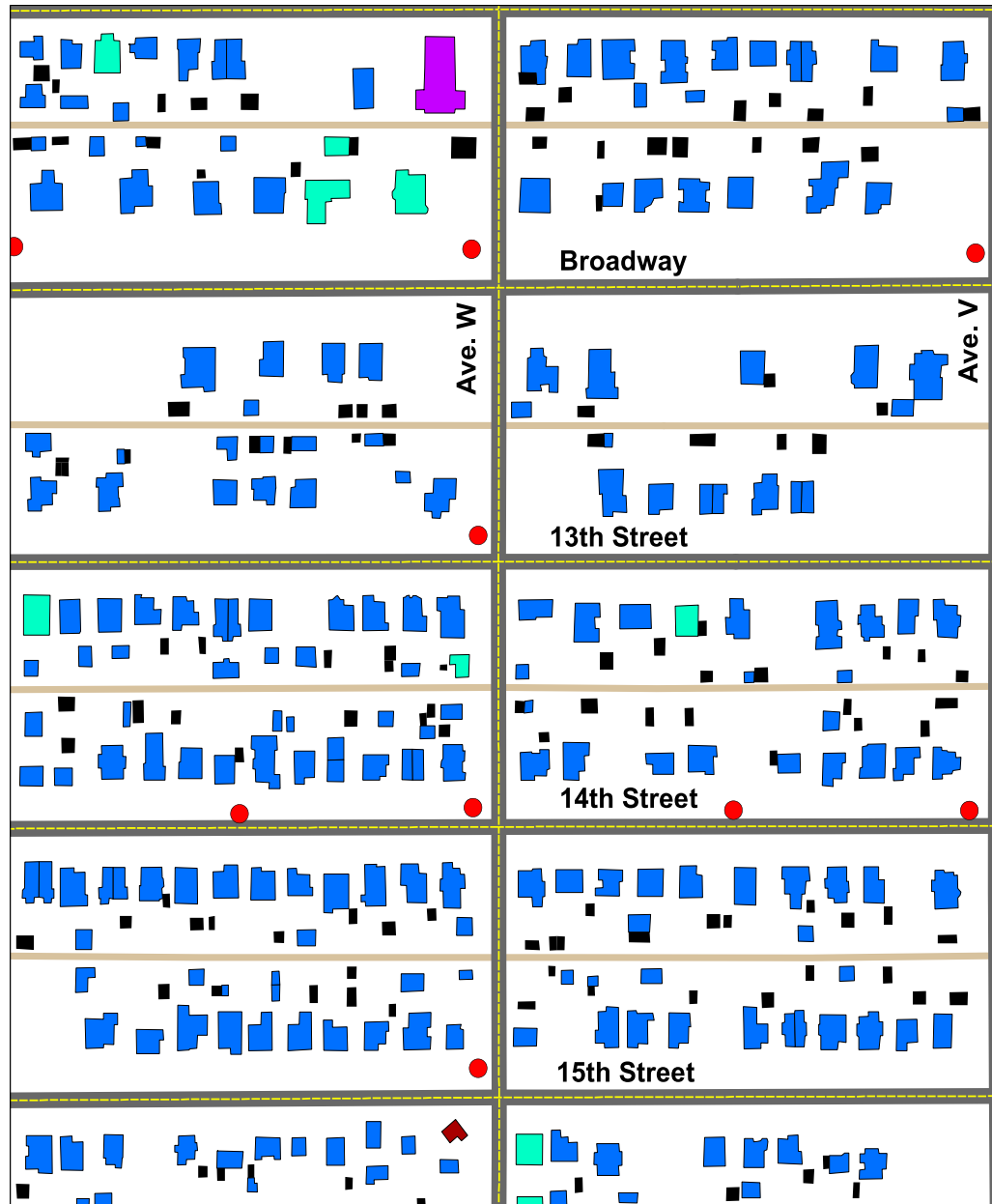




1:1900

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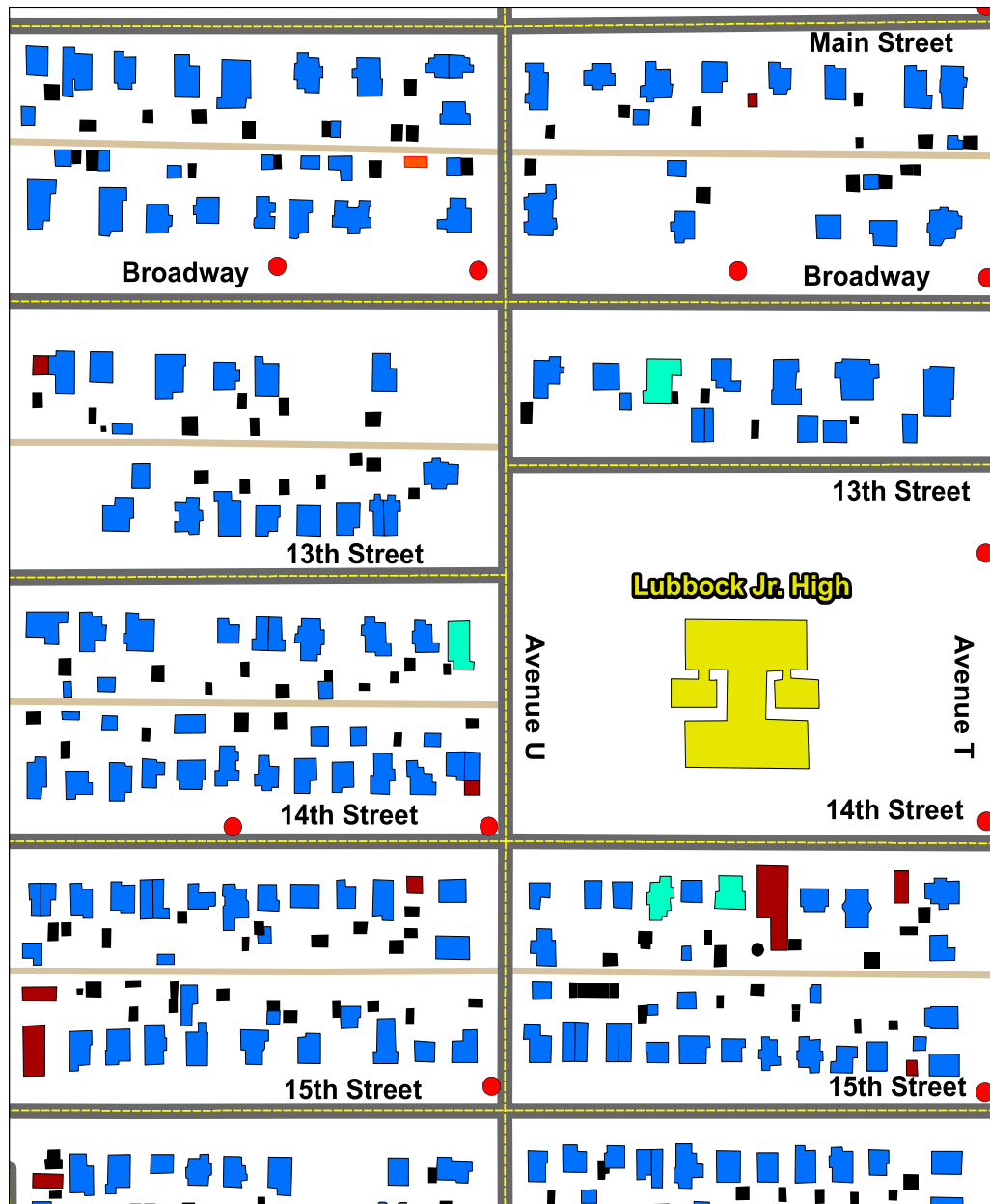


1:1900

- Fire Hydrant
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1:1900

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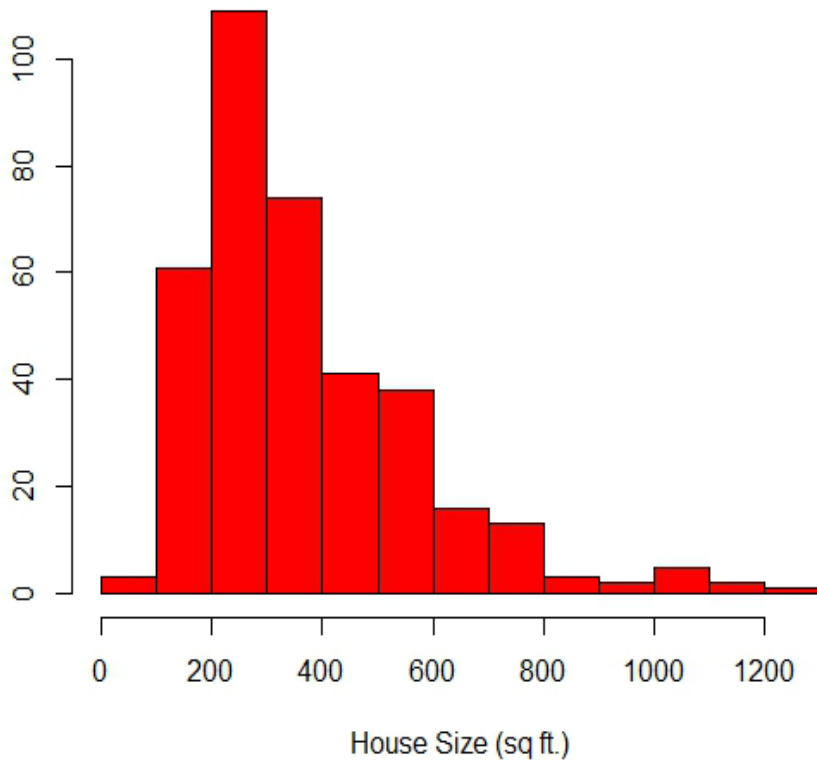


0 0.25 Miles

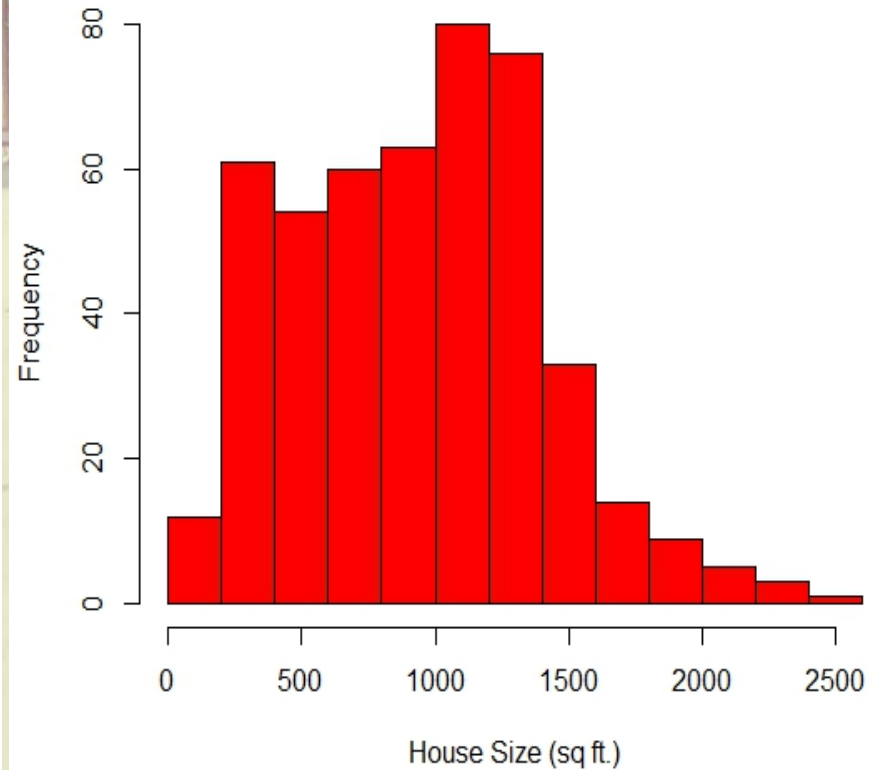
0 500 1,000 1,500 Feet

# Comparison of House Sizes (m<sup>2</sup>)

House Sizes: East Lubbock/Wheelock Subdivision



House Sizes: South Overton Neighborhood, Lubbock



➤ `wilcox.test(ELresidence$Area_sq_ft , S0residence$Area_sq_ft)`

**Wilcoxon rank sum test with continuity correction**

data: `ELresidence$Area_sq_ft` and `S0residence$Area_sq_ft`

$W = 22186$ , **p-value < 2.2e-16**

➤ `t.test(ELresidence$Area_sq_ft, S0residence$Area_sq_ft)`

**Welch Two Sample t-test**

data: `ELresidence$Area_sq_ft` and `S0residence$Area_sq_ft`

$t = -24.3133$ ,  $df = 678.569$ , **p-value < 2.2e-16**

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-619.0680 -526.5515

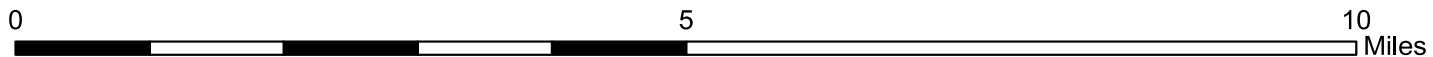
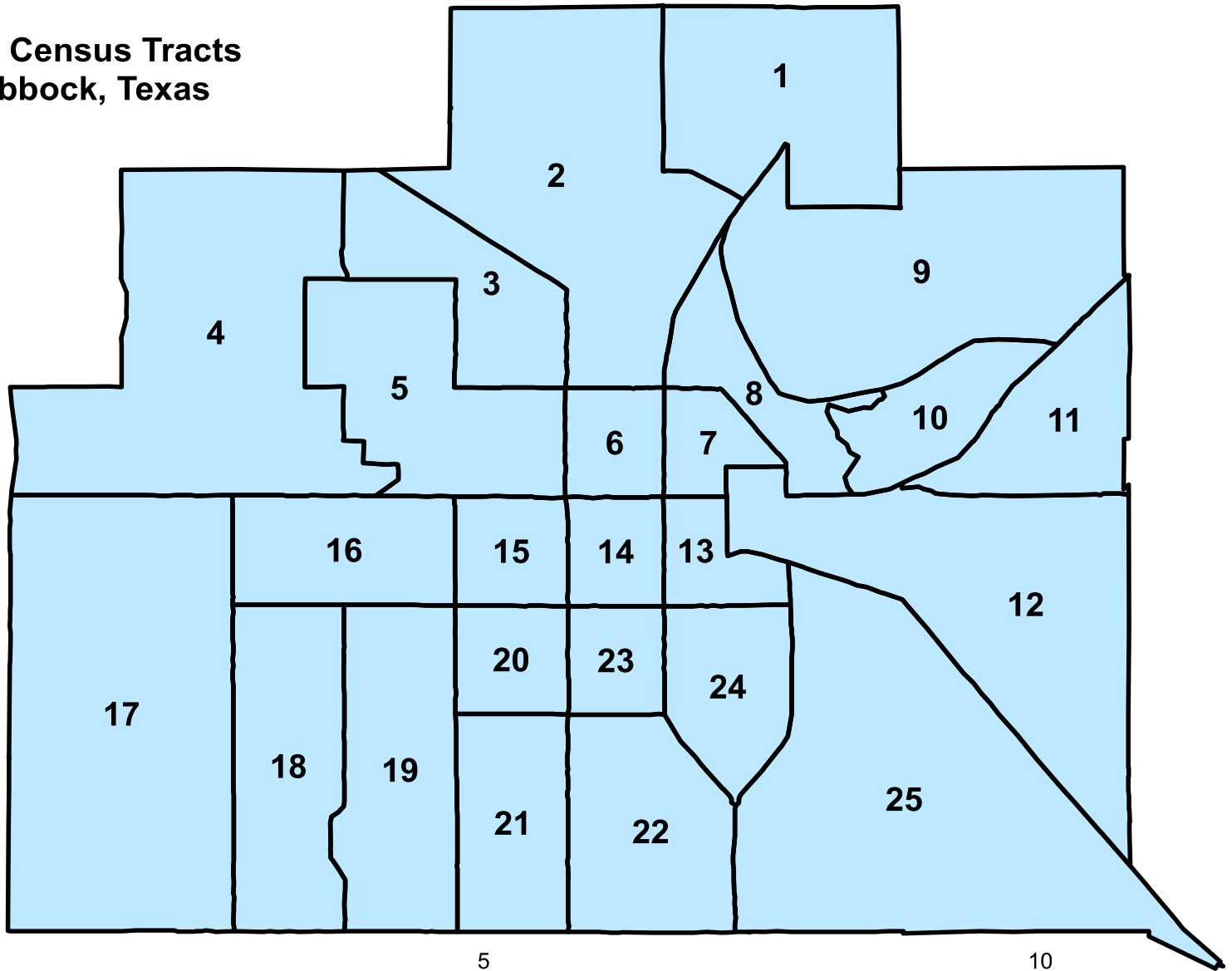
sample estimates:

mean of x mean of y

368.9179 941.7277

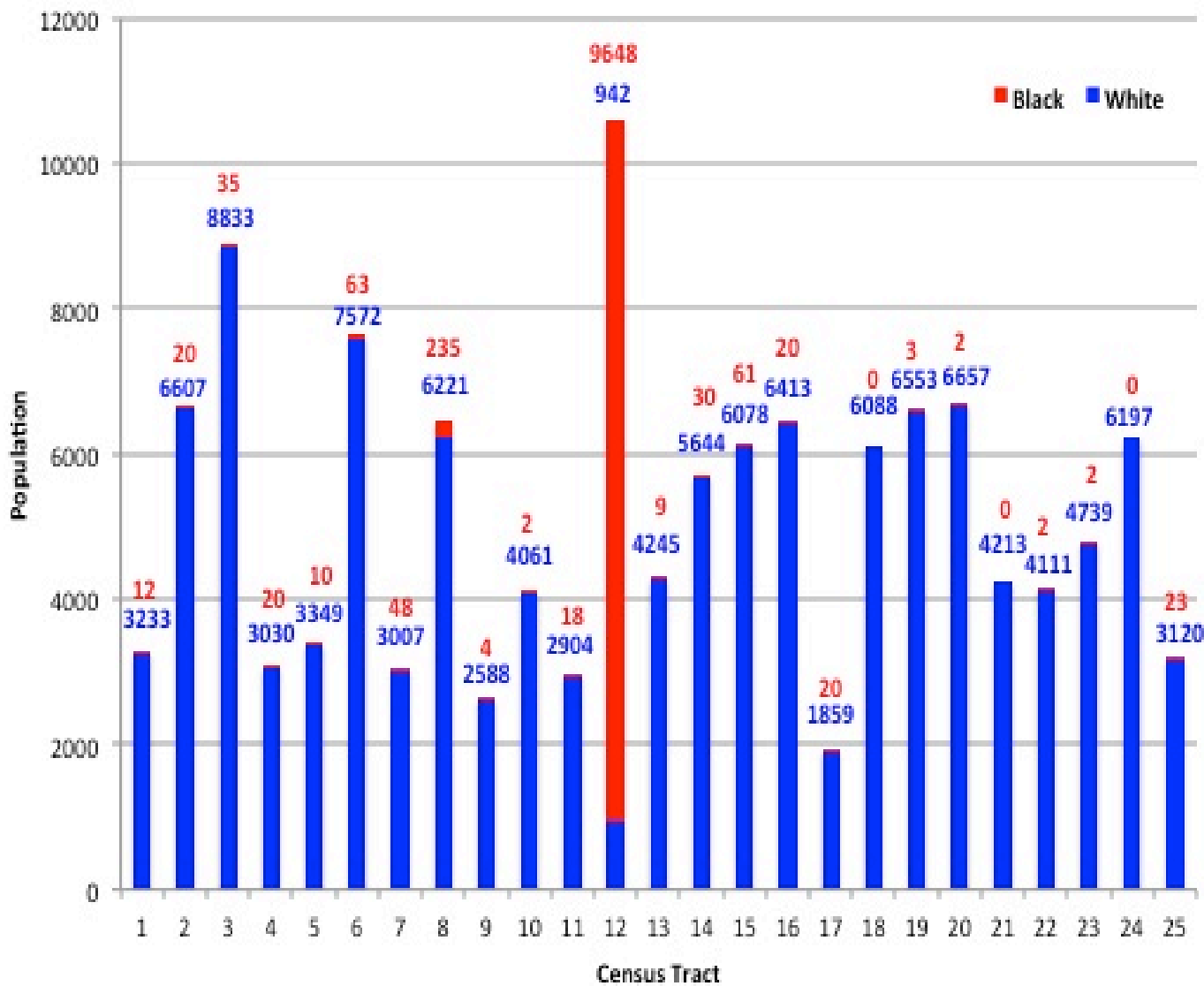
Statistically significant differences were shown in both tests.  
In 1940 the homes in South Overton were significantly larger  
than homes in East Lubbock

# 1960 Census Tracts Lubbock, Texas

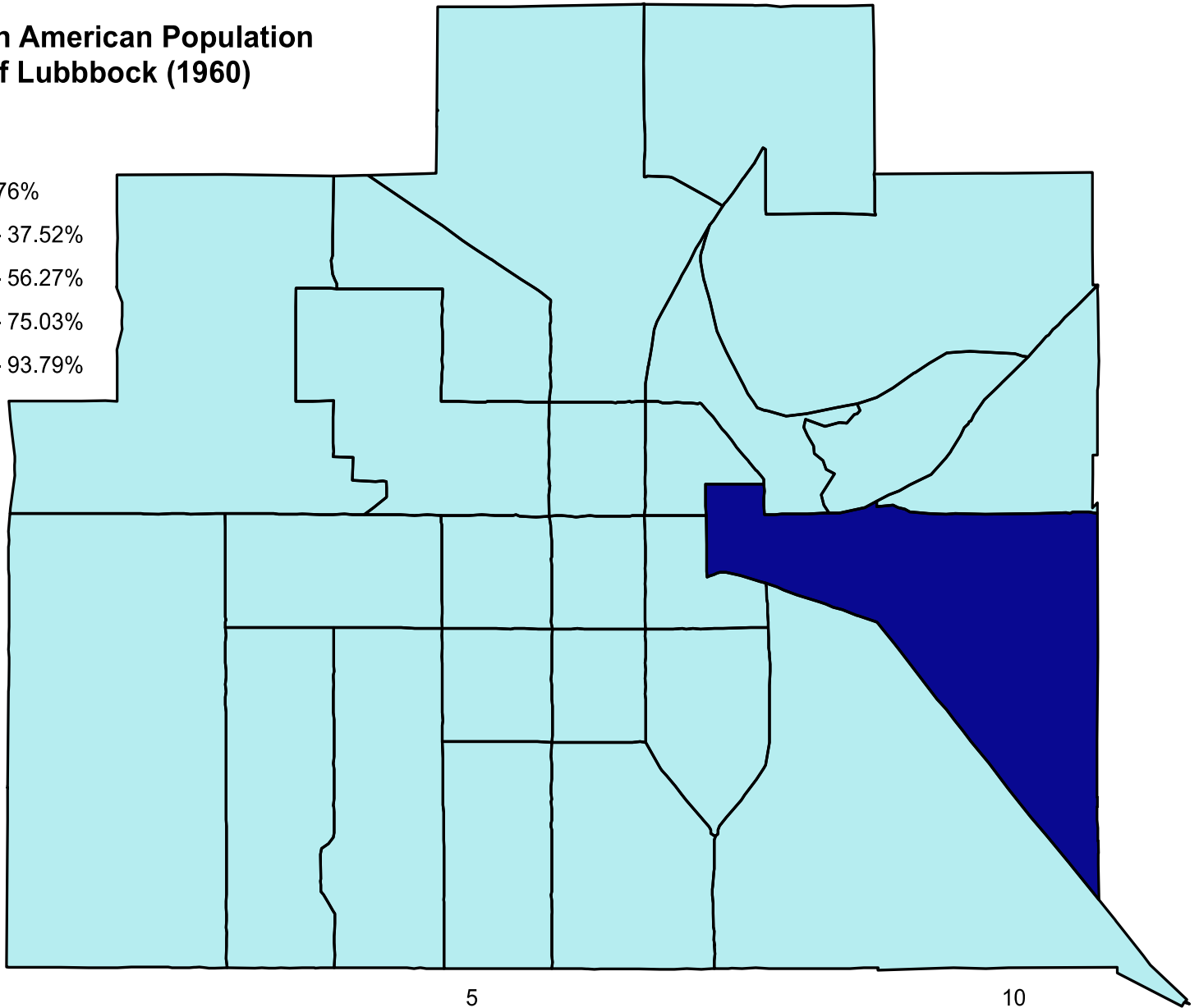
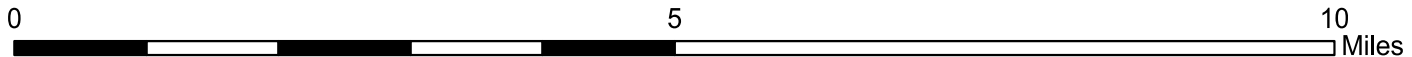
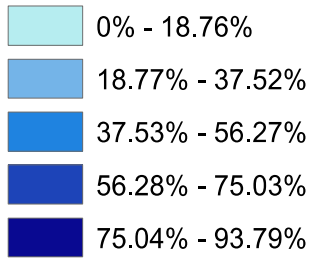




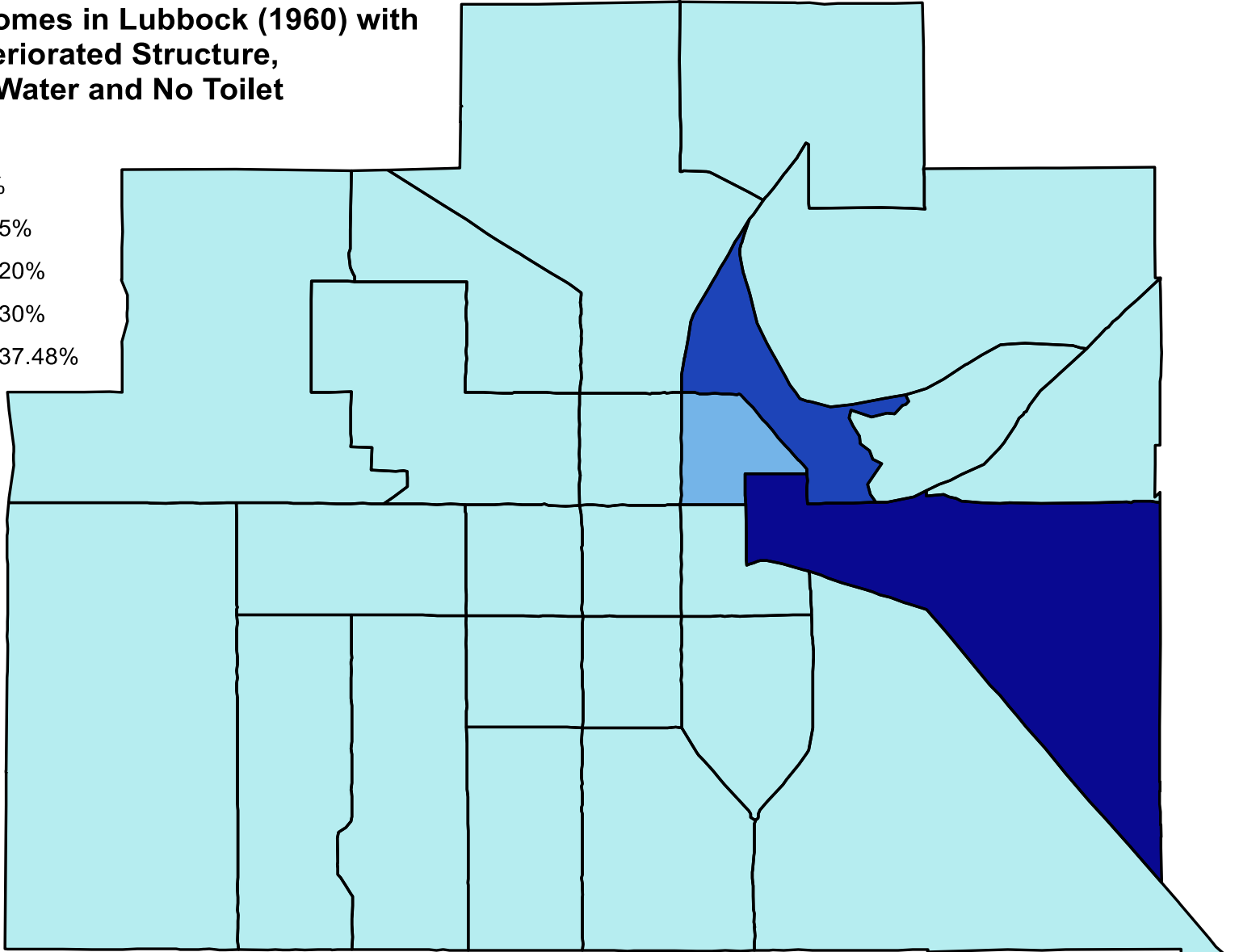
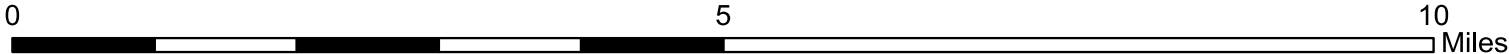
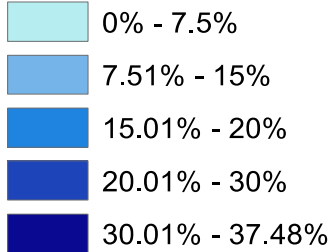
## Lubbock Population by Race (1960)



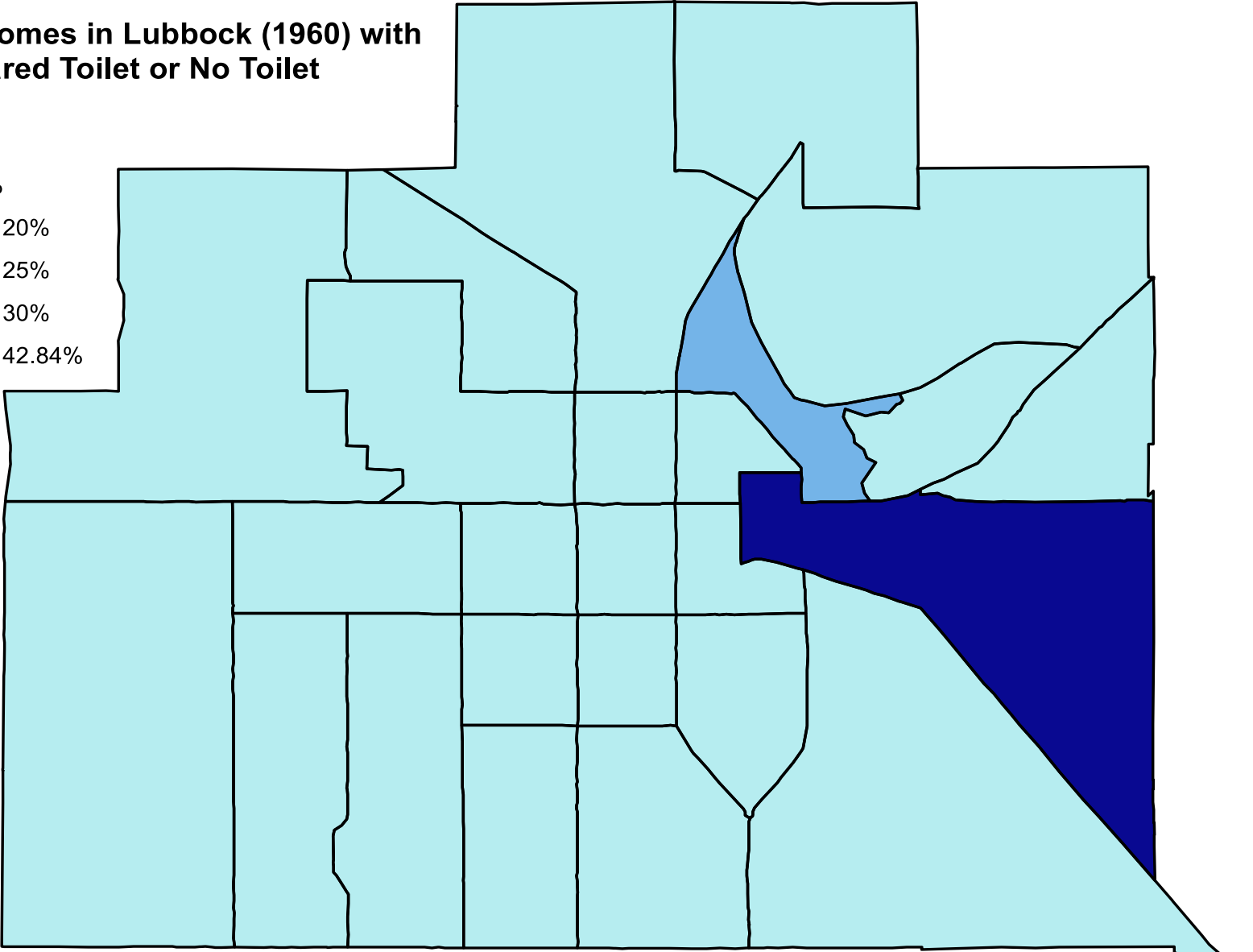
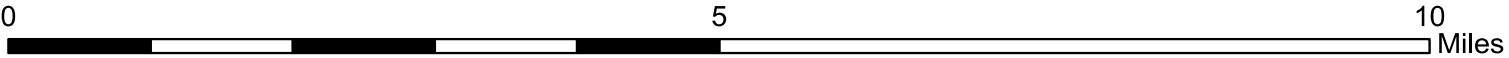
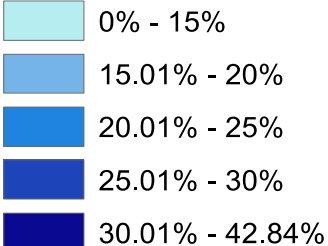
# African American Population of Lubbock (1960)



**Percent of Homes in Lubbock (1960) with Deteriorated Structure, No Water and No Toilet**

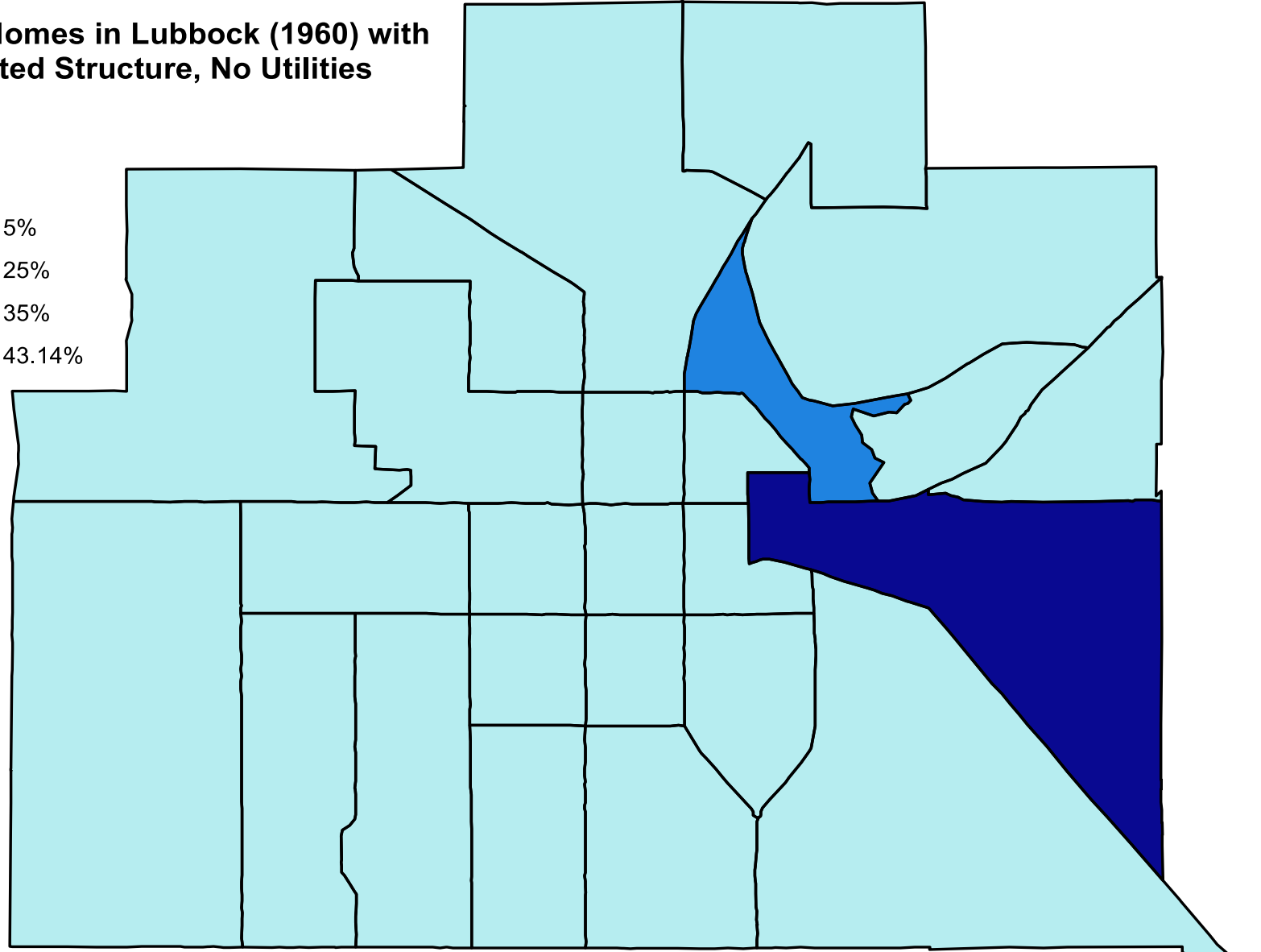
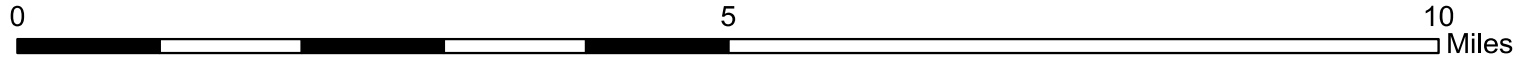
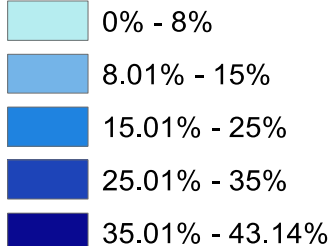


# Percent of Homes in Lubbock (1960) with A Shared Toilet or No Toilet



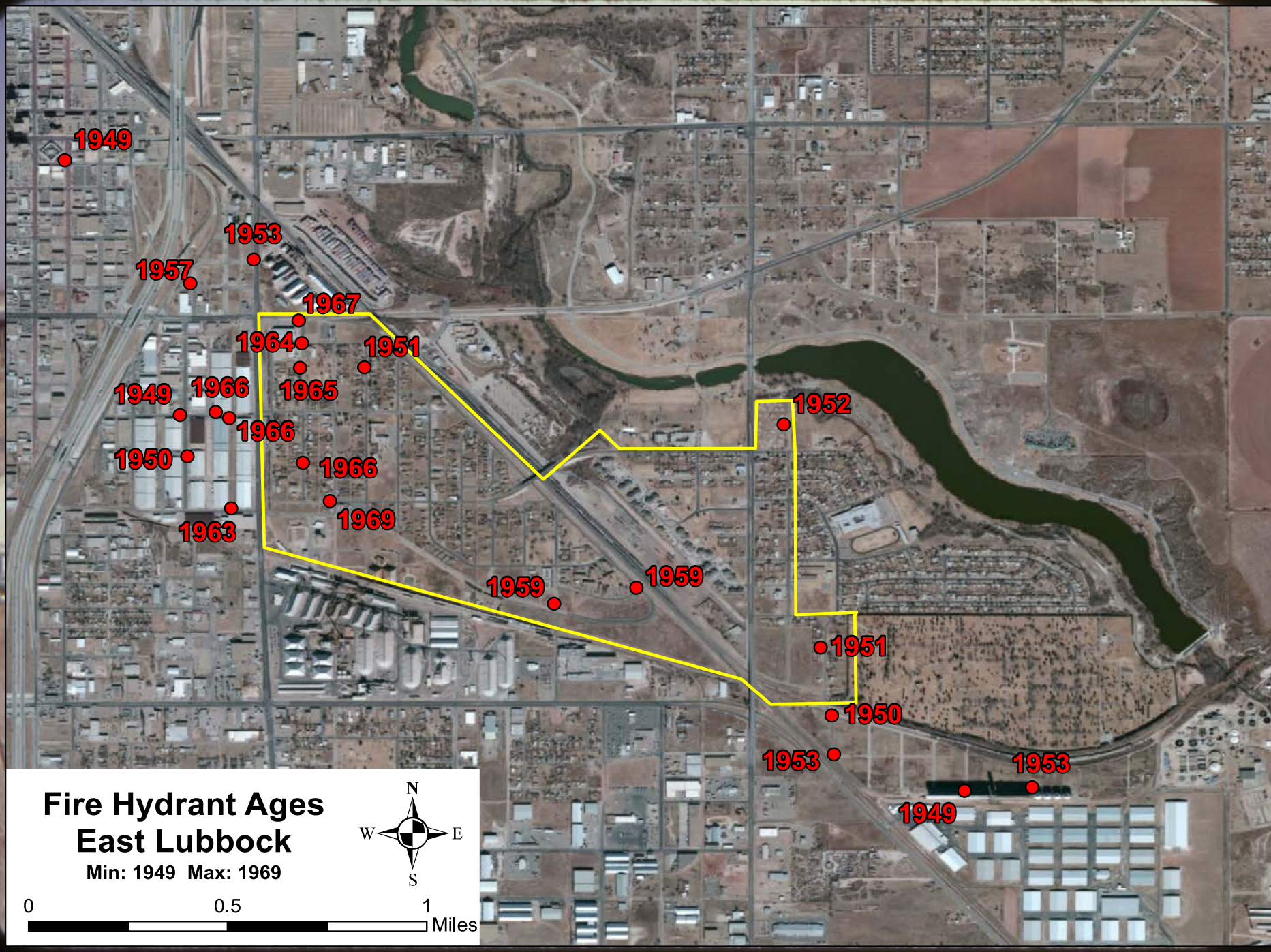


# Percent of Homes in Lubbock (1960) with Dilapidated Structure, No Utilities



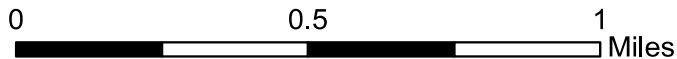






# Fire Hydrant Ages East Lubbock

Min: 1949 Max: 1969



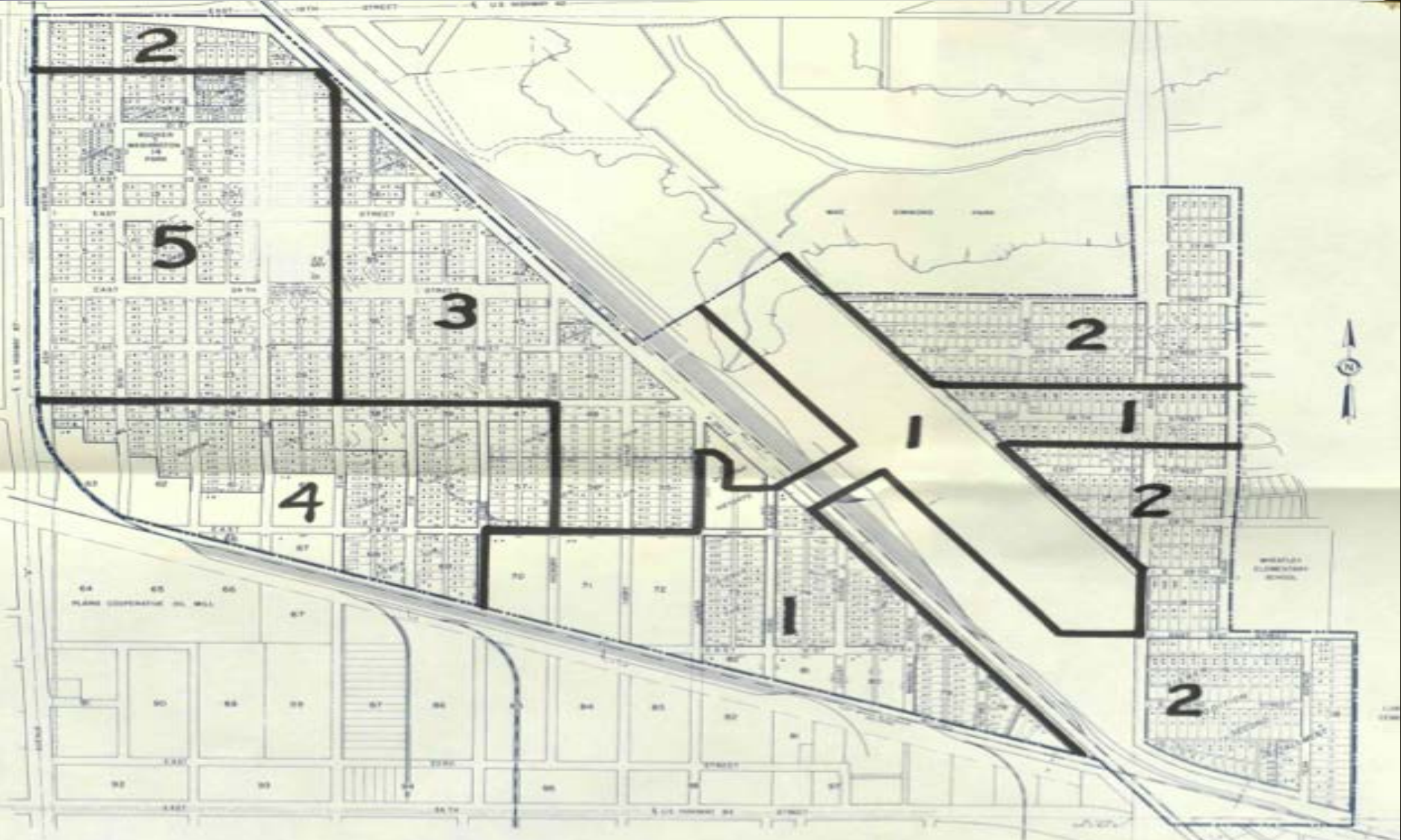


# Living Conditions (ca. 1964)





# Coronado Urban Renewal Project (1959-1964)



# Coronado Urban Renewal Project

SIZE AND INCOME OF FAMILIES TO BE  
DISPLACED IN CORONADO

Monthly Income	Total Number of Families	Number of Families by Size							
		2	3	4	5	6	7	8	9-
Total	1,281	375	226	191	142	117	88	57	85
Under \$200	281	113	51	44	17	18	18	8	12
\$200 - 249	195	63	31	36	21	15	9	13	8
\$250 - 299	189	51	37	32	30	21	11	4	13
\$300 - 349	215	58	33	29	34	24	11	7	19
\$350 - 399	150	40	39	19	14	18	13	9	8
\$400 - 449	98	22	12	14	13	8	12	7	9
\$450 - 499	68	19	12	5	10	6	3	7	6
\$500 - up	85	9	31	12	13	7	11	2	10

The weighted-mean-monthly income was \$289 per family and was determined by using the mid-point of each income group weighted by the number of families in each group.

Edgley and Buford document wide-spread dissatisfaction with the Project. The biggest issue was the city's underestimation of resident's abilities to afford their new homes.

City claimed that the project was based on removing slums and the safety of residents. Was race a motivating factor?



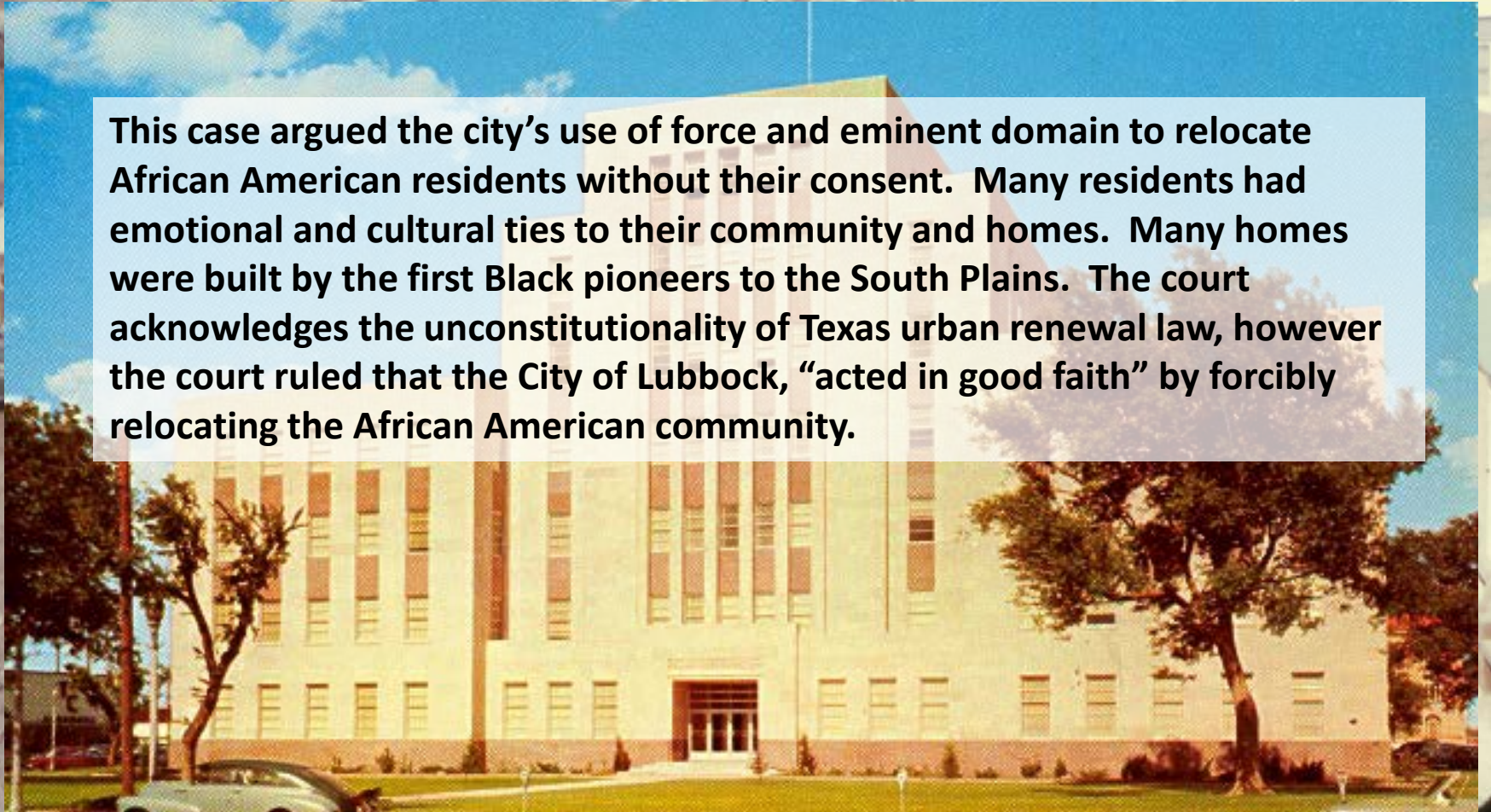


# R.B. Davis et al v. City of Lubbock and Urban Renewal Agency

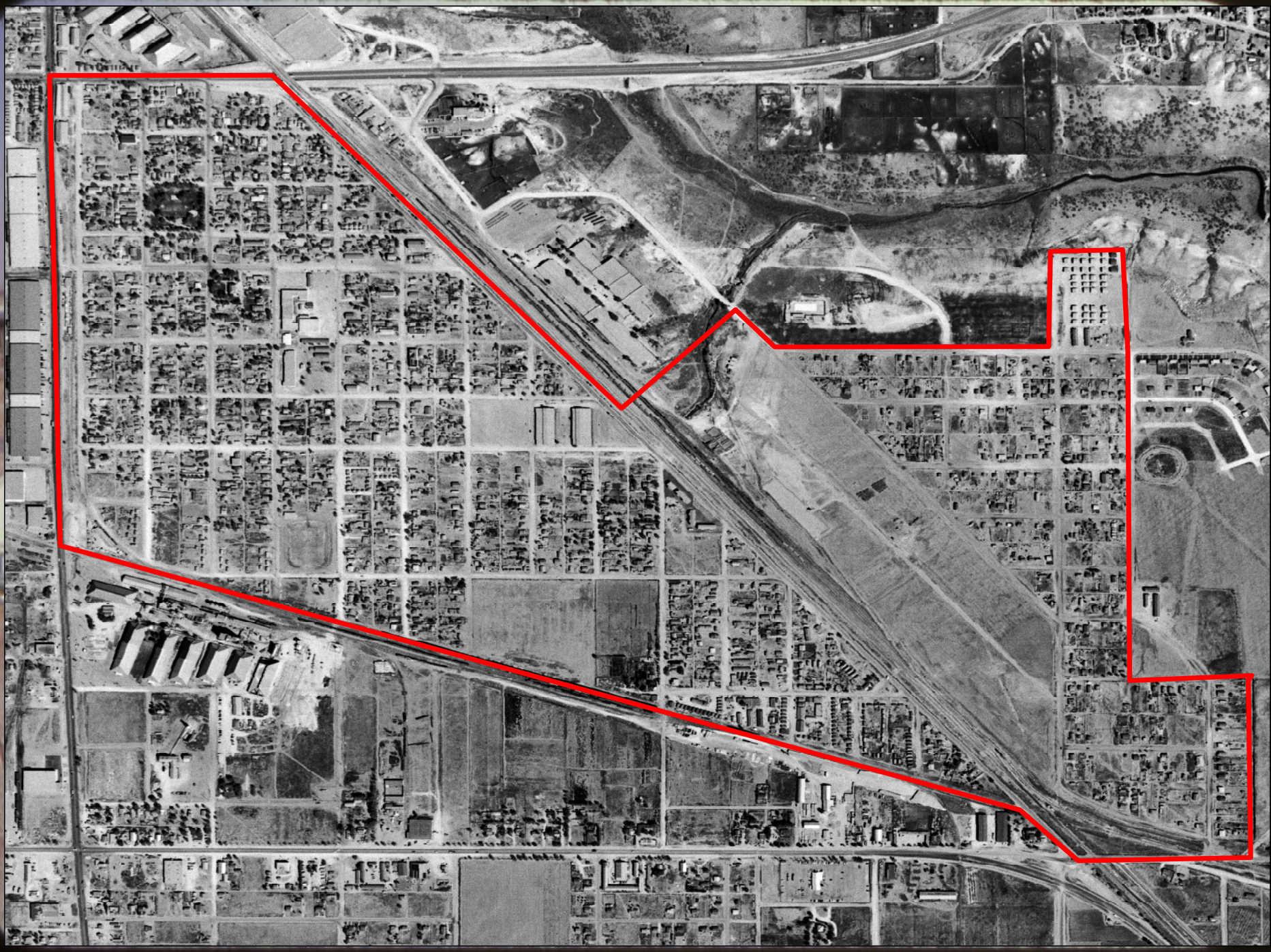
Decided July 15<sup>th</sup>, 1959

Supreme Court of Texas, 99<sup>th</sup> District, Lubbock County

**This case argued the city's use of force and eminent domain to relocate African American residents without their consent. Many residents had emotional and cultural ties to their community and homes. Many homes were built by the first Black pioneers to the South Plains. The court acknowledges the unconstitutionality of Texas urban renewal law, however the court ruled that the City of Lubbock, "acted in good faith" by forcibly relocating the African American community.**



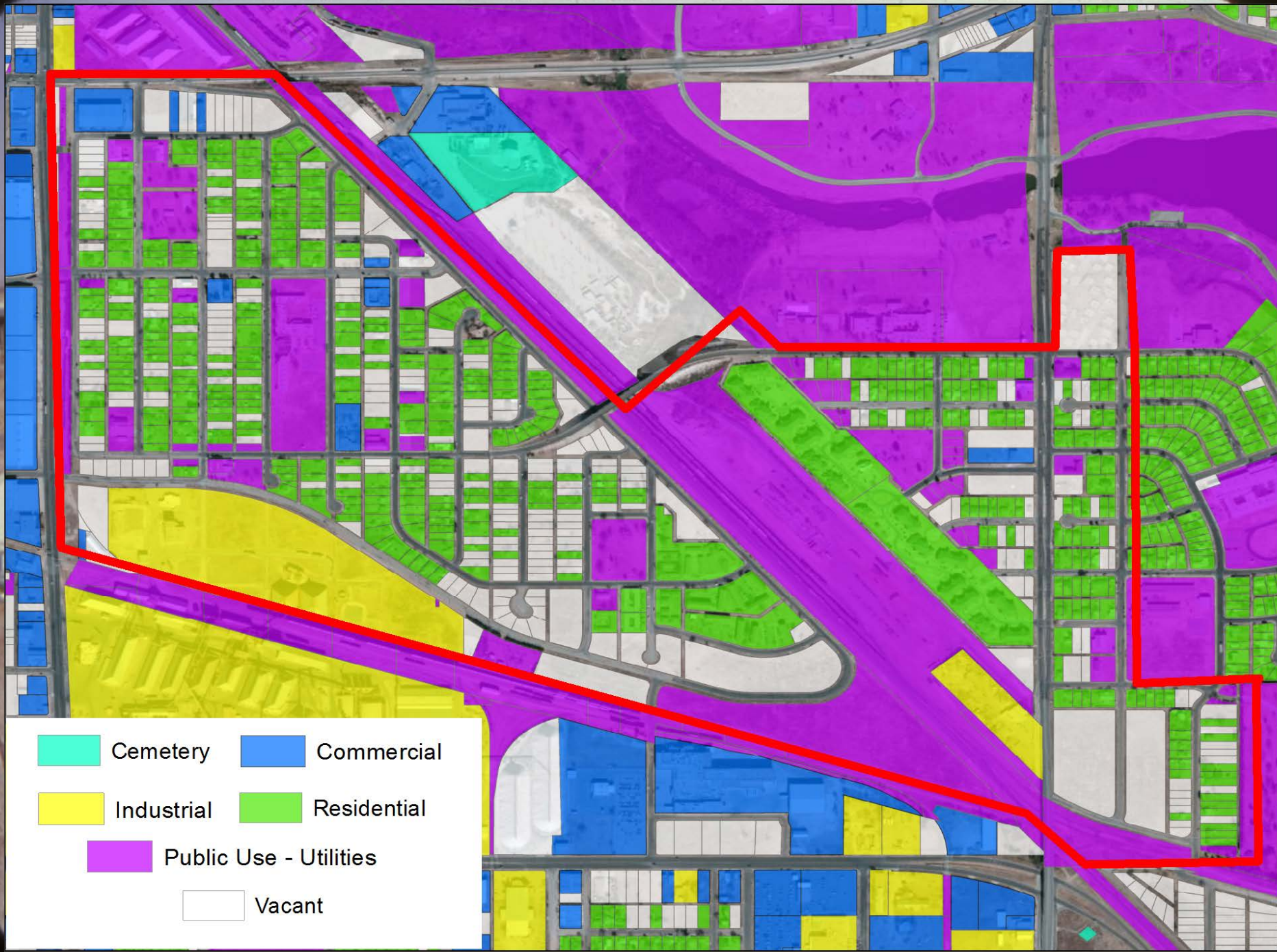












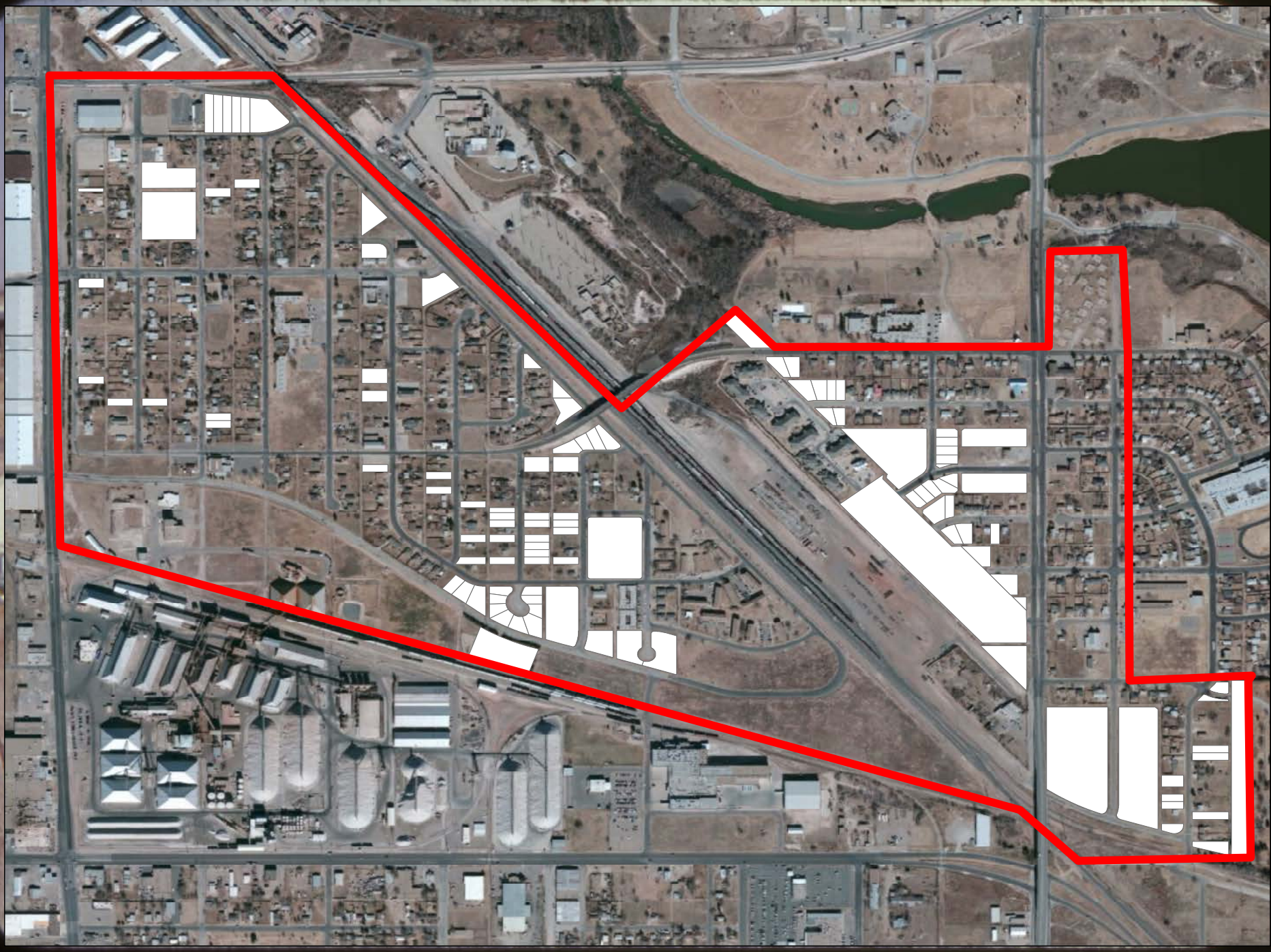






- |   |                        |   |             |
|---|------------------------|---|-------------|
|   | Cemetery               |  | Commercial  |
|   | Industrial             |  | Residential |
|  | Public Use - Utilities |   |             |
|  | Vacant                 |   |             |











# Was the Coronado Urban Renewal Project a success? Why hasn't that land been redeveloped?

Total Area	City Owned Area	Vacant Area	City Owned AND Vacant	Percent City Owned	Percent Vacant	Percent of City Owned (Vacant)
1,320,561.46 m <sup>2</sup>	240217.87 m <sup>2</sup>	326413.80 m <sup>2</sup>	127239.32 m <sup>2</sup>	18.19%	24.72%	52.97%
326.32 acres	59.36 acres	80.66 acres	31.44 acres			

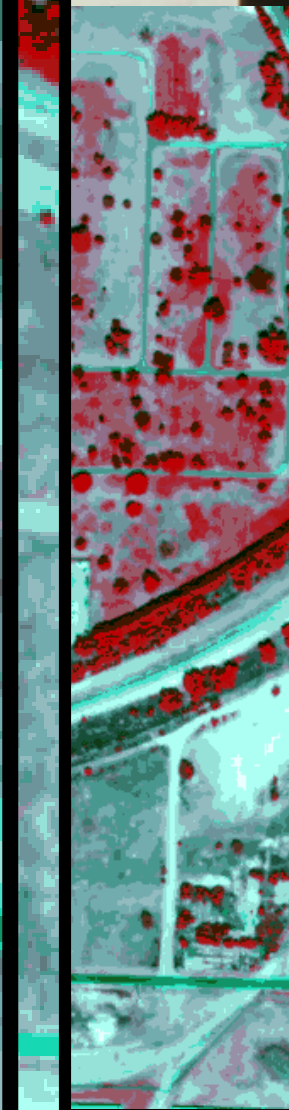
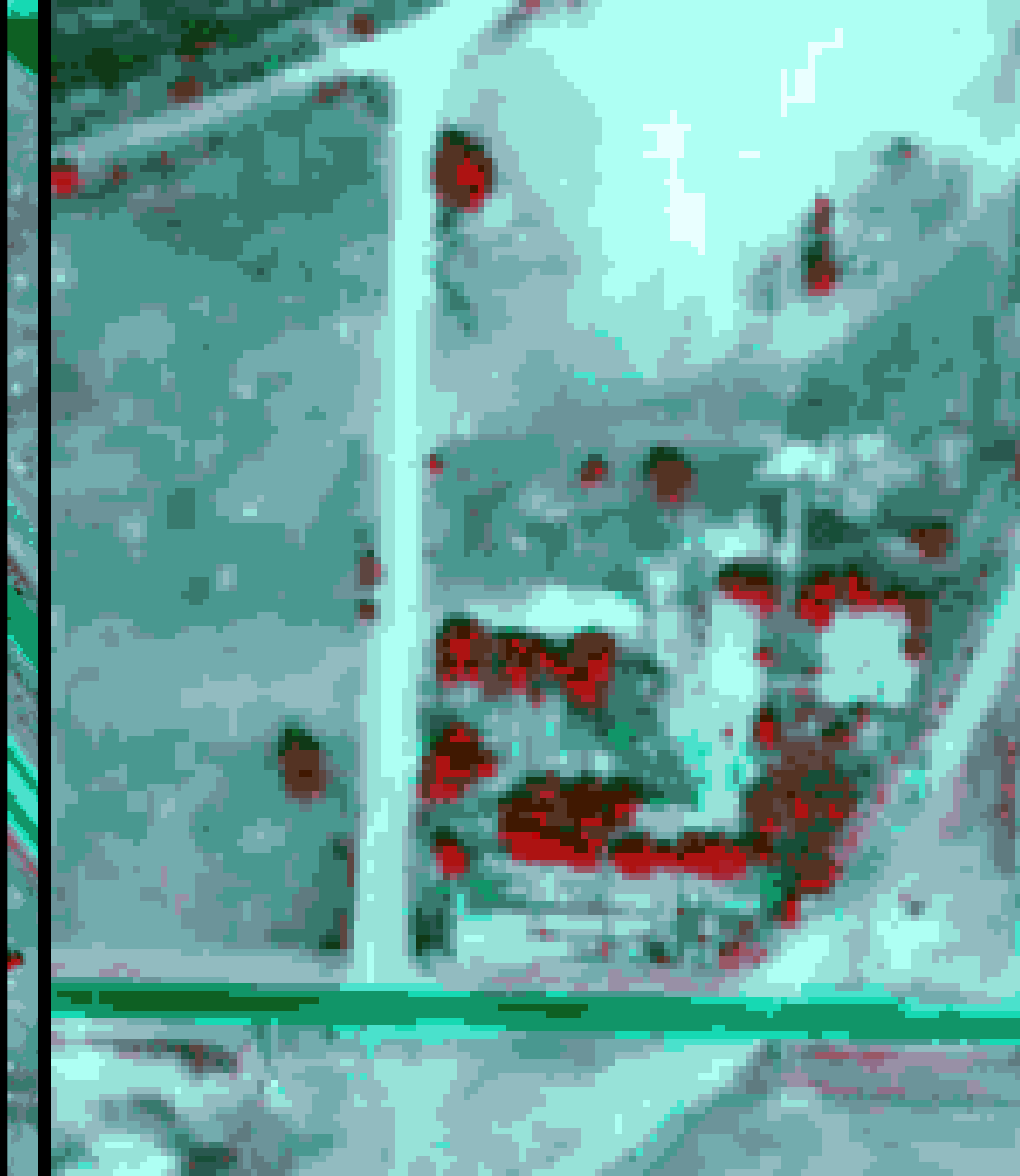
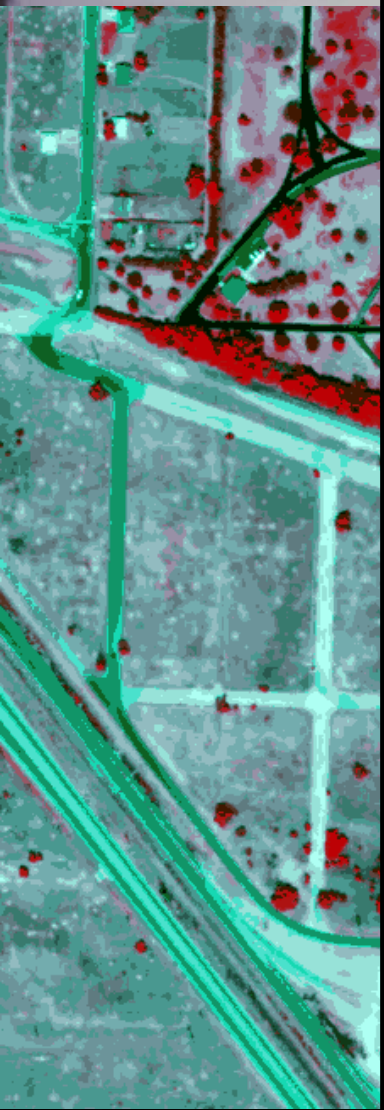


# Remote Sensing Methodology

- High resolution color-infrared (1m) NAIP imagery from 2012 was classified using ERDAS Imagine for the purposes of visualizing remains of destroyed structures from the Coronado Urban Renewal Project. A simple 30 class, unsupervised classification was run with 25 iterations and a 99% similarity convergence. The results allow for visualization of remaining features such as old fence lines, pathways and housing foundations, often covered in grass and barely visible to the naked eye.

2012

y









# Conclusions

- People before hazard
- Hazard intentionally placed in 1943 Lubbock City Plan
- City never redeveloped areas encompassed by the 1964 Coronado Urban Renewal Project.
- The past is still very much alive in Lubbock.



Questions?



TEXAS TECH UNIVERSITY™