

Liberty County, Texas

STATE OF COMMUNITY REPORT

TEXAS TARGET COMMUNITIES

TEXAS A&M UNIVERSITY

JULY 23RD, 2015

1 EXECUTIVE SUMMARY

This State of Community Report is prepared by Texas Target Communities. It gathers data from a wide variety of sources in order to gain a more complete picture of current conditions in Liberty County, Tx. Due to resource limitations, there was no public participation, though it can be integrated at a later date. By centralizing the data in this document, relationships between different components and characteristics of the county become clearer and potential opportunities and synergies come to light.

Liberty County prides itself on being a great place to live and raise families, which is evident in the rapidly growing population. It is rural, but not too distant from the amenities of Houston. However, the rural character means that public resources and funding are more limited, and economic opportunities are fewer. Poverty levels are higher and education and health levels are lower than averages.

From the 19th-century until today, the county has based its economy on natural resource extraction and processing, which may not be sustainable in the long run. Traditionally blue-collar work is the main employment driver. Many people travel outside of the county for their work, as well as for health care and other goods and services.

The movement of both people and goods is enabled by strong transportation network coverage, including highways, railroads, river freight, and nearby ports. The expected expansion of a major Houston-area toll road into the county is eagerly awaited. Some bus transit is provided, but more is needed based on the financial and mobility constraints of many residents. School, fire, and other public infrastructure are provided but have some gaps, such as inadequate public hospital services.

Liberty County has many wetlands and two protected areas, so there is tension between land development pressures and conservancy interests. There are also dangers from hazards like flooding, wind, and storm surge due to its proximity to the Gulf Coast and the presence of the Trinity River. The rest of the land is primarily forests and farmland, with relatively little urban land development. Planning at the city level is minimal, apart from Cleveland City.

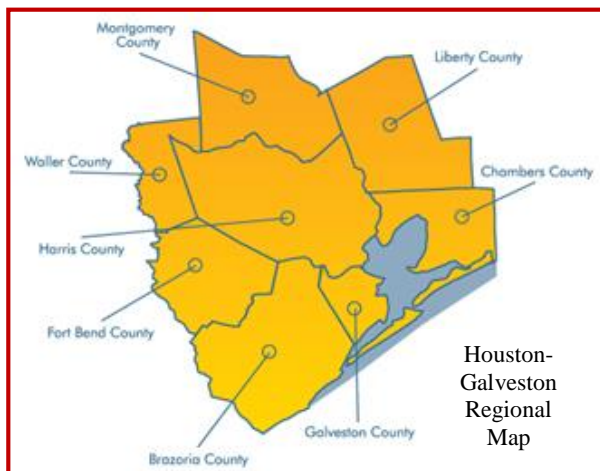
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2 COUNTY OVERVIEW

Liberty County is home to 18 communities in southeast Texas and is part of the thriving Houston metropolitan area. It shares its eastern border with Harris County and Montgomery County and its southern border with Chambers County. Humid and subtropical, the annual average temperatures range from 40°F in January to 94°F in July.

The 2014 county population is estimated by Census to be 78,117 people, and the population of its largest town and county seat, Liberty, is 8,919. Other major communities include Ames, Cleveland, Daisetta, Dayton, Devers, and Hardin.



This rural county covers an area of 1,158 square miles, of which less than 10% is developed land and 1.5% is water. Nearly half of the territory is rated as prime farmland. The Trinity River runs vertically through the center of the county before emptying into Trinity Bay, an arm of Galveston Bay. Surrounding the river is one of Liberty County’s treasures, the Trinity River National Wildlife Refuge.

The county also boasts a portion of the Big Thicket National Preserve in the northern territory, where visitors and residents have access to outdoor recreation in a natural setting¹.

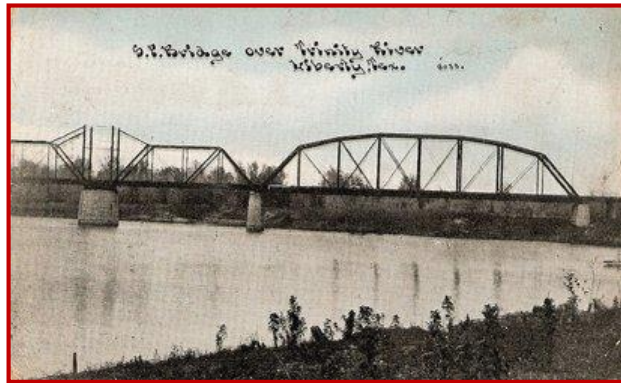
Lying between the industrial powerhouses of Houston and Beaumont-Port Arthur near the I-10 corridor, Liberty County is poised to participate in and benefit from the economic development of that region. In recent years, economic growth in the county has not kept pace with Texas averages, but this may change in conjunction with future planning and development efforts.

Located only 23 miles from the Gulf Coast, Liberty County is vulnerable to hurricanes. The most recent major hurricane to make landfall was Hurricane Ike in 2008, which cut a destructive path through the western part of the county and had a serious impact on manufacturing and timberland. However, as a report by the Texas Engineering Extension Service showed, Liberty County was the

¹ Kleiner, D. J. (2015). Liberty County: Handbook of Texas Online. The Texas State Historical Association. Retrieved April 01, 2015, from <http://www.tshaonline.org/handbook/online/articles/hcl08>

only affected county that managed to sustain economic growth during the four quarters following Hurricane Ike².

Transportation in the county is served by two U.S. Highways (Hwy 59 and Hwy 90) and four State Highways (SH-61, SH-105, SH-146, and SH-321), which are also major evacuation routes in case of hurricanes or other disasters. The construction of the Grand Parkway toll road through the southwest of the county is expected to begin in a few years, providing greater connectivity with the metropolitan region.



*Figure 2.1: Bridge over Trinity River, Liberty, TX
Source: Will Beauchamp Collection*

Public transportation needs are primarily served by the Brazos Transit District, which offers services in Liberty, Dayton, Ames, and Cleveland. Other organizations that provide medical public transportation services include Cleveland Senior Citizens, Liberty County Project on Aging, Indigent Care Program, and Liberty County Veterans office.

The 2014-2015 Liberty County Community Plan, a document required by the Criminal Justice division of the Governor's office, identified several areas of concern for county residents with an emphasis on safety, law enforcement, and criminal activity³. Increased substance abuse, driving while intoxicated, and child abuse, sexual assault and neglect were highlighted. The county hopes to address these problems with increased treatment facilities and shelters, updated police equipment and facilities, a centralized 9-1-1 call center, and increased resources for the county attorney. Other problems include traffic congestion, homelessness, lack of medical facilities, and the potential for communication breakdowns between emergency aid providers in case of a disaster event.

² Texas Engineering Extension Service. (2015, April 2). Hurricane Ike Impact Report: Liberty County. Retrieved from The Storm Resource:

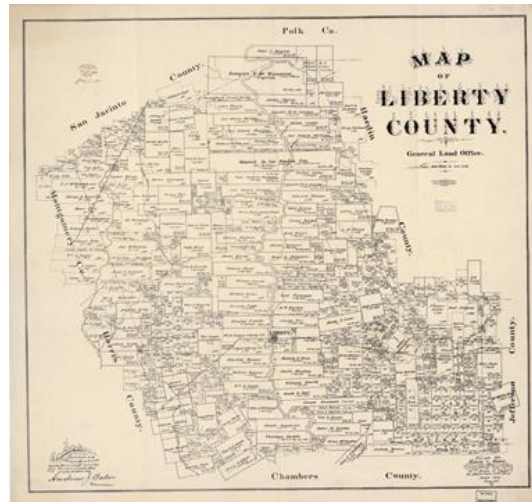
www.thestormresource.com/Resources/Documents/county_reports/Liberty_County_Impact_Report.pdf

³ Liberty County Commissioners Court. (2015). Liberty County Community Plan. Liberty County: Liberty County Commissioners Court.

3 HISTORY

The area was first inhabited by prehistoric Native Americans and artifacts dating to 1000 B.C. have been unearthed. Spanish and later Mexican settlement occurred in the 18th and early 19th centuries.

In 1818 American colonists settled in an area on the Trinity River that would eventually come to be called Liberty. After the Texas War of Independence with Mexico, the town was incorporated in 1837 and became the county seat. A notable early inhabitant was Sam Houston, who owned property and practiced law in Liberty County.



The area grew in importance thanks to its transportation links via land and water, with rail arriving in 1858. Timber was the area’s first major industry, and it produced and exported cotton, tobacco, rice, corn, soybeans and other agricultural products. The county also benefitted from oil booms in the early 20th century. River transportation, which initially waned with the advent of railroads in the region, has regained some of its stature in recent decades. The region continues to specialize in farming and natural resource extraction to this day, and retains much of its rural character.

Historically, Liberty County was racially and ethnically diverse. For example, the original name of the municipality that encompassed the area was Villa de la Santísima Trinidad de la Libertad, reflecting the governance of Mexican Texas. Also, after the Civil War, many freed African American slaves remained in the area working either for their former owners or on small farms. The African American population nearly doubled from 1860 to 1870 and there were nearly as many blacks as whites living in the county by 1880. However, the proportion of blacks living in Liberty County declined in the following decades, eventually reaching roughly one-third by the first part of the 20th century and one-quarter by 1940. Tense race relations were characteristic of this period and may have contributed to the diaspora of black county residents. Additionally, Liberty County’s rural population has increased at a faster rate than its urban population and the ensuing lack of employment opportunities for disadvantaged black residents may have been another contributing factor⁴.

⁴ Kleiner, D. J. (2015). Liberty County: Handbook of Texas Online. The Texas State Historical Association. Retrieved April 01, 2015, from <http://www.tshaonline.org/handbook/online/articles/hcl08>

4 DEMOGRAPHICS

4.1 POPULATION DENSITY

4.1.1 County Level

The population density in Liberty County is 65.03 people per square mile⁵, versus 96.3 people per square mile in Texas (Census, 2010). The average family size is 3.28 people in Liberty County, versus 2.75 people in Texas (Census, 2010)⁶.

4.1.2 Cities Level

The population of Liberty County is clustered around three major cities: the City of Liberty and the City of Dayton in the central of the county, and the City of Cleveland in the northwest of the county.

As of 2010, the population of the cities in the county is distributed, in decreasing order, as follows⁷:

- 8,397 for Liberty City
- 7,675 for Cleveland City
- 7,242 for Dayton City
- 1,003 for Ames City
- 966 for Daisetta City
- 819 for Hardin City
- 669 for Hull CDP
- 600 for Plum Grove City
- 563 for Kenefick Town
- 447 for Devers City
- 423 for Big Thicket Lake Estates CDP
- 247 for North Cleveland City
- 93 for Dayton Lakes City
- 49 for Old River-Winfree city

The total population of the three largest cities in the county account for 23,314 of the county's total population of 75,643. In other words, only 31% of the total county's population is located within the county's three largest cities.

⁵ Texas Association of Counties. 2010. Retrieved from <http://www.txcip.org/tac/census/profile.php?FIPS=48291>

⁶ "Family households" consist of a householder and one or more other people related to the householder by birth, marriage, or adoption. They do not include same-sex married couples even if the marriage was performed in a state issuing marriage certificates for same-sex couples

Retrieved from <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

⁷ Census. 2010. Retrieved from <http://txsdc.utsa.edu/Reference/Geo2010CensusPlacesByCounty.aspx>

The population density per square miles, in decreasing order, is as follows⁸:

- 802.6 persons per sq. mile for Cleveland City
- 559 persons per sq. mile for Daisetta City
- 447 persons per sq. mile for Kenefick Town
- 365 persons per sq. mile for Ames City
- 343.5 persons per sq. mile for Dayton City
- 317 persons per sq. mile for Hardin City
- 288 persons per sq. mile for Big Thicket Lake Estates CDP
- 279 persons per sq. mile for Devers City
- 206.8 persons per sq. mile for Liberty City
- 191 persons per sq. mile for Hull CDP
- 186 persons per sq. mile for Plum Grove City
- 147 persons per sq. mile for North Cleveland City
- 80 persons per sq. mile for Dayton Lakes City

In other words, the county is sparsely populated, with the majority (69%) of the population spread throughout the county.

4.2 POPULATION GROWTH

The population growth for Liberty County, Houston and Galveston Area Council, and Texas from 2000 to 2010 is shown in Table 4.1. The 2010 population for Liberty County is 75,643 as per Census, 2010. That is 7.82% increase from its 2000 population of 70,154. The population for Houston and Galveston area is 4,854,454 in 2000 and 6,087,133 in 2010, or a 25.39% increase. Compared to Liberty County, the population of the state of Texas grew at a higher rate at 20.59%.

Table 4.1 - Population Growth Rate from 2000 to 2010 for Liberty County, H-GHAC, and State of Texas⁹

	Population in 2000	Population in 2010	Growth Rate
Liberty County	70,154	75,643	7.82%
H-GAC Area	4,854,454	6,087,133	25.39%
State of Texas	20,851,820	25,145,561	20.59%

⁸ Population Density for Liberty City, Cleveland City, and Dayton City is retrieved from: <http://quickfacts.census.gov/qfd/states/48/4842568.html>

Population Density for the other cities is retrieved from: <http://www.towncharts.com/Texas/Texas-city-index-Housing-data.html>

⁹ United States Census Bureau, 2000 & 2010 and Houston- Galveston Area council

4.3 POPULATION PROJECTION

Several sources are used to estimate the population growth in Liberty County. By year 2020, the population in Liberty County is estimated to increase by 5,439 people as per Texas Population Projections Program (zero migration scenario), which is 7% increase. The population projection increase is 11,387 people as per Esri Business Analyst, which is 15% increase. An increase of 15,137 people is estimated by Texas State Data Center based on 100% migration scenario, which is 20% increase. Finally, an increase of 28,357 people is projected by HGAC in the 2035 Regional Growth Forecast, which is 37% increase. HGAC uses a trends-based model to forecast the population projection¹⁰. The population growth in Liberty County is about 7.82% since 2000 as per Census data.

After providing different sources for the population projection in Liberty County, it is the County's decision to select the appropriate estimate for planning purposes.

4.3.1 Projection Based on Texas Population Projections Program

Liberty County is expected to grow by 14,187 people by 2050¹¹.

The projected population from 2020 to 2050 (Figure 4.3.1.1) is from the Texas Population Projections Program, and is calculated by the zero migration scenario¹². We select the population information by 10-year period, which project the population to be as follows:

- 81,082 in 2020
- 85,284 in 2030
- 87,919 in 2040
- 89,830 in 2050

¹⁰ Retrieved from <http://www.h-gac.com/community/socioeconomic/archived-regional-growth-forecast-data.aspx>

¹¹ The growth number is calculated from year 2010

¹² Texas Population Projections Program produces biennial projections of the population of the state and all Counties in the state. Every 2-3 years, the program produces state and county level projections for every year from 2015 through 2050. In the projection, the population is calculated by the zero migration scenario which assumes that immigration and outmigration are equal (i.e., net migration is zero) resulting in growth only through natural increase.

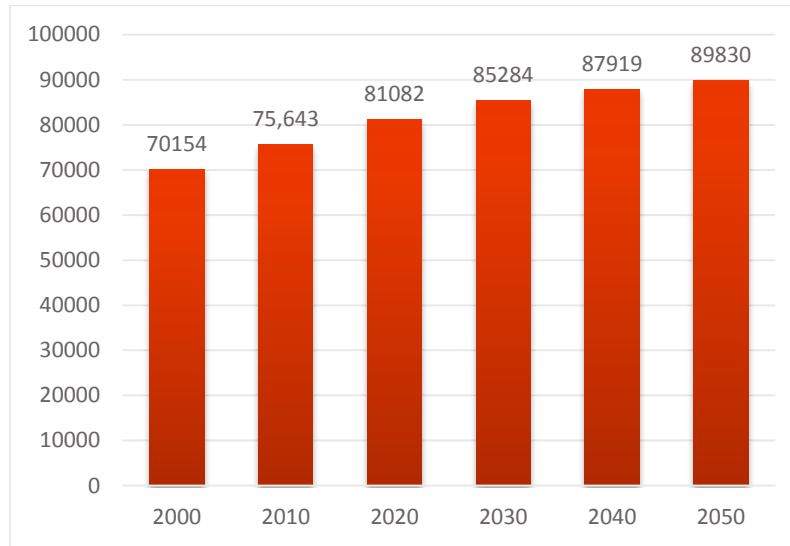


Figure 4.3.1.1: Liberty County Population: Historical and Projected Based on No Migration Scenario¹³

4.3.2 Projection Based on Texas Data Center, Office of State Demographer

If we analyze the population with migration trends, the population would be anywhere from 116,253 to 151,846 people by the year 2050. It is more realistic to look at these two projections that depict migration projections at 50% of the 2000-2010 years migration trend, or 100% of the 2000-2010 migration trend (figure 4.3.2.2).

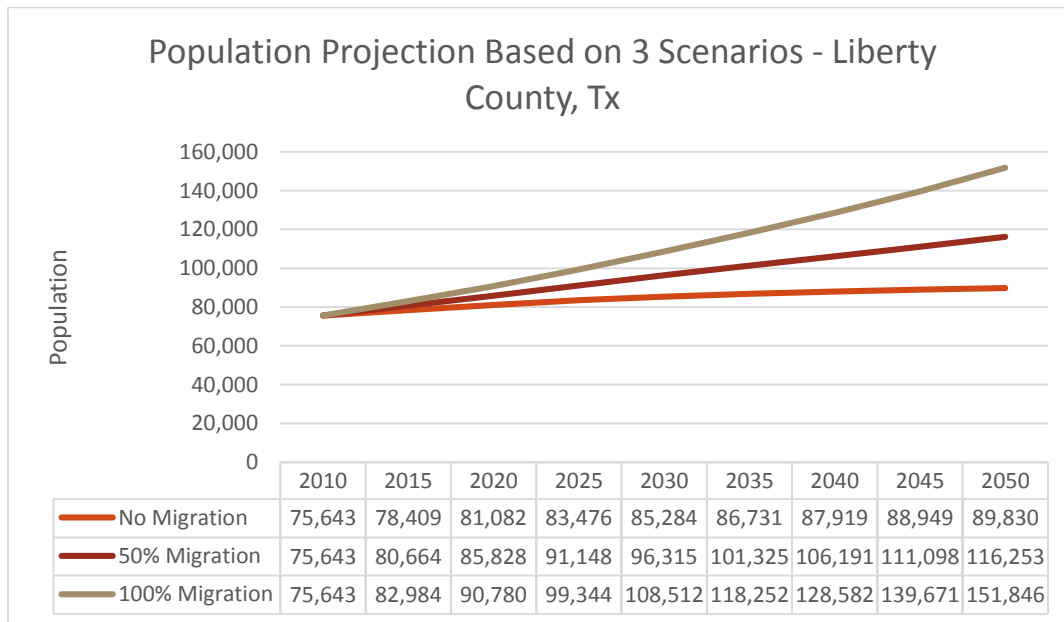


Figure 4.3.2.2: Population Projections 2010 through 2050 based on three migration scenarios, Liberty¹⁴

¹³ Note: Population in 2000 and 2010 is from American Census. The population in 2020, 2030, 2040 and 2050 is from Texas Population Projections Program.

¹⁴ Office of the State Demographer. Retrieved from <http://txsdc.utsa.edu/>

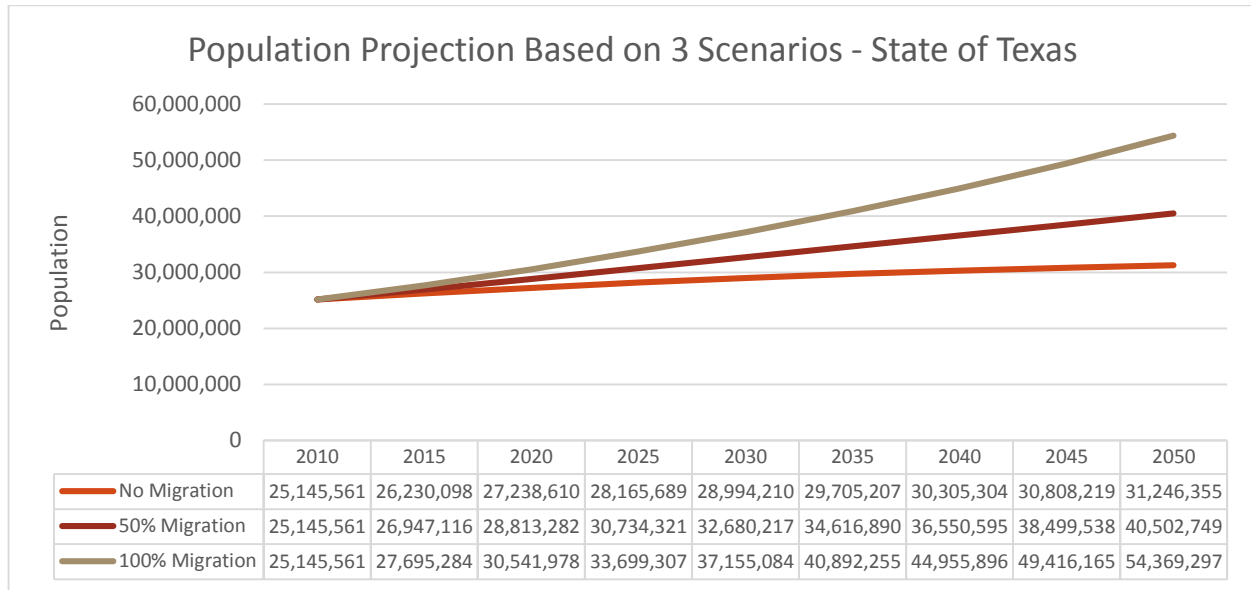


Figure 4.3.2.3: Population Projections 2010 through 2050 based on three migration scenarios, Texas¹⁵

Under these circumstances, the 50% migration scenario is recommended for future community planning. This is based on figure 4.3.2.4, which shows the inbound and outbound migrations for Liberty County (2005 until 2010). The inbound migration is slightly higher than the outbound migration, which negates the efficacy of the zero migration scenario and the 100% migration scenario in the County.

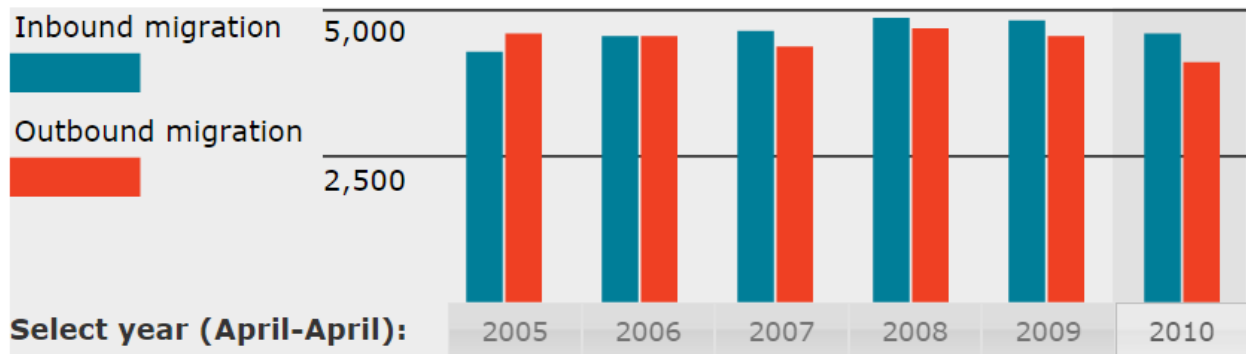


Figure 4.3.2.4: Inbound and Outbound migration in Liberty County (2005-2010)¹⁶

¹⁵ Office of the State Demographer. Retrieved from <http://txsdc.utsa.edu/>

¹⁶ Retrieved from <http://www.forbes.com/special-report/2011/migration.html>

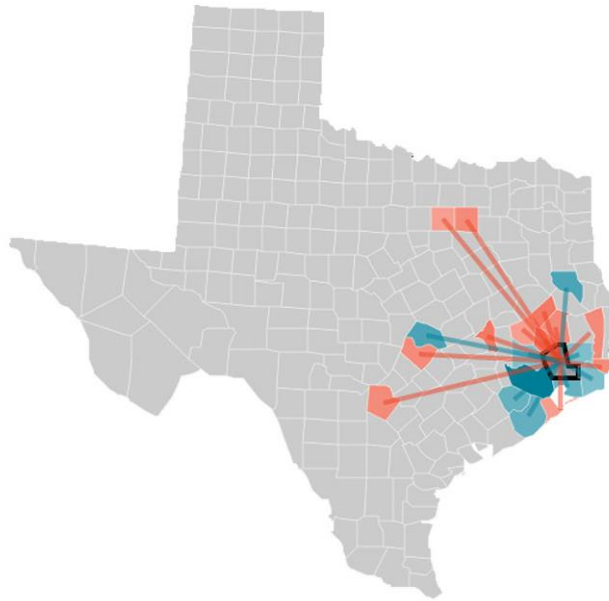


Figure 4.3.2.5: Spatial representation for Inbound and Outbound migration in Liberty County (2005-2010) ¹⁶

4.3.3 Projection Based on Esri Business Analyst

The population projection based on Esri Business Analyst forecasts 15% increase in the population by year 2020, which is higher than that provided by Texas Population Projections Program.

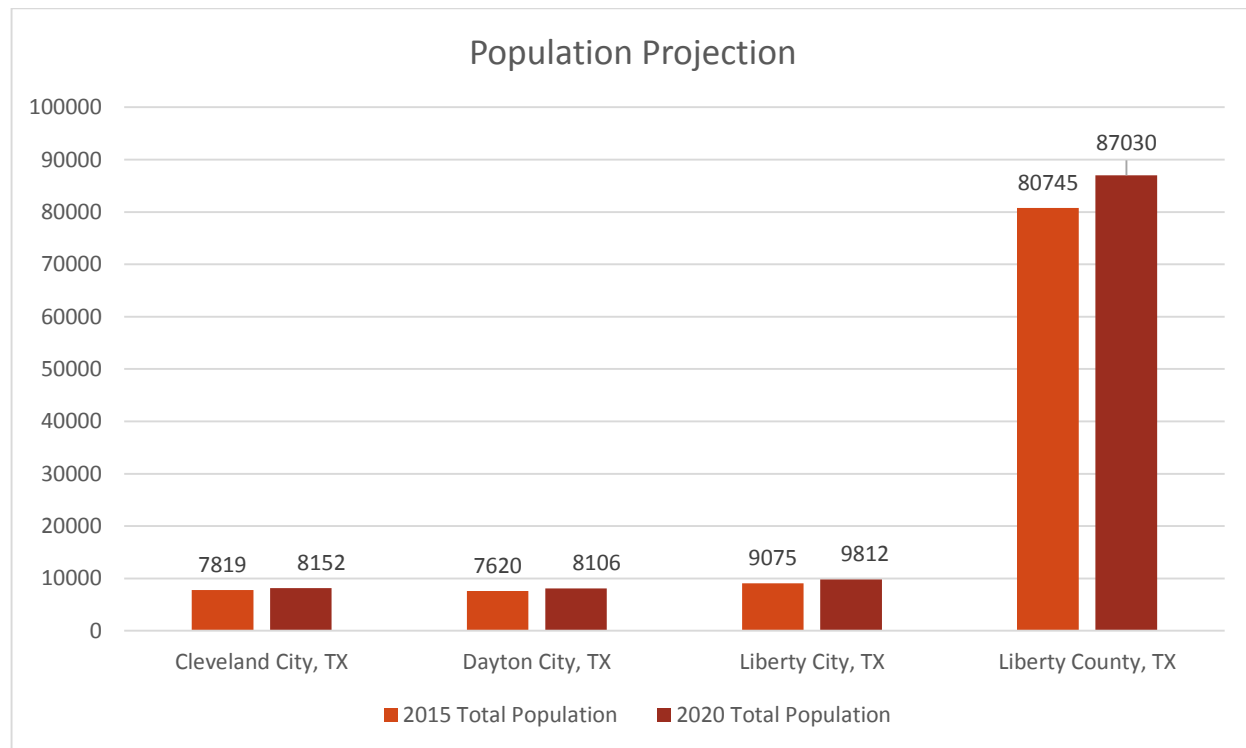


Figure 4.3.3.1: Population Projection, 2015 and 2020

4.3.4 Projection Based on HGAC 2035 Regional Plan

The population projection based on HGAC 2035 Regional Plan forecasts 37% increase in the population by year 2020. The variation in the forecasted projection between the aforementioned sources might be due to the presence of outliers.

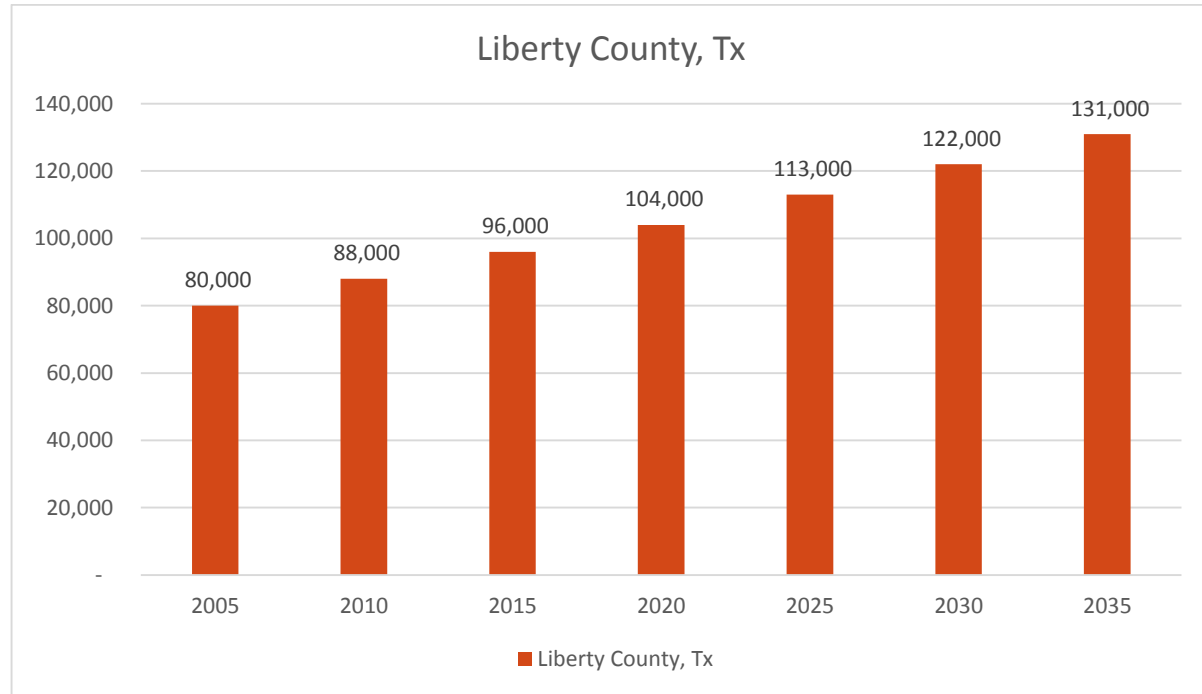


Figure 4.3.4.1: Population Projection (2005 – 2035)

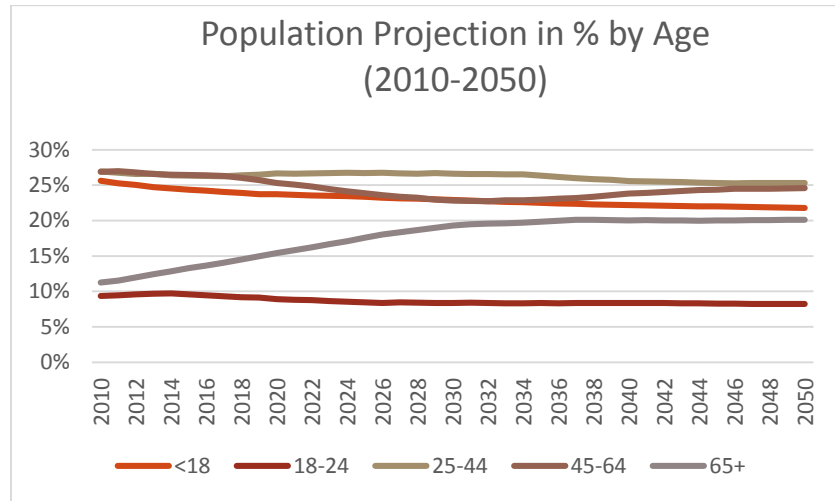
4.3.5 Population Projection by Age, Gender and Race

Migration affects not only the size of the population but also the composition of the population. The age, gender and race selectivity of migration can have a significant impact on the future age structures of a population. The below projections are based on 50% migration scenario¹⁷.

4.3.5.1 Population Projection by Age

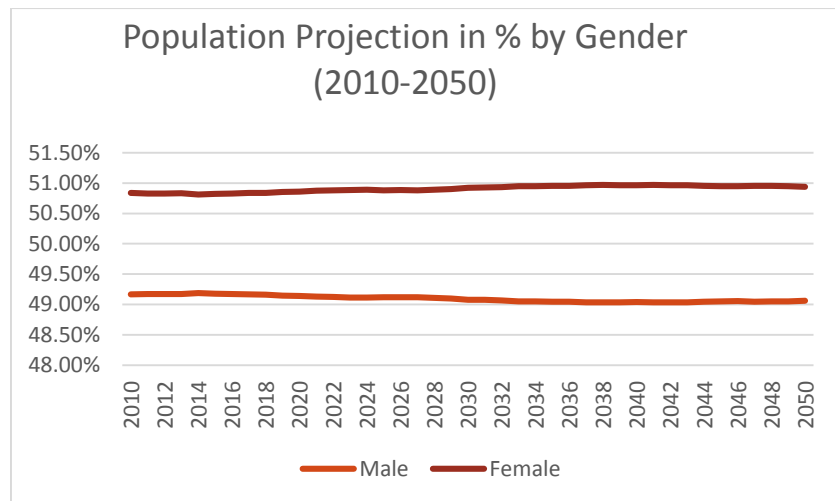
It is noticeable that the projected percentage of elderly (>65 years old) increases from 11% in 2010 till 20% in 2050. However, the young population (<18 years old) decreases from 26% in 2010 till 22% in 2050.

¹⁷ Retrieved from <http://txsdc.utsa.edu/>



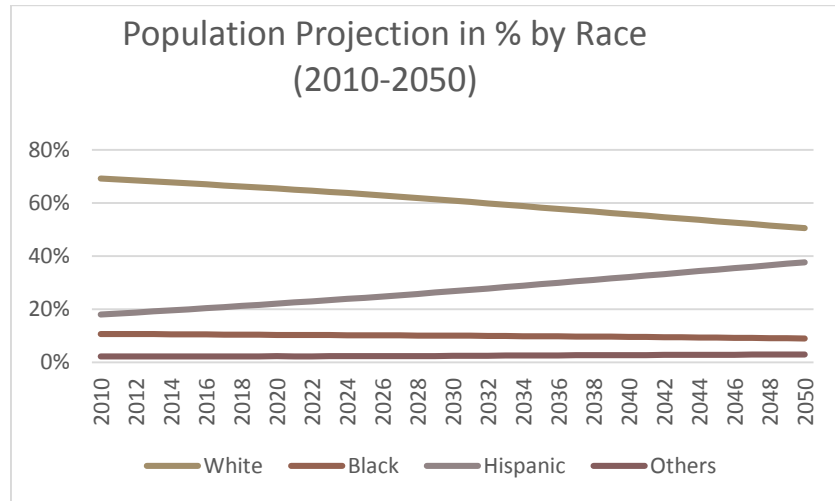
4.3.5.2 Population Projection by Gender

The population projection by gender is almost constant, with approximately 49% for males and 51% for females.



4.3.5.3 Population Projection by Race

The white population is projected to decrease from 69% in 2010 till 50% in 2050. However, the Hispanic population is projected to increase from 18% in 2010 till 38% in 2050. The black population is projected to slightly decrease from 11% in 2010 till 9% in 2050.



4.3.6 Spatial Population Projection

According to the projected population density map in 2035, the population density in Dayton and Liberty cities would increase (refer to fig 4.3.6.1).

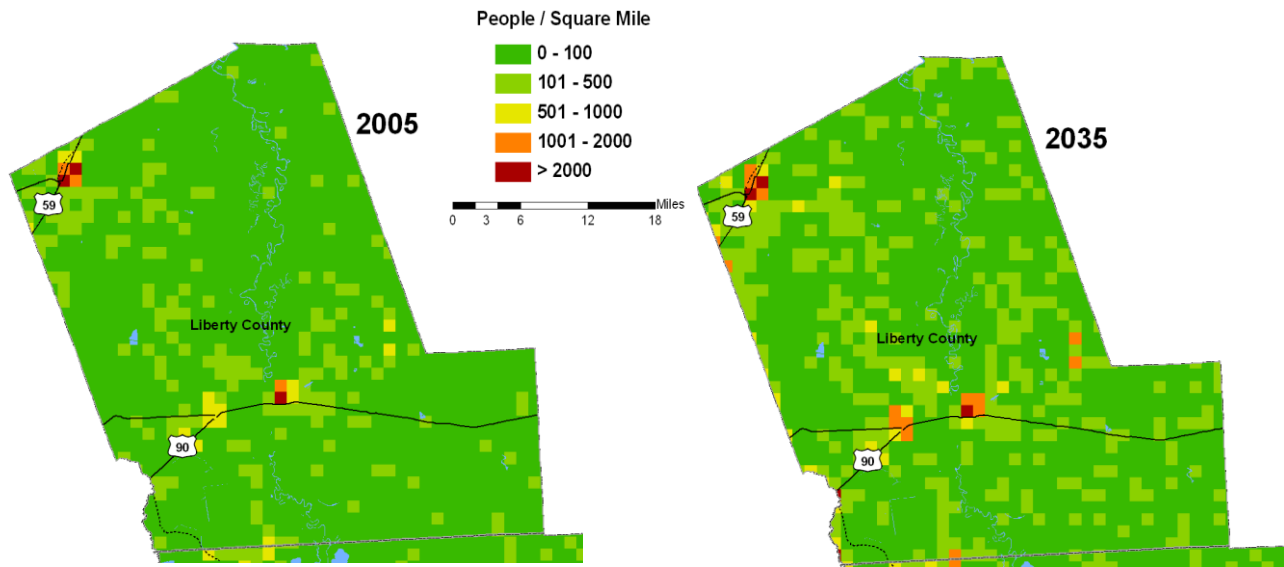


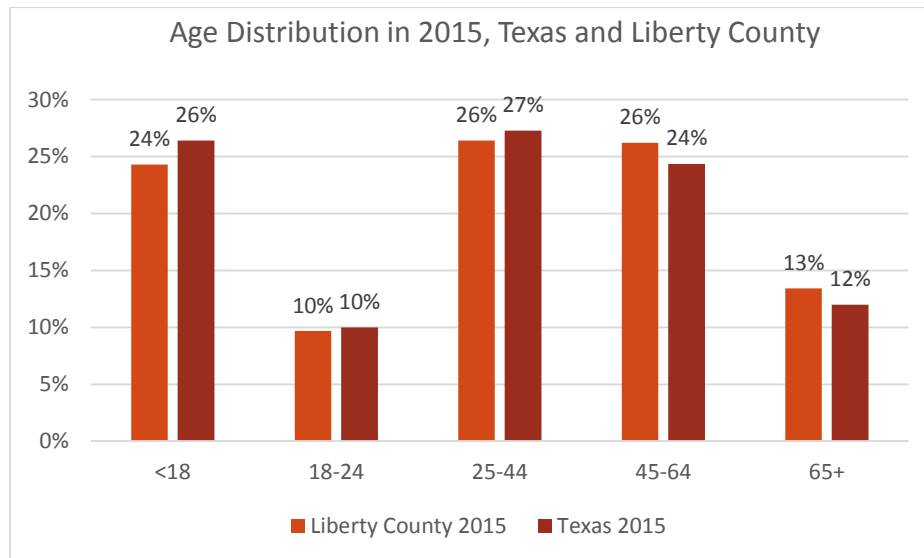
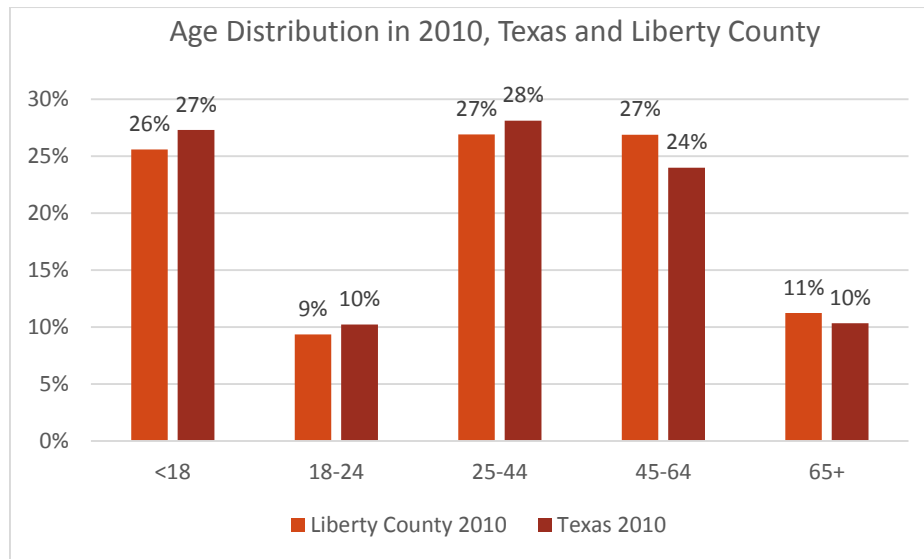
Figure 4.3.6.1: Population Densities in Liberty County for 2005 and 2035 (Projected)¹⁸

4.4 AGE DISTRIBUTION

The age structure of the population of Liberty County has slightly varied. From 2010 to 2015, the proportion of the age 65 years and over goes up slightly while the school-age group goes down slightly (Figure 4.4.1). The percentages of various age groups are generally similar to statewide

¹⁸ LCTP. (2009). Liberty County Transit Plan, Final Report. Houston Galveston Area Council

averages, but they do indicate that Liberty County’s population is slightly older. When compared to the State of Texas, the percentage of group over age 65 and more, in Liberty County, is a little higher.



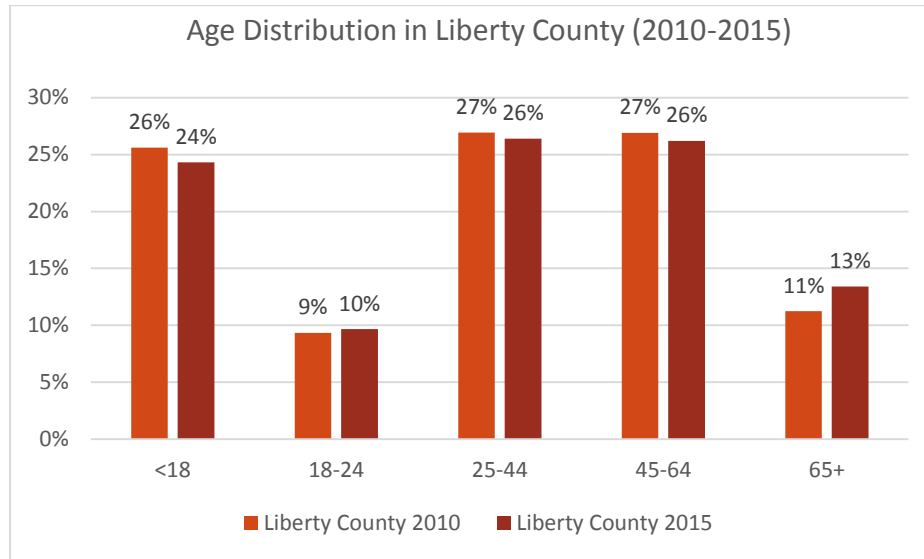
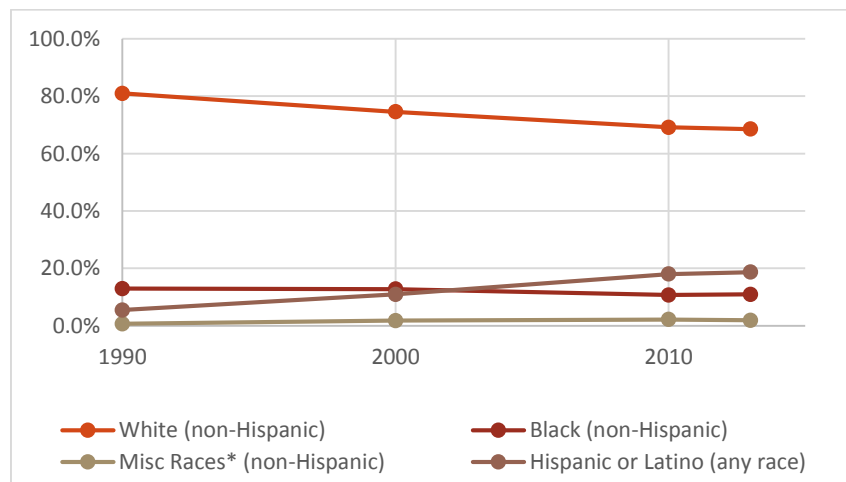


Figure 4.4.1: Age Distribution in Liberty County and Texas, 2010 and 2015¹⁹

4.5 RACE DISTRIBUTION

In terms of racial composition, the county is predominately white (68.5% in 2013), with roughly 10% black population holding fairly steady (refer to figure 4.5.1). A growing number of residents (18.7% in 2013) are reporting Hispanic or Latino ethnicity, and the increase from 10.9% in 2000 and 5.5% in 1990 indicates an ongoing major demographic shift. The populations of American Indians or Alaska Natives, Asians, Hawaiians and Pacific Islanders together are less than 1%, and those reporting 2 or more races are 1-2%. There are comparatively few foreign-born persons living in Liberty County: 6.8% versus 16.3% statewide²⁰.



¹⁹ Data Retrieved from <http://txsdc.utsa.edu/>

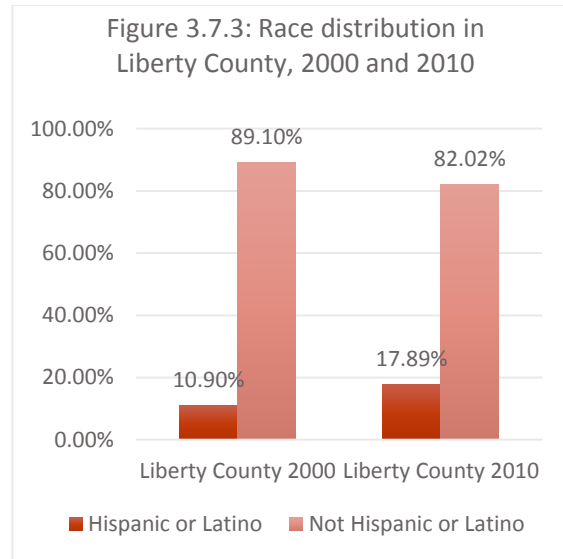
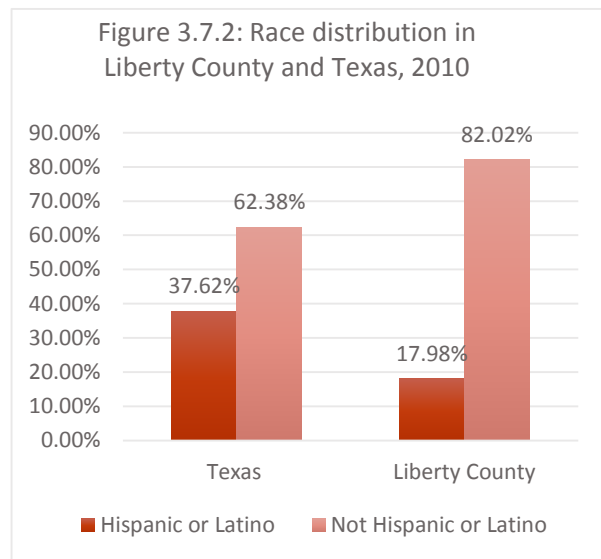
²⁰ U.S. Census Bureau. (2010, 2013). State and County Quick facts for Liberty County and Texas

Figure 4.5.1: Liberty County Race Timeline²¹

From 2000 to 2010, the percentage of Hispanic or Latino in Liberty County increased according to the data of table 4.5.1. Although, Liberty County still has a lower percentage compared to the state with 17.89% in Liberty County and 37.62% in the State, in 2010.

Table 4.5.1: Growth rate of Hispanic or Latino in Texas and Liberty County from 2000 to 2010

	Hispanic or Latino population in 2010	Hispanic or Latino population in 2000	Growth Rate
Texas	9,460,921	6,669,666	48.85%
Liberty County	13,602	7,660	77.57%



²¹ U.S. Census Bureau. (2010, 2013). State and County Quick facts for Liberty County and Texas

*Includes American Indian, Alaska Native, Asian, Hawaiian or Pacific Islander, Some Other Race, Two or More Races

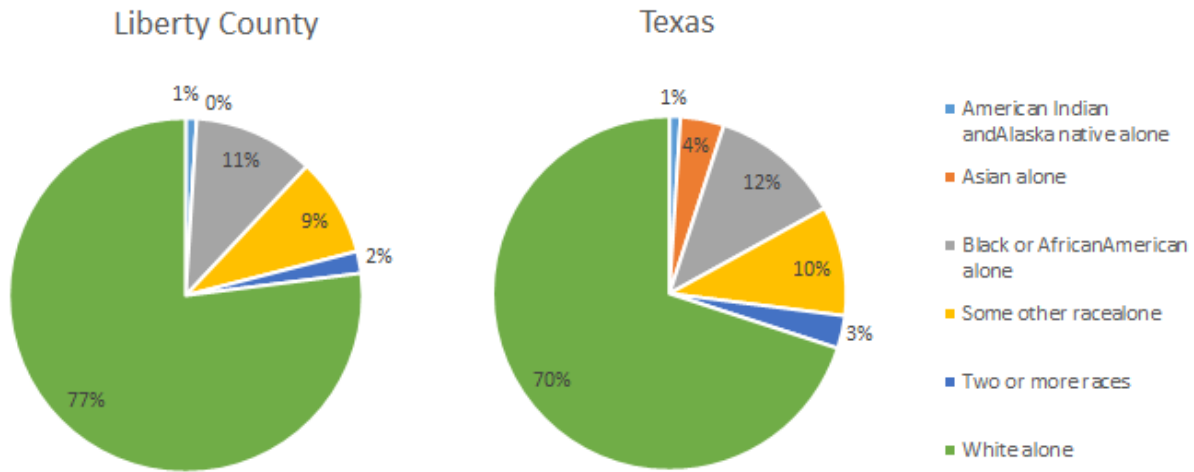


Figure 4.5.2: Race Distribution in Liberty County and Texas, 2010

4.6 EDUCATION

Liberty County actually has higher than average high school graduates, but then begins to lose ground with regards to levels above high school. Figure 4.6.1 depicts the relatively low amount of educational attainment. As a whole Liberty County can improve attracting those with higher education levels.

There are no 2-year or 4-year colleges or universities in the county and only 8.8% of county residents have a Bachelor’s degree or higher, compared with 26.7% statewide²². As shown in Figure 4.6.1, Liberty County (green) has more residents whose highest educational attainment is below the level of an Associate’s degree compared with the Houston metropolitan region (red), the state (blue), and the country (purple). Correspondingly, fewer county residents hold a college degree of some kind.

²² U.S. Census Bureau. (2010, 2013). State and County Quick facts for Liberty County and Texas

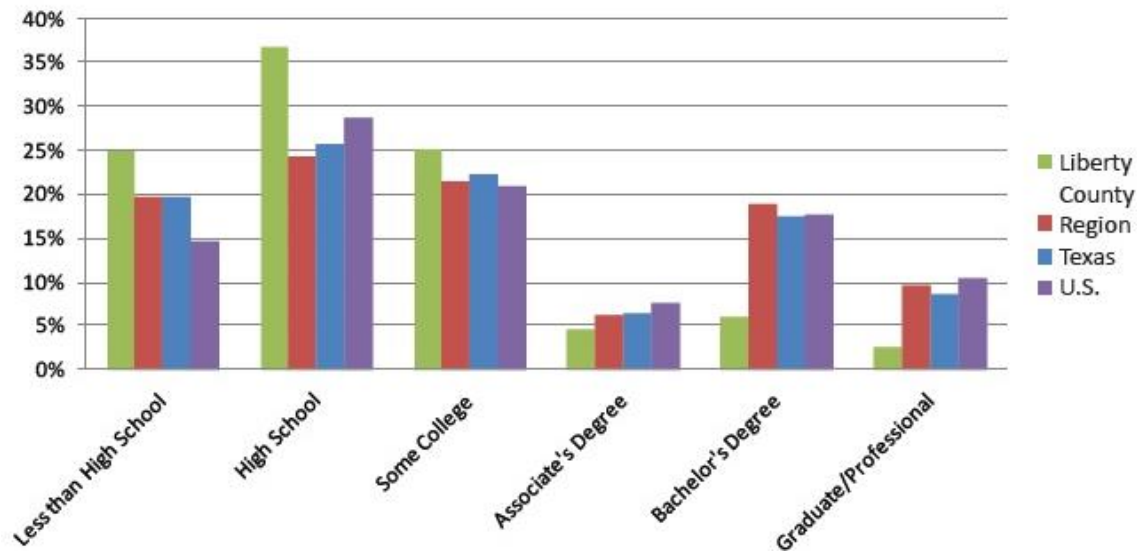


Figure 4.6.1: Educational Attainment²³

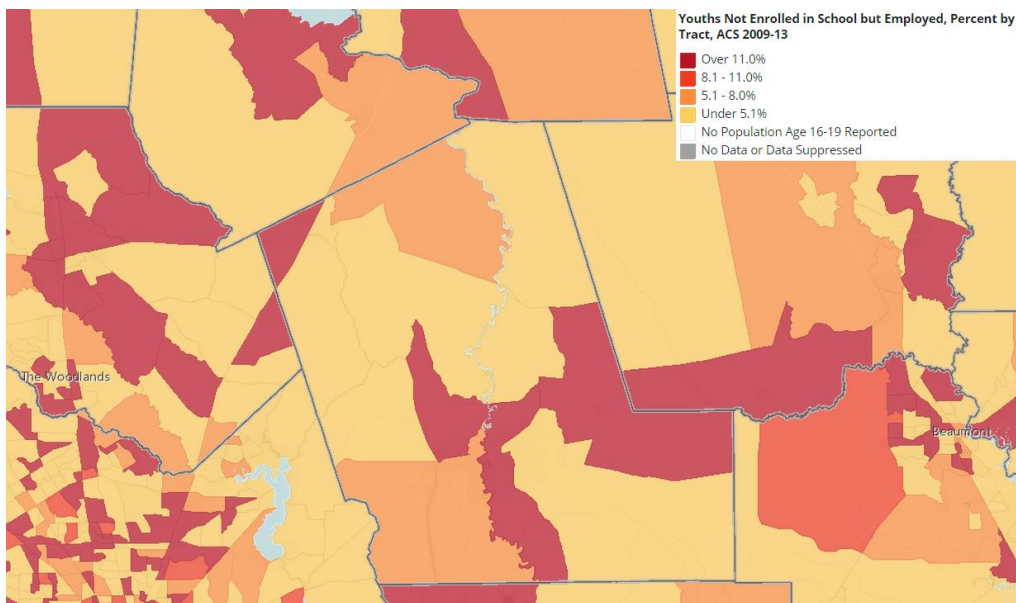


Figure 4.6.2: Youth no enrolled in school but employed in Liberty County²⁴

²³ HGAC. (2013). County Profile Liberty County. HGAC as part of our great region 2040

²⁴ Retrieved from http://maps.communitycommons.org/viewer/?action=open_map&id=8647

4.7 YOUTH DISCONNECTION

Disconnected youth are young people between the ages of 16 and 24 who are neither working nor in school. Young people in this age range who are working or in school part-time or who are in the military are not considered disconnected. The rate of youth disconnection in Liberty County ranges between 17.4% and 25.6% which is the highest category²⁵.

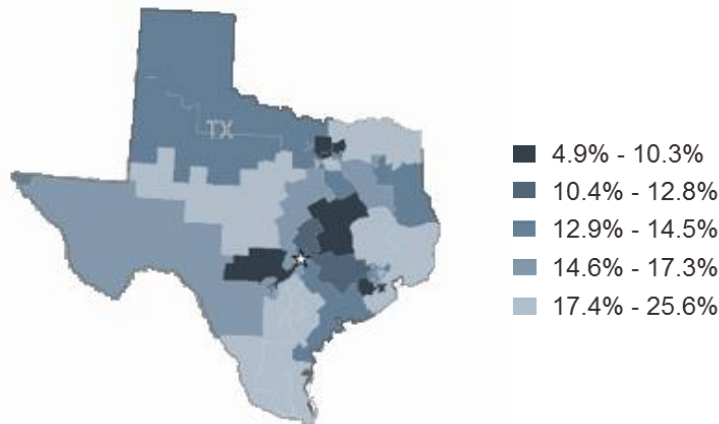


Figure 4.7: Youth Disconnection by Jurisdiction

4.8 CAUSES OF DEATH

Turning now to health, the three primary causes of death are shown in Figure 4.8.1. Heart disease and cancer are the biggest killers, and the rates at which they kill are a quarter to a third higher in Liberty County than in the Houston region or Texas. These two diseases are known to be caused or exacerbated by lifestyle factors such as poor diet, smoking, and inadequate physical activity. In addition, the deaths by motor vehicle accidents are nearly twice as high as in the comparison regions.

²⁵ Mapping Where America Is Failing Its Youth Report. June 16, 2015. Richard Florida and Aarian Marshall. Retrieved from http://www.citylab.com/work/2015/06/mapping-where-america-is-failing-its-youth/395927/?utm_source=psTW

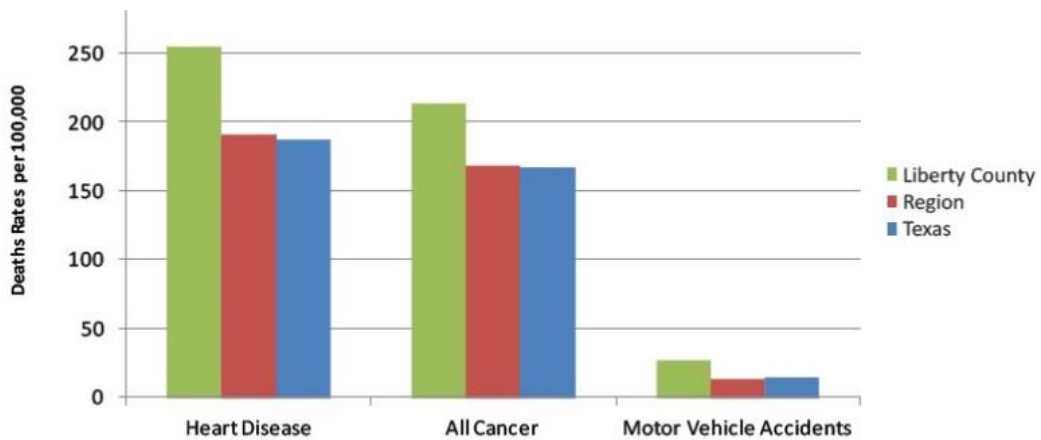


Figure 4.8.1: Major Causes of Death in Liberty County, H-GAC, and Texas²⁶

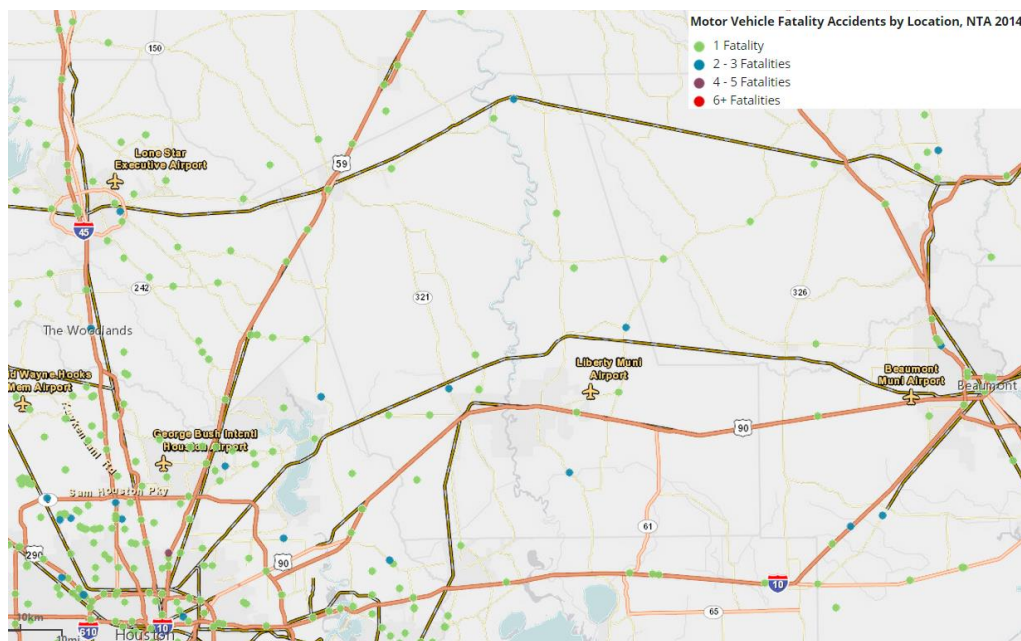


Figure 4.8.2: Spatial Representation for Location of Motor Vehicle Fatality Accidents in Liberty County²⁷

²⁶ HGAC. (2013). County Profile Liberty County. HGAC as part of our great region 2040.

²⁷ Retrieved from http://maps.communitycommons.org/viewer/?action=open_map&id=8562

4.9 POPULATION ECONOMICS & POVERTY

4.9.1 Spatial Distribution of Income Levels

Turning to socioeconomic indicators, the spatial distribution of income levels can be seen in Figure 4.8.1. Areas in the south-west, closer to Houston, have a smaller percentage of families living in poverty. Those census tracts colored a darker green are more poverty-ridden.

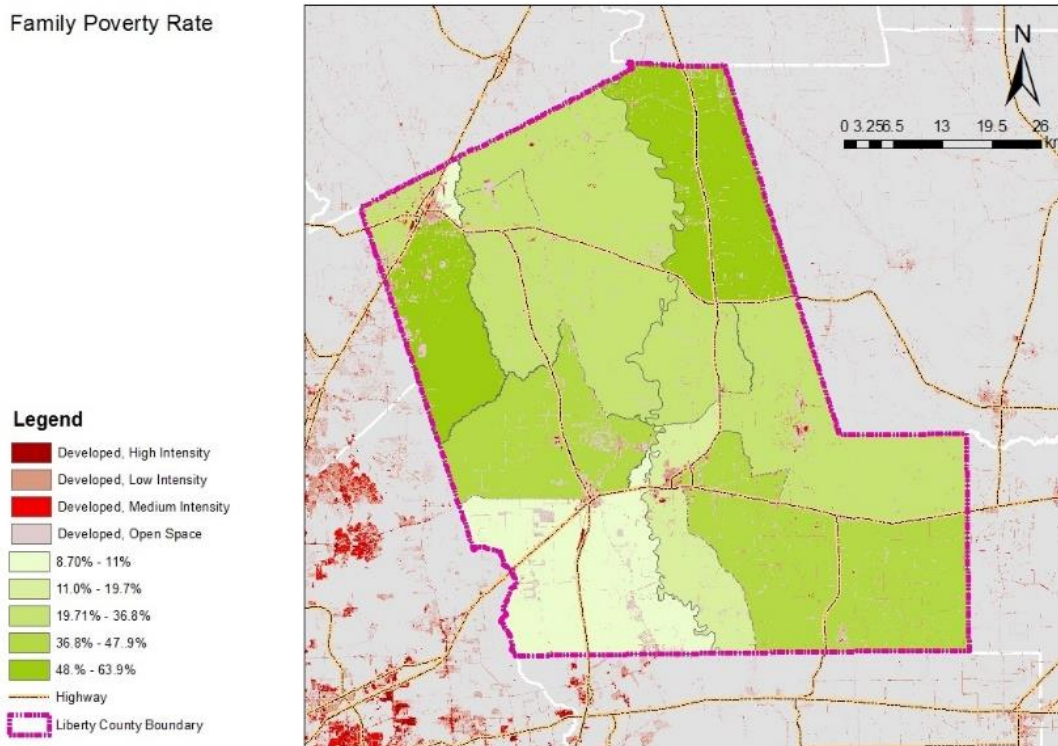


Figure 4.8.1: Percentage of Families in Poverty

4.9.2 Gender Wage Gap

The median earnings for all workers in Liberty County are \$27,936. When we look specifically at full-time, year-round workers, there is a significant gender wage gap: men earned a median wage of \$47,272 while women earned \$31,175, just 66% of men's earnings²⁸.

4.9.3 Unemployment Rate

Based on the figure 4.8.3.1, there are more people unemployed in Liberty County than the State. As of 2013, the unemployment rate in Liberty County was 7.9%, with an estimated 30,289

²⁸ U.S. Census Bureau. (2010, 2013). State and County Quick facts for Liberty County and Texas

employed in a workforce of 32,896²⁹. The April 2015 estimated rate, not adjusted for seasonal variations, is 6.0%³⁰.

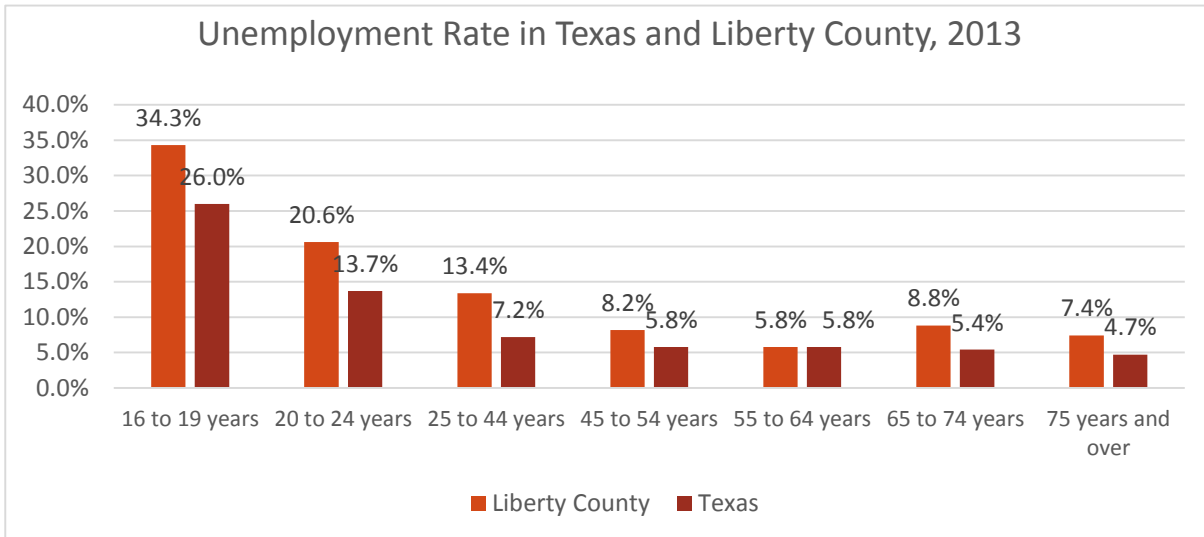


Figure 4.8.3.1: Unemployment rate in Liberty County and Texas (2013)³¹

Setting aside unemployment (which counts only those actively seeking work), Figure 4.8.3.2 shows that, compared with Texas, a smaller percent of the working-age population is actively in the labor force, with more males in the labor force than females.

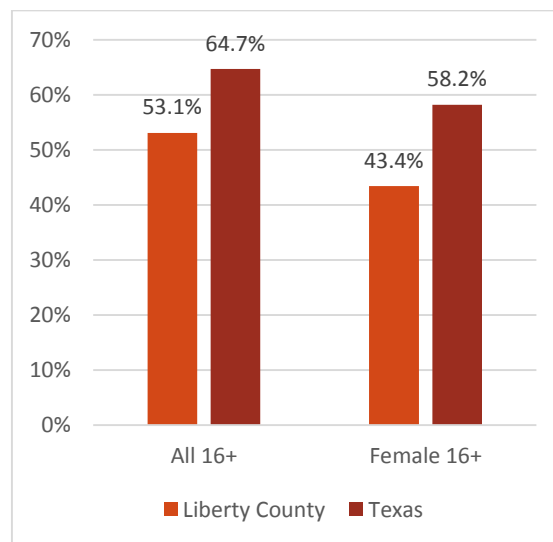


Figure 4.8.3.2: Percentage of Population in the Labor Force³²

²⁹ BEA. (2013). Local Area Unemployment Statistics

³⁰ United States Department of Statistics. Bureau of Labor Statistics. Retrieved from <http://data.bls.gov/>

³¹ Data Retrieved from <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

³² U.S. Census Bureau. (2010, 2013). State and County Quick facts for Liberty County and Texas

4.9.4 Poverty Rate

The poverty rate of Liberty County and the State in 2013 is similar. Figure 4.8.4.1 tells us that the poverty of Liberty County increases slightly while that of Texas varies. In the latest data, the poverty rate of Liberty is only a little more than that of Texas but the slope is less than Texas. If the poverty develops following the current slope, the Texas's poverty rate will exceed that of Liberty County.

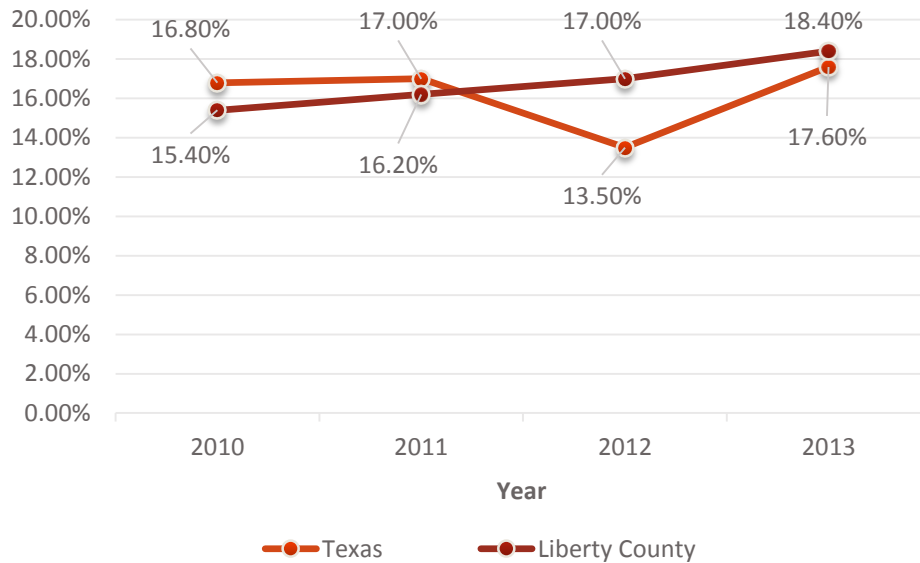


Figure 4.8.4.1: Poverty rate history in Texas and Liberty County

Based on the poverty rate in different ethnicities presented in figure 4.8.4.2, poverty rate of Hispanic or Latino origin is much higher than that of White alone, in both Texas and Liberty County. The rate of Hispanic or Latino origin in Liberty County is higher than that of Texas.

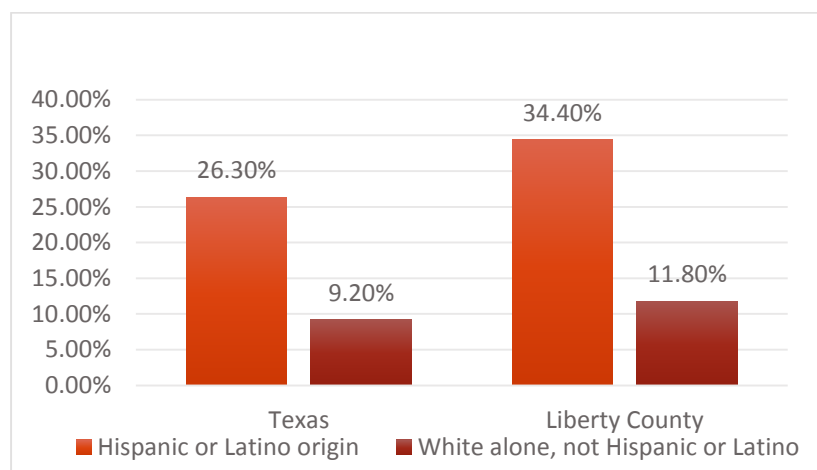


Figure 4.8.4.2: Poverty rate of different ethnicity

5 HOUSING

5.1 HOUSING STOCK GROWTH

5.1.1 Rate of Growth

The housing stock has grown at a similar rate to the population, with expedited growth following World War II. Housing growth peaked in the 1990's and since has slowed significantly. Overall residential growth trends are in line with patterns for the state of Texas, with variations in the 1990's. During the 1990's, there was a large increase in both the number of housing units being built and the number of occupants moving into housing units, as can be seen in Figure 5.1.1.

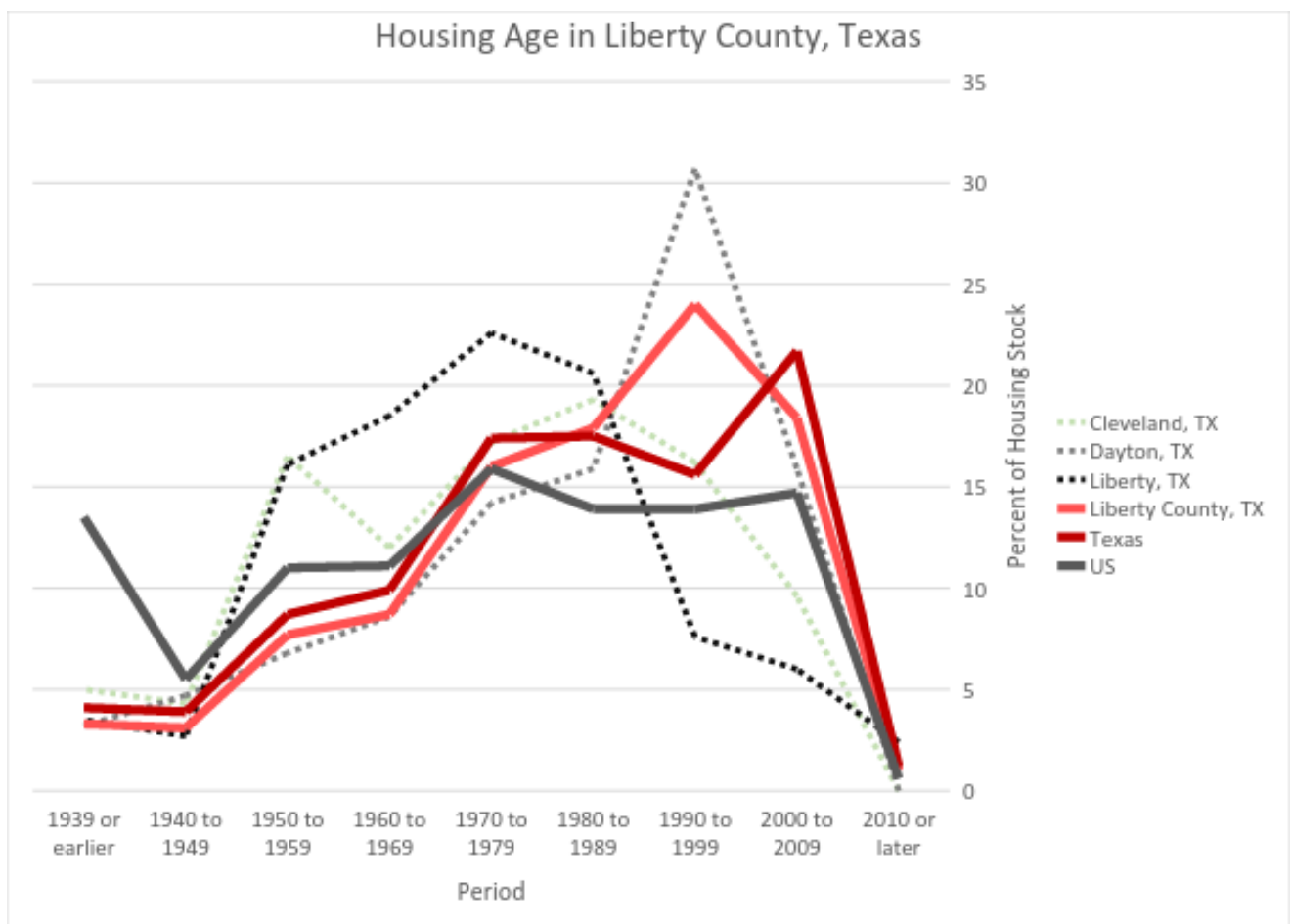


Figure 5.1.1: Housing Age in Liberty County, Texas (U.S. Census)

5.1.2 Growth by Jurisdiction

Over 40% of the County’s housing stock has been built since 1990. This trend does vary from city to city within the County. For example, the City of Liberty experienced heightened growth from the 1950’s through the 1980’s, but then it slowed. Dayton experienced a much higher rate of growth during the 1990’s, just above 30%. Overall trends for the County and cities within the county point to growth of the housing stock during the 1980’s and 1990’s, followed by an influx of occupants during the 2000’s (see Figure 5.1.2). The number of occupants moving into housing units peaked in the period from 2000 to 2009.

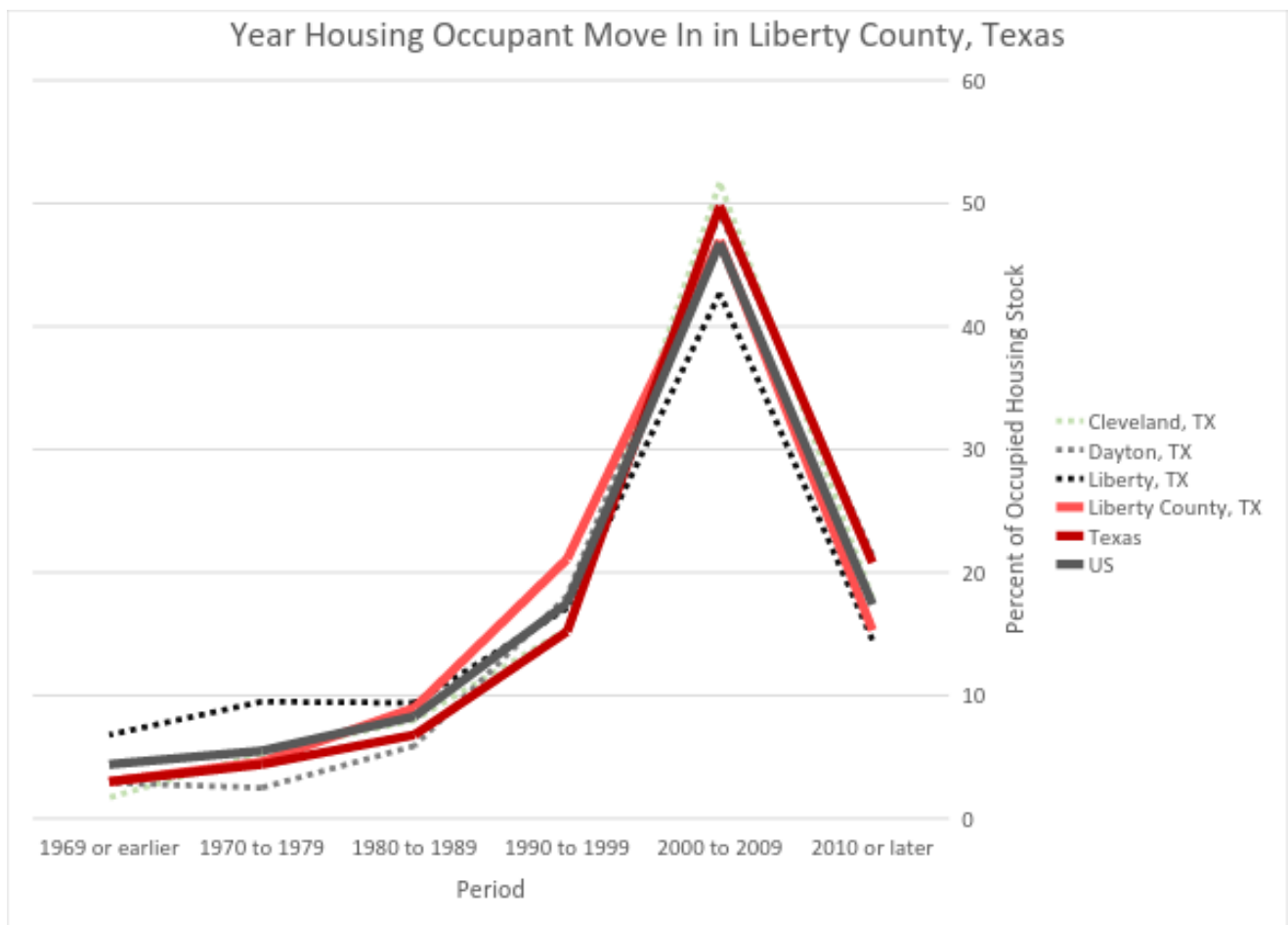


Figure 5.1.2: Year Housing Occupant Move in Liberty County, Texas (U.S. Census)

5.2 HOUSING UNIT DENSITY

The housing units are mainly located in Cleveland, Dayton, Liberty, Daisetta, and Hardin (see Figure 5.2).

As of 2010, the housing units of the cities in the county, in decreasing order, are as follows³³:

- 3,242 for Liberty City
- 3,002 for Dayton City
- 2,980 for Cleveland City
- 434 for Ames City
- 422 for Daisetta City
- 347 for Hardin City
- 297 for Hull CDP
- 243 for Kenefick City
- 231 for Plum Grove City
- 230 for Big Thicket Lake Estates CDP
- 167 for Devers City
- 94 for North Cleveland City
- 59 for Dayton Lakes City
- 49 for Old River-Winfrey city

The housing density per square miles is 25.14 for Liberty County and 39.26 for the state.

However, the housing density for the major cities are as follows, in decreasing order³⁴:

- 311.62 houses per sq. mile for Cleveland City
- 241.2 houses per sq. mile for Daisetta City
- 192.9 houses per sq. mile for Kenefick City
- 165.9 houses per sq. mile for Hardin City
- 160.5 houses per sq. mile for Hull CDP
- 155.8 houses per sq. mile for Big Thicket Lake Estates CDP
- 142.0 houses per sq. mile for Ames City
- 110.1 houses per sq. mile for Dayton City
- 97.9 houses per sq. mile for Devers City
- 79.85 houses per sq. mile for Liberty City
- 76.8 houses per sq. mile for Plum Grove City
- 64.1 houses per sq. mile for Dayton Lakes City
- 62.6 houses per sq. mile for North Cleveland City

Although the housing density in both Dayton and Liberty is less than most other places in the county, it is approximately 3 times and 2 times bigger than that of Texas, respectively.

³³ Census. 2010. Retrieved from <http://txsdc.utsa.edu/Reference/Geo2010CensusPlacesByCounty.aspx>

³⁴ Housing Density for Liberty City, Cleveland City, and Dayton City is retrieved from: <http://quickfacts.census.gov/qfd/states/48/4842568.html> | Housing Density for Daisetta City and Hardin City is retrieved from: <http://www.towncharts.com/Texas/Texas-city-index-Housing-data.html>

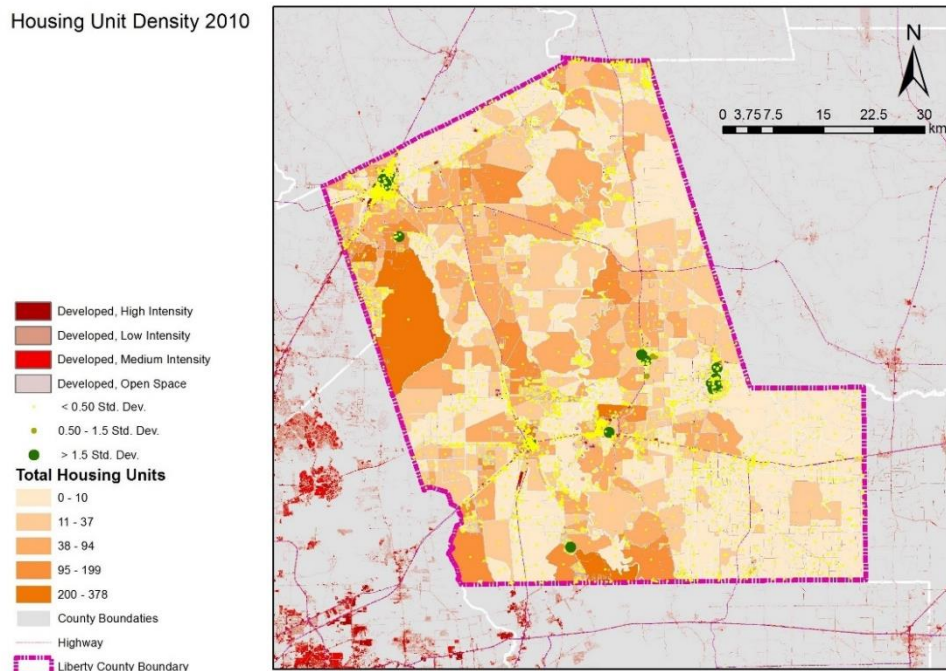


Figure 5.2: Liberty County, Housing Unit Density 2010 (Courtesy TAMU, 2015)

5.3 HOUSING TYPES

Housing types in Liberty County differ from Texas patterns, as shown in Figure 5.3. There is a significantly larger percentage of the population living in mobile homes and smaller percentage living in multi-family dwellings in Liberty than in Texas as a whole.

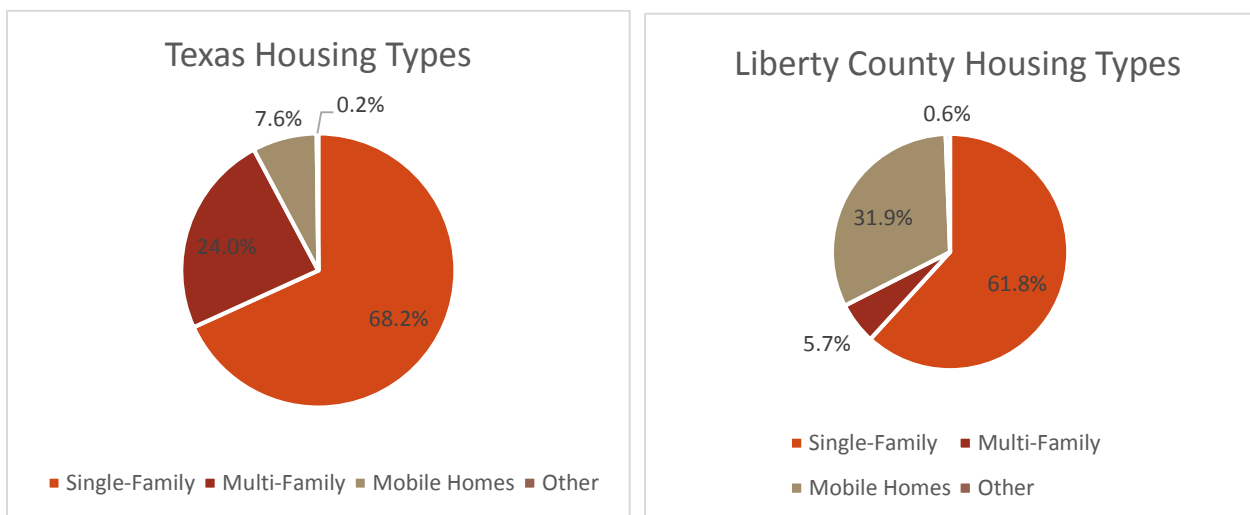


Figure 5.3: Liberty County Housing Types³⁵

³⁵ HGAC, County Profile Liberty County, 2013

5.4 HOUSEHOLDS

Figure 5.4 shows that the majority (55.8%) of the households in Liberty County are married-couple families, which is higher than that in Texas. Other families, which constitute 18.8% of the households, includes 7% female householder families with no husband present and own children under 18 years. Nonfamily households, which includes people living alone and other nonfamily households, made up 25% of all households in Liberty County versus 30% for Texas.

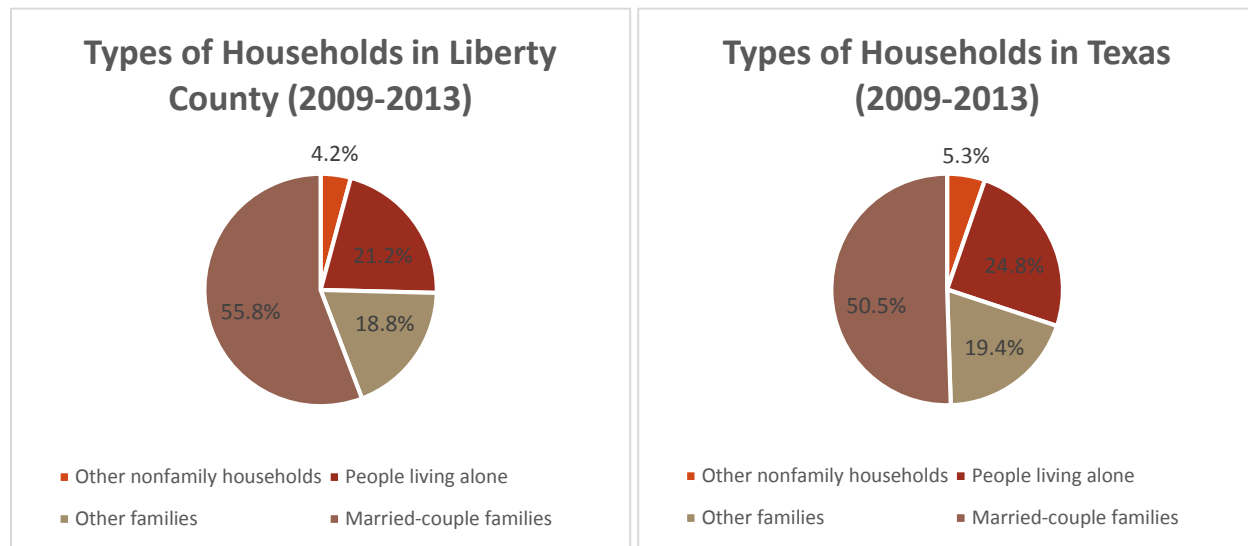


Figure 5.4: Types of Households in Liberty County³⁶

5.5 HOUSING PRICES

Figure 5.5 shows the average housing price percentages for Liberty County as compared to the State of Texas and the U.S. as a whole. The majority of Liberty County’s housing stock lies within the “less than \$50,000” and “\$50,000 to \$99,999” price categories. This statistic is considerably higher than the benchmark regions of the State of Texas and the U.S.

³⁶ Retrieved from

http://thedataweb.rm.census.gov/TheDataWeb_HotReport2/profile/2013/5yr/np01.hrml?SUMLEV=50&county=291&state=48 and

http://thedataweb.rm.census.gov/TheDataWeb_HotReport2/profile/2013/5yr/np01.hrml?SUMLEV=40&state=48

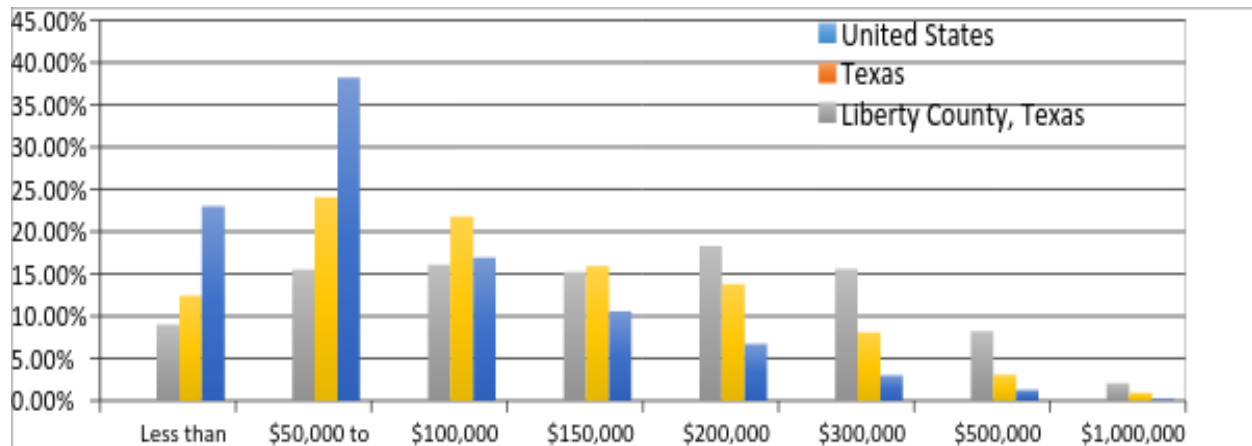


Figure 5.5: Percentage of Housing Prices in Liberty County Texas 2013³⁷

5.6 AFFORDABLE HOUSING

5.6.1 Percentage of Income Spent on Mortgage

The US Department of Housing and Urban Development defines a household as being housing cost burdened with 30% or more of the monthly total household income is spent on housing costs. In 2013, 33.4% of the renters and 21.6% of the owners spent 30% or more of their income on housing. The majority of the low income households (Less than \$20,000) spent 30% or more of their income on housing (10.1% for owners and 22.3% for renters). However, the majority of households of other income categories are not housing cost burdened (figure 5.6.1.1). Housing prices in Liberty County closely depicts the area’s income levels, where the median household income is \$47,228 (Census, 2009-2013). This shows that the housing market in Liberty County is affordable for in comparison to the household income.

However, there is a need for more affordable housing for owners only, which is based on the projected increase in the housing cost burden for owners in contrary to that for renters (refer to figure 5.6.1.2).

³⁷ American Fact Finder 2013

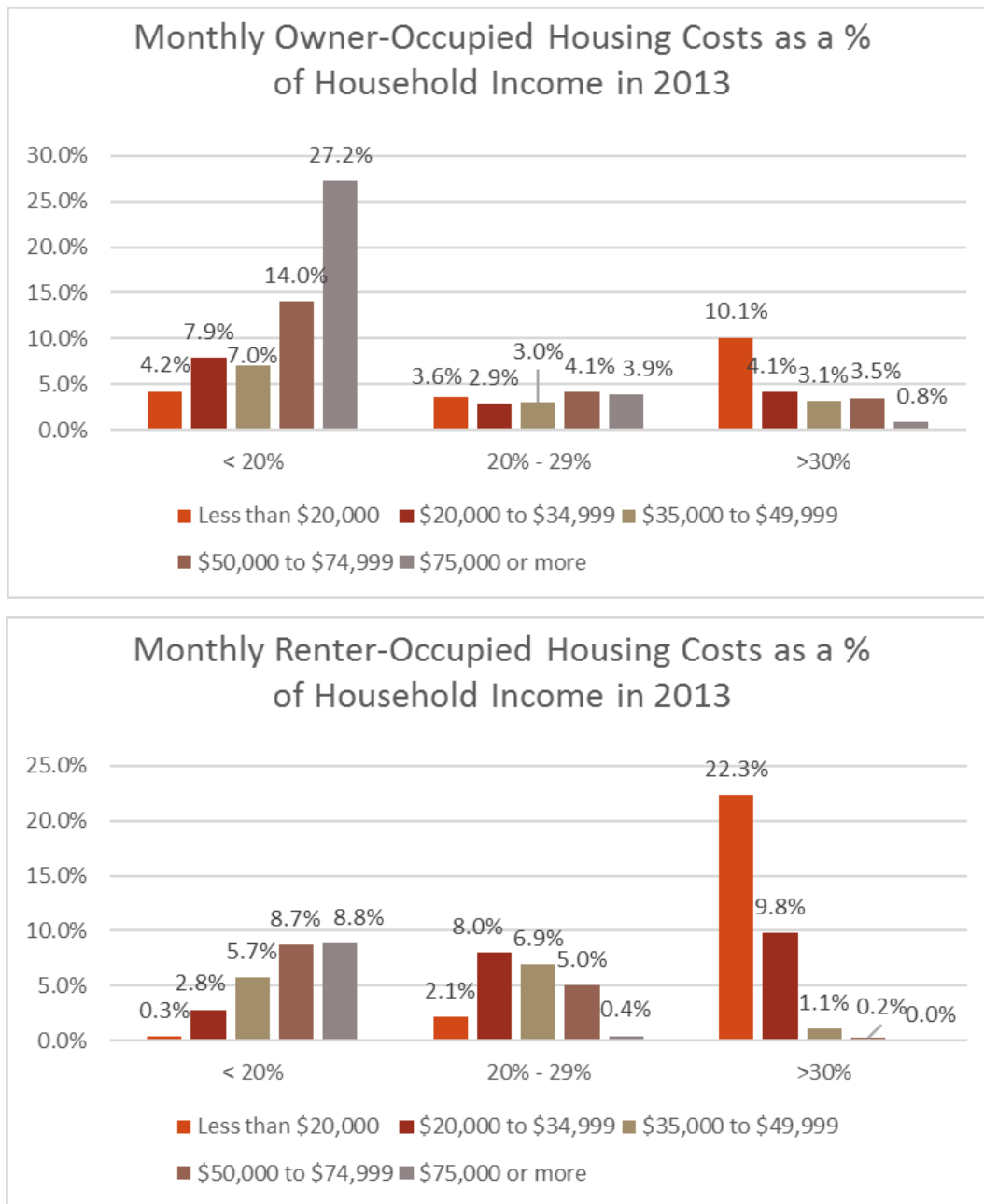


Figure 5.6.1.1; Monthly Owner Occupied and Renter Occupied Housing Costs as a % of Household Income in 2013

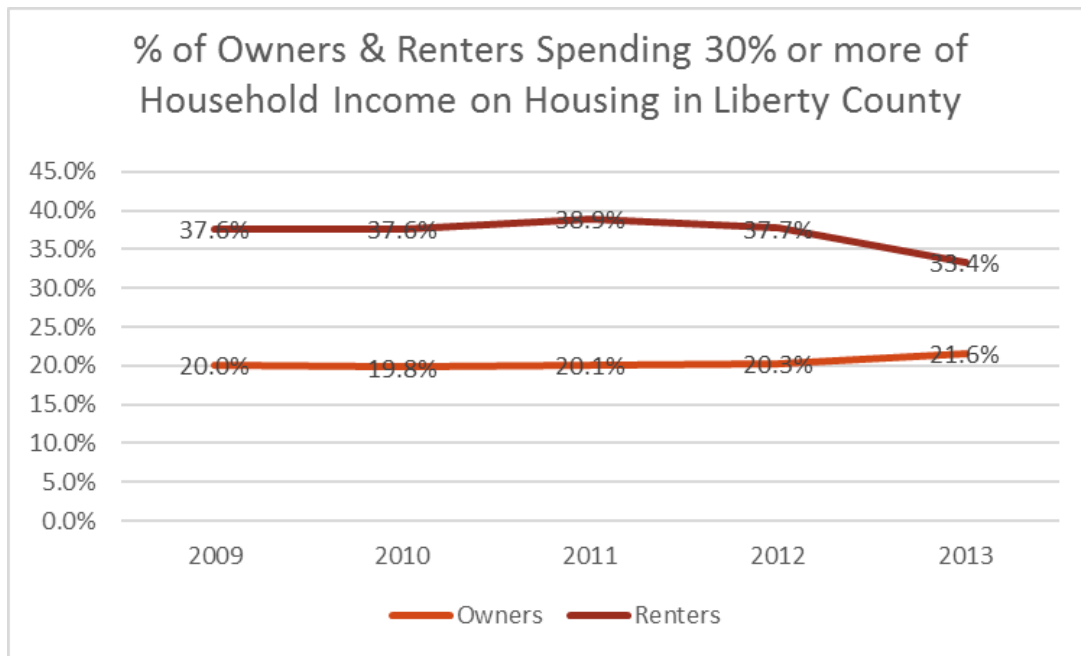


Figure 5.6.1.2: % of Housing Cost Overburdened Owners and Renters in 2013

5.6.2 Spatial Representation for Affordable Housing Projects

The affordable housing projects are mainly located in Cleveland and Dayton (refer to figure 5.6.2). Cleveland is promoting a large amount of affordable housing in its R2 zoning district³⁸. R2 zoning district is Single-family Residential District, which include conventional detached single-family dwellings and manufactured homes. Ideally, affordable housing should be located in an urban area where residents have easy access to public facilities. Even though constructing affordable housing within the urban areas will meet unmet housing needs there and might encourage low-income households to come settle in the cities to take advantage of transportation links to Houston and subsidized housing prices, it will do little to improve the family poverty rate in rural areas.

³⁸ Refer to the Zoning Ordinances in the City of Cleveland, Sec. 126-106. - R-2 Residential District. Retrieved from https://www.municode.com/library/tx/cleveland/codes/code_of_ordinances

Affordable Housing

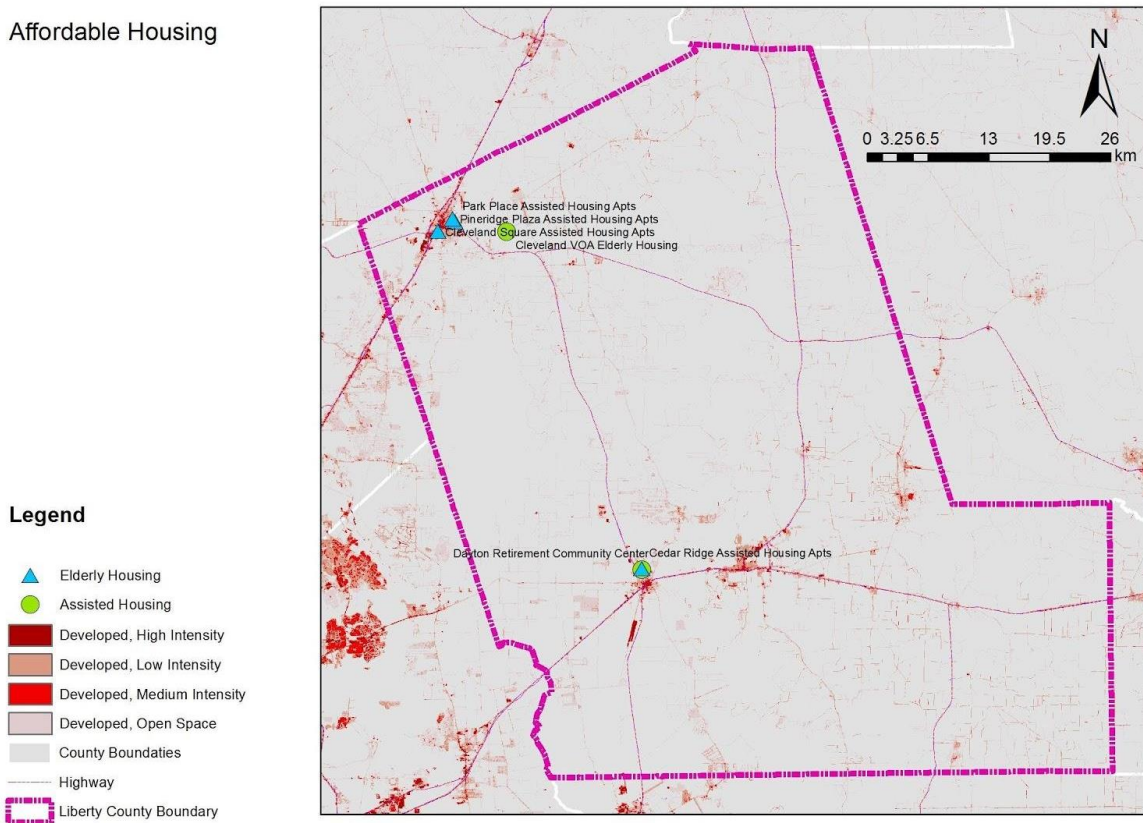


Figure 5.6.2: Liberty County, Affordable Housing Map

5.6.3 Affordable Housing Programs

Housing assistance programs are available from the County and cities within the County. The Liberty County Housing Authority, as well as the Cleveland and Dayton Housing Authorities, offer both public housing and housing through the Housing Choice Voucher Program. Included in these programs are housing options for the elderly and persons with disabilities.

5.7 OCCUPANCY VS. VACANCY RATE

The County has a total of 28,910 housing units, with an occupancy rate of 85.9 percent. This is slightly below the Texas and United States rates of 88.2 and 87.5 percent, respectively (refer to figure 5.7.1). 4,066 housing units are vacant in the County, where the minority of the units are either for rent or sale (refer to figure 5.7.3).

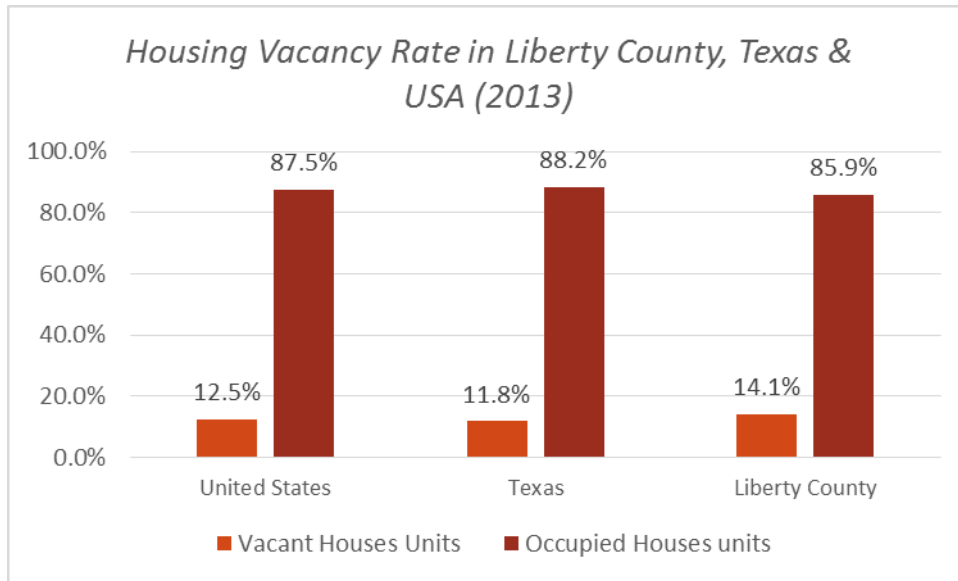


Figure 5.7.1: Housing Vacancy Rate in Liberty County Texas 2013³⁹

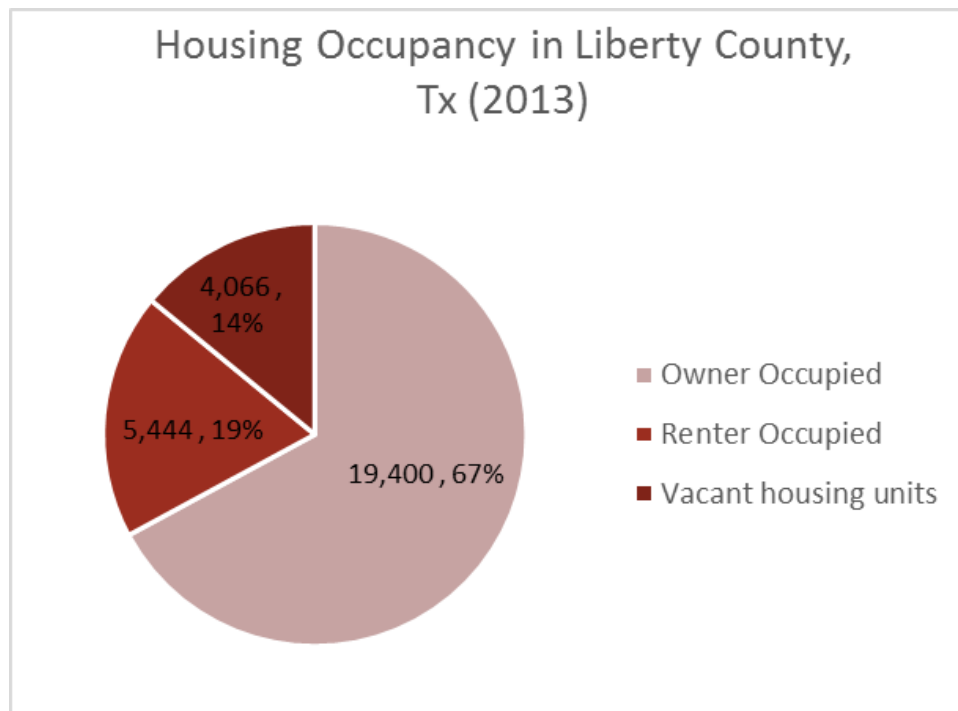


Figure 5.7.2: Housing Occupancy Distribution in Liberty County Texas, 2013 (Census)

³⁹ American Fact Finder 2013

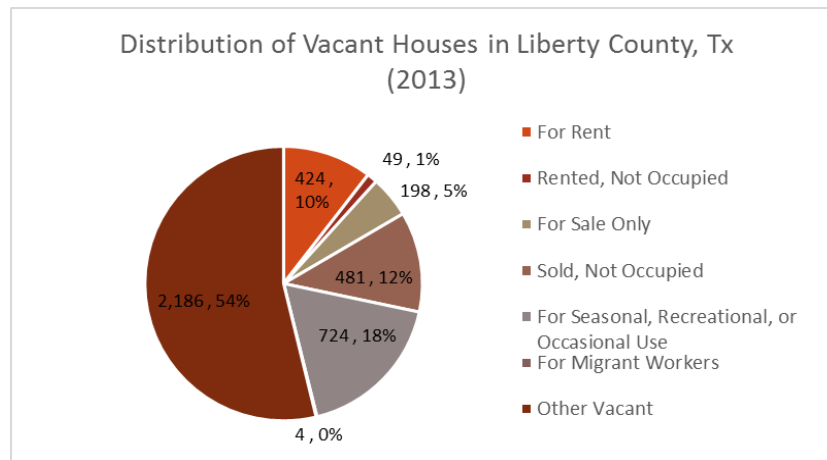


Figure 5.7.3: Distribution of Vacant House in Liberty County Texas, 2013 (Census)⁴⁰

5.8 OWNER OCCUPIED HOUSING

Figure 5.8 shows housing value for owner occupied units. Liberty County has a higher number of units valued on the lower end of the scale, with the majority (61.2%) of its owner occupied housing stock valued at less than \$100,000. In the City of Cleveland, almost 90% of the owner occupied housing stock is valued at less than \$100,000, with about 60% falling in the \$50,000 to \$99,999 range.

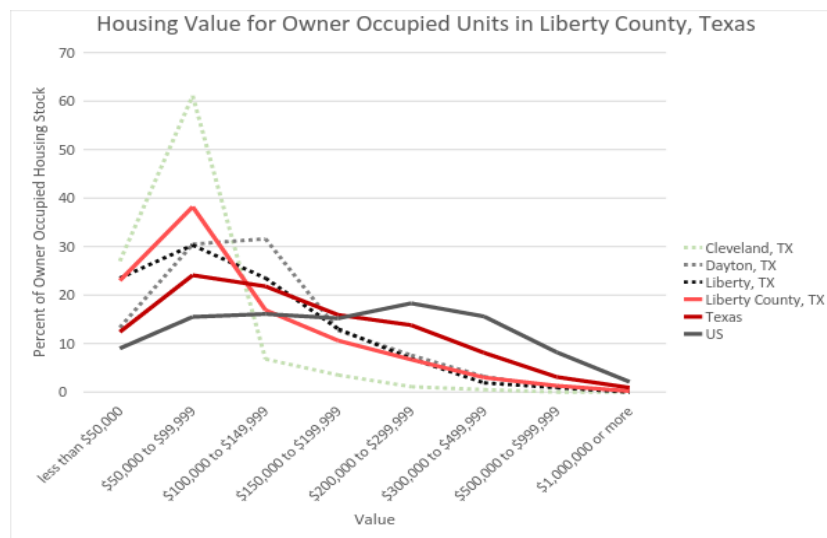


Figure 5.8: Housing Value for Owner Occupied Units in Liberty County, Texas (U.S. Census)

⁴⁰ Other Vacant Houses label include households who are making repairs or renovations, does not want to rent or sell, are using the unit for storage, or are elderly and living in a nursing home or with family members

5.9 RENTER OCCUPIED HOUSING UNITS

Figure 5.9 shows the rental housing cost in Liberty County versus State of Texas and the U.S, as well as the cost for three cities in Liberty County, which are Cleveland, Dayton and Liberty. The majority of rent in Liberty County, Dayton City and Cleveland City ranges between \$500 and \$749 per month in rent. However, rental rates in the City of Liberty tend to be a little higher, while rates in Cleveland peak on the lower end.

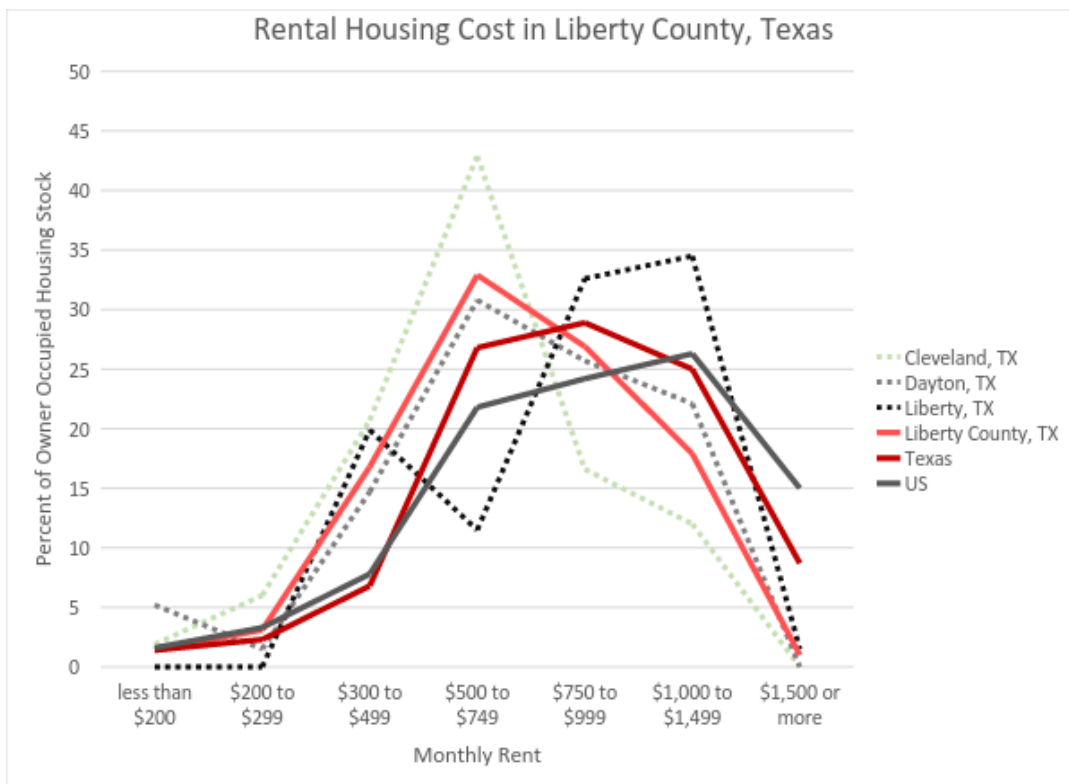


Figure 5.9: Rental Housing Cost in Liberty County, Texas (U.S. Census)

5.10 OCCUPANCY RATE PROJECTION BY JURISDICTION

Figure 5.10 shows the occupancy rate projection for Dayton City, Cleveland City, Liberty City, and Liberty County by year 2020⁴¹. The main difference is the owner occupied housing (orange color) versus the renter occupied housing (red color). The estimated owner occupied housing is 66% in Liberty County, however, it's the lowest in Cleveland City for 43%.

⁴¹ Retrieved from <http://bao.arcgis.com/>

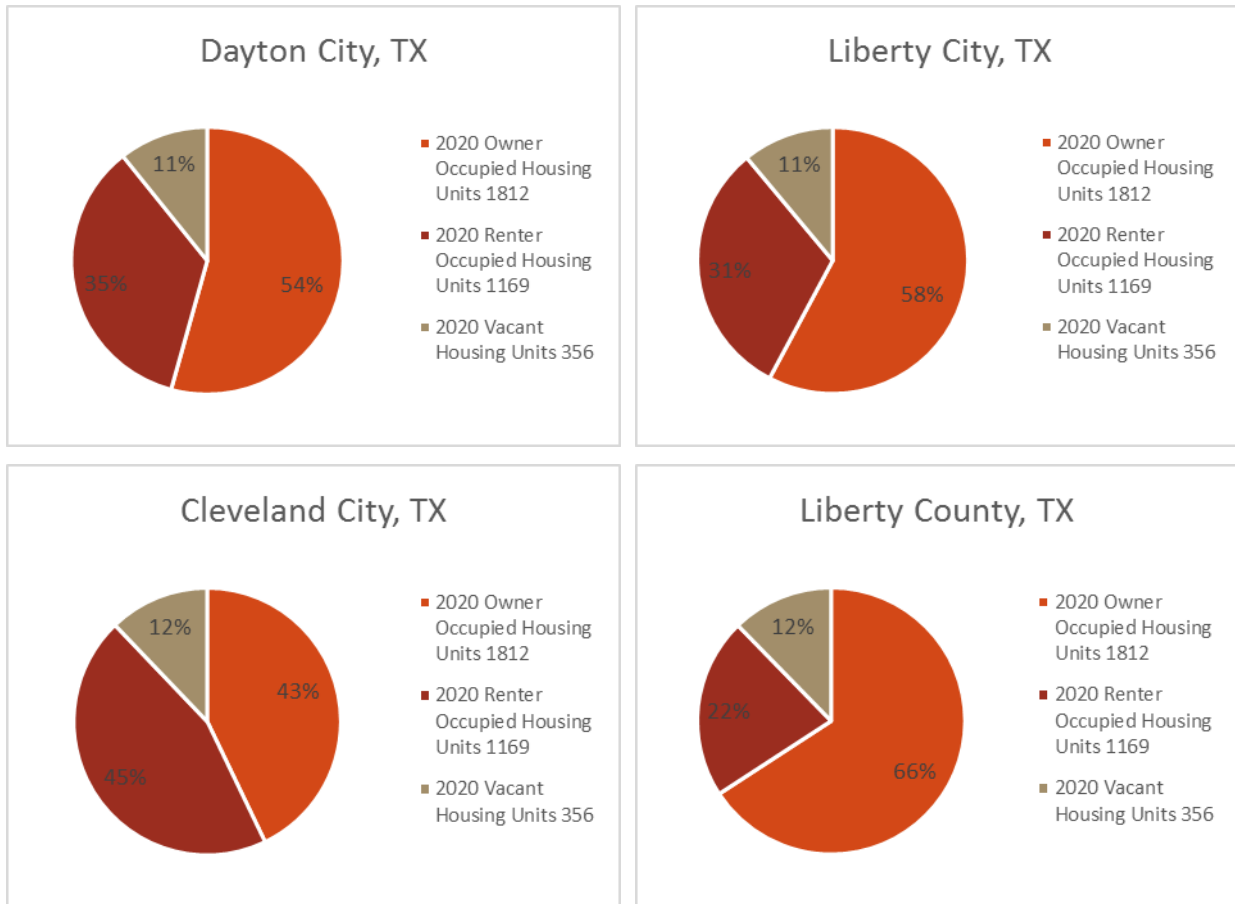


Figure 5.10: Occupancy Rate Projection for Dayton City, Cleveland City, Liberty City, and Liberty County by year 2020

6 ECONOMY

As of 2013 there were 28,566 people employed in Liberty County earning an average of \$39,735 annually⁴². This represents an increase of 8.94% in employment since 2003 and an average annual earnings growth rate of 3.0% during that same period.

Major employers in the county include⁴³:

- Boomerang
- Brookshire Brothers
- Campbell Concrete & Materials
- Cleveland, Dayton, & Liberty ISD
- Liberty County
- Texas Department of Criminal Justice
- Texas Home Health
- Wal-Mart

The industry sectors with the largest absolute employment are Public Administration (4,486), Retail Trade (3,340), and Construction (2,545).

6.1 INDUSTRY SPECIALIZATION BY EMPLOYMENT SHARE

To better understand the strengths and weaknesses of the economy in Liberty County, we can examine the employment data by NAICS industry sector (for further details, see Table 12.1, Figures 12.1 and 12.2 in Appendices). It is important to compare Liberty County's employment figures with those of benchmark regions like Texas and the U.S. in order to understand the unique characteristics of the County. Likewise, identifying trends over a 10-year period can provide insight into how the county is developing.

In comparison with Texas, Liberty County has a higher percentage of workers employed in:

- Agriculture, Forestry, Fishing and Hunting (6.49% vs 2.05%)
- Public Administration (15.71% vs. 12.73%)
- Construction (8.91% vs. 6.35%)

At the other end of the spectrum, there is a smaller proportion of workers in:

- Finance and Insurance (3.46% vs. 5.98%)
- Wholesale Trade (2.03% vs. 3.97%)
- Administrative and Support and Waste Management (4.94% vs. 6.69%)

⁴² Bureau of Economic Analysis. (2013). Liberty County: County Data. Liberty County, TX

⁴³ Texas Workforce Commission. (n.d.). Liberty County Profile

Over the past 10 years, the fastest-growing industries by increase in employment share have been Mining (2.28%), Accommodation and Food Services (0.75%) and Transportation and Warehousing (0.51%) (See Figure 12.3 in Appendices). The large increase in Mining activity is likely due to the boom in shale oil and gas extraction in Texas, which also contributed to an overall increase of 1.53% in statewide employment share.

The fastest-shrinking industries are Retail Trade (-1.40%), Agriculture et al. (-1.36%), and Public Administration (-0.73%). The change in Retail Trade is representative of state and national trends, but the shrinkage in Agriculture et al. is far greater than state and national averages while the shrinkage in Public Administration is far smaller than the Texas average.

6.2 LOCATION QUOTIENT ANALYSIS

Another way to consider county specialization is to look at its Location Quotient (LQ), which is the local employment share divided by the benchmark employment share. An LQ greater than 1 indicates that the region has a specialization in that particular industry. The table below shows the industries ranked by highest 2013 LQ with Texas as the benchmark.

6.2.1 Basic Industries

The most prominent specialization is in Agriculture et al. (LQ 3.17), which is even more notable with a U.S. benchmark. Agriculture is a strong industry in the County and can export to the region, but other industries which include mining, accommodation and transportation are growing in a faster pace.

Another strong LQ is Mining (4.66), but only in terms of a U.S. benchmark. This is most likely due to the high level of oil and gas extraction activity in Texas. Nevertheless, it should be noted that there is greater specialization in Mining in Liberty County than Texas overall (LQ 1.19).

6.2.2 *Non-basic Industries*

The investment in non-basic industries in the County helps in diversifying the economy, from resiliency standpoint. Both health care and education services are highly important in Liberty County and belong to the non-basic industries category. Therefore, it is advisable to invest in these two specific industries in order to encourage educational attainment and provide the needed health care services to the locals.

Table 6.2: 2013 Industry Location Quotients

NAICS Title	LQ 2013 Liberty-Texas	LQ 2013 Liberty-US
Agriculture, Forestry, Fishing and Hunting	3.17	3.35
Construction	1.40	1.75
Transportation and Warehousing	1.32	1.47
Public Administration	1.23	1.19
Other Services (except Public Administration)	1.22	1.22
Retail Trade	1.20	1.16
Manufacturing	1.20	1.04
Mining	1.19	4.66
Utilities	0.97	1.06
Health Care and Social Assistance*	0.92	0.78
Real Estate and Rental and Leasing	0.83	0.82
Accommodation and Food Services	0.81	0.81
Administrative and Support and Waste Mgmt.	0.74	0.80
Finance and Insurance	0.58	0.64
Arts, Entertainment, and Recreation	0.54	0.39
Wholesale Trade	0.51	0.58
Management of Companies and Enterprises*	0.50	0.32
Professional, Scientific, and Technical Services*	0.41	0.38
Information	0.37	0.32
Educational Services*	0.21	0.13

**Due to BEA omission of data to protect confidentiality, these figures are based on rough estimates generated by report authors and are not to be relied upon for strategic planning.*

6.3 ECONOMIC BASE MULTIPLIER ANALYSIS

Upon analyzing employment data and determining the percentages that are basic (i.e., export-producing) and non-basic (i.e., serving local markets), we can use this information to calculate a basic employment multiplier. The employment multiplier indicates the total number of jobs that will be created by an increase in one job in a given basic industry. Looking at Table 6.3 below, the employment multiplier for Mining is 6.1, which means that an increase of economic activity for one mining industry worker will lead to sufficient activity to support 5.1 more jobs in other sectors.

These multipliers indicate the industries in which it would be most fruitful to stimulate economic growth via local policy and investment programs:

- Mining
- Manufacturing
- Retail Trade
- Other Services
- Public Administration
- Transportation and Warehousing
- Construction
- Agriculture et al.

Table 6.3: Liberty County Base Employment Multiplier (2013)

NAICS Title	Multiplier 2013
Mining	6.1
Manufacturing	6.1
Retail Trade	6.0
Other Services (except Public Administration)	5.5
Public Administration	5.3
Transportation and warehousing	4.1
Construction	3.5
Agriculture, Forestry, Fishing, and Hunting	1.5

6.4 ECONOMIC GROWTH

As noted above, total employment in Liberty County has increased by 8.94% in the period 2003-2013. While substantial, it is slightly less than the national average and significantly less than the state average (see Figure 6.4).

Since Texas’s growth during this period is relatively anomalous in comparison with nationwide trends, it seems best to perform shift-share analysis with the U.S. as a benchmark. The results of this analysis allow us to better understand the different components of Liberty’s growth and how it might be improved in the future.

There was an absolute increase of 2,344 jobs during the period 2003-2013. Of that total, 2,552 jobs were created due to national growth factors, 140 jobs were created due to regional growth factors, and 348 jobs were lost due to the mix of industries in the region. Based on these results, Liberty County's growth has largely been due to national trends - a rising tide lifts all boats. However, there are a few regional factors that have helped, but more worrying is the fact that the mix of industries in the county has cancelled out the regional growth and some of the national growth. The county may wish to address this issue via further analysis in the future.

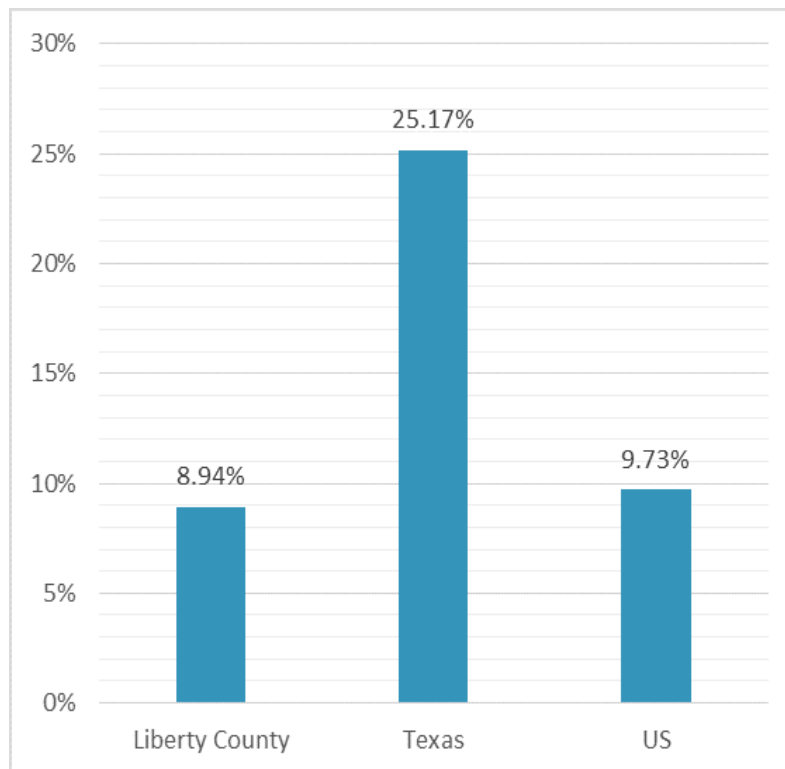
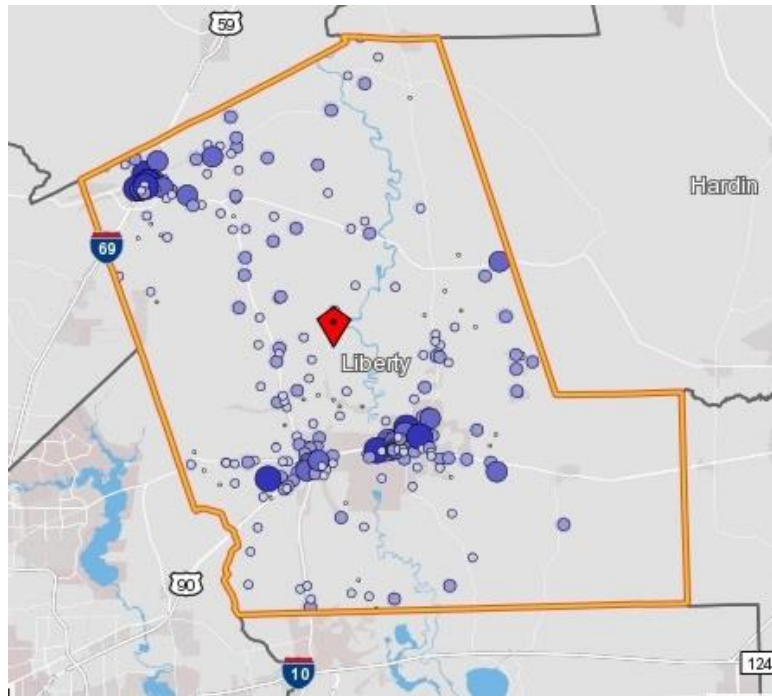


Figure 6.4: Employment Growth Comparison, 2003-2013

6.5 JOB DENSITY AND INFLOW/OUTFLOW

Figure 6.5 indicates job density patterns in Liberty County. The data source is the 2010 Census, which excludes some industries such as farm employment and public administration, so it is not a complete picture of Liberty County employment and thus job figures have not been included in the map to avoid misunderstandings. However, it is reflective of the employment agglomeration patterns near the major incorporated areas of Liberty, Dayton, and Cleveland.



*Figure 6.5: Job Density, Liberty County 2011
(U.S. Census Bureau)*

6.5.1 Employment Inflows and Outflows

It is also important to keep in mind the amount of inter-county commuting that takes place in the Houston metropolitan area. Figure 6.5.1.1 illustrates the proportion, though again, it must be remembered that the employment data used to create this map is incomplete. In this example, 5,112 workers live and are employed in Liberty County, 9,084 workers live outside but work in Liberty County, and 35,349 workers live in Liberty County and work outside its borders, in 2011.

This last group is notable for the injection of dollars it brings to the County. In 2013, approximately \$1.1 billion in worker earnings flowed into the county, while only \$267 million flowed out. This is over four times the amount of earnings inflow compared to outflow. If the County can encourage workers to spend their earnings within its borders rather than purchasing goods and services from elsewhere, this injection can help to spur local growth

2002



2011

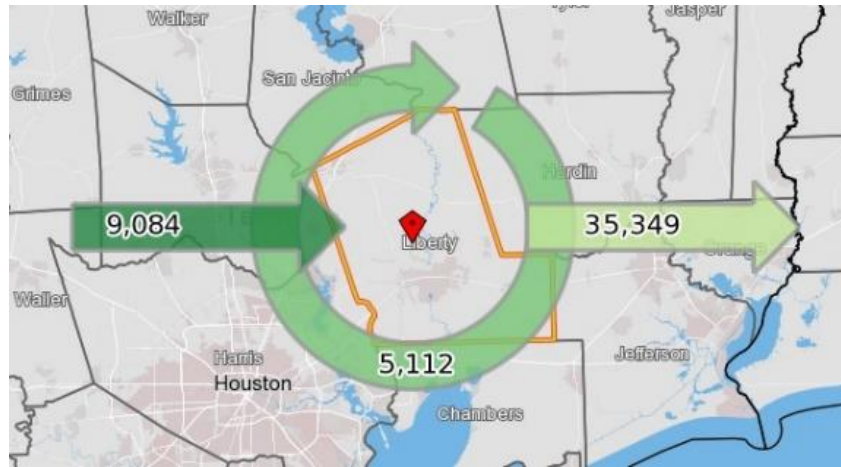


Figure 6.5.1.1: Employment Inflow and Outflow for 2002 and 2011 (U.S. Census Bureau)

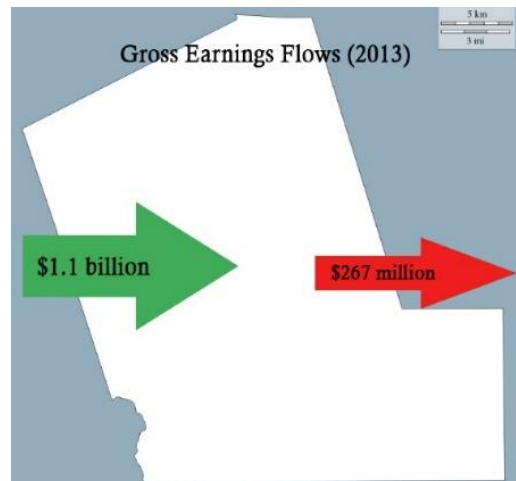






Figure 6.5.1.2: Gross Earnings Flows (2013)
Source: BEA Liberty County Data

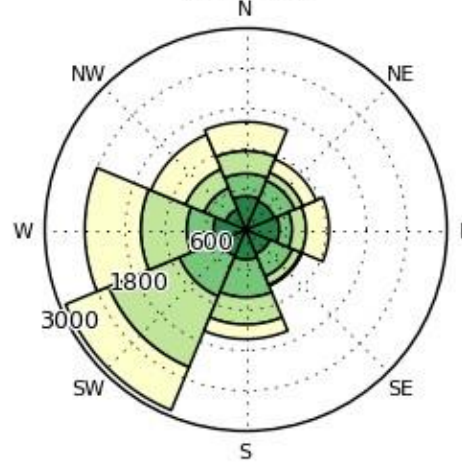
6.5.2 Jobs by Distance

Figure 6.5.2 shows the increase in the commute distance and jobs count towards Southwest, which is the location of Houston City.





Jobs by Distance - Work Census Block to Home Census Block

		2011	
		Count	Share
Total Primary Jobs		13,367	100.0%
	Less than 10 miles	3,539	26.5%
	10 to 24 miles	3,173	23.7%
	25 to 50 miles	3,347	25.0%
	Greater than 50 miles	3,308	24.7%

Job Counts by Distance/Direction in 2011
All Workers



Jobs by Distance - Work Census Block to Home Census Block

		2002	
		Count	Share
Total Primary Jobs		11,942	100.0%
	Less than 10 miles	4,597	38.5%
	10 to 24 miles	2,130	17.8%
	25 to 50 miles	2,921	24.5%
	Greater than 50 miles	2,294	19.2%

Job Counts by Distance/Direction in 2002
All Workers

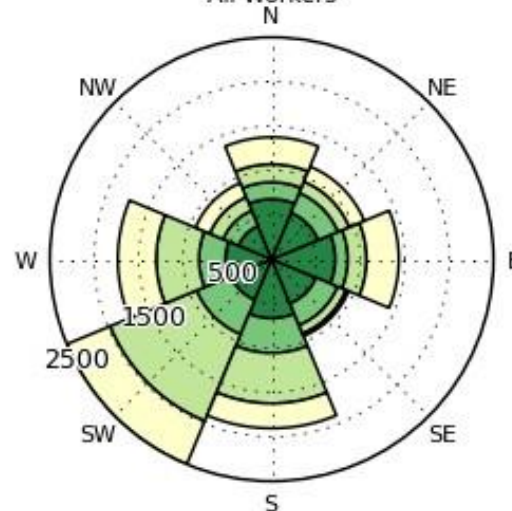


Figure 6.5.2: Commuting distance of Liberty County in 2002 and 2011

6.5.3 Spatial Representation for Employment Densities

Based on the map of employment densities for Liberty County in 2005 in figure 6.5.3, the employment within Liberty County concentrates on the three major cities – Liberty City, Cleveland City, and Dayton similar to population distribution.

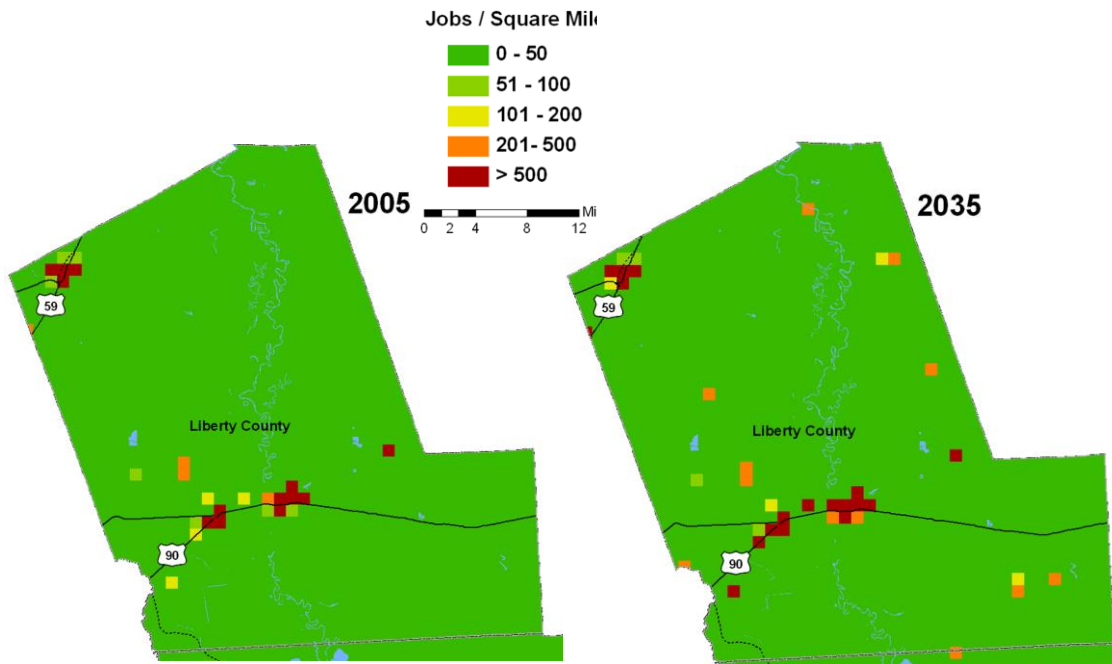


Figure 6.5.3: Employment Densities in Liberty County for 2005 and 2035 (Projected)⁴⁴

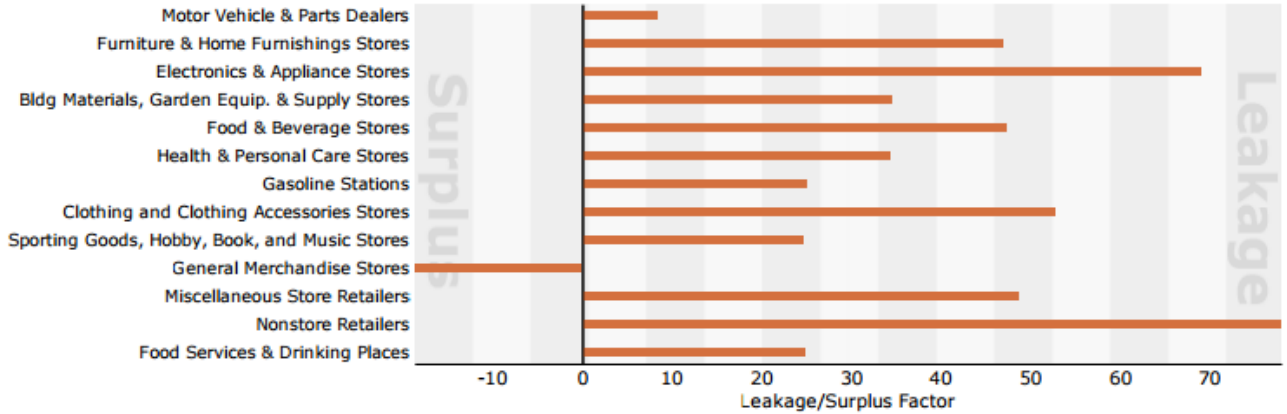
6.5.4 Leakage / Surplus Factor

Chart 6.5.4 shows the Leakage/Surplus Factor by Esri, which measures the balance between the supply generated by retail businesses and the demand produced by household spending on retail goods within the same industry. All the positive Leakage/Surplus Factors indicate that there are no retailers in the market, but household demand exists, and therefore there is an opportunity for investment.

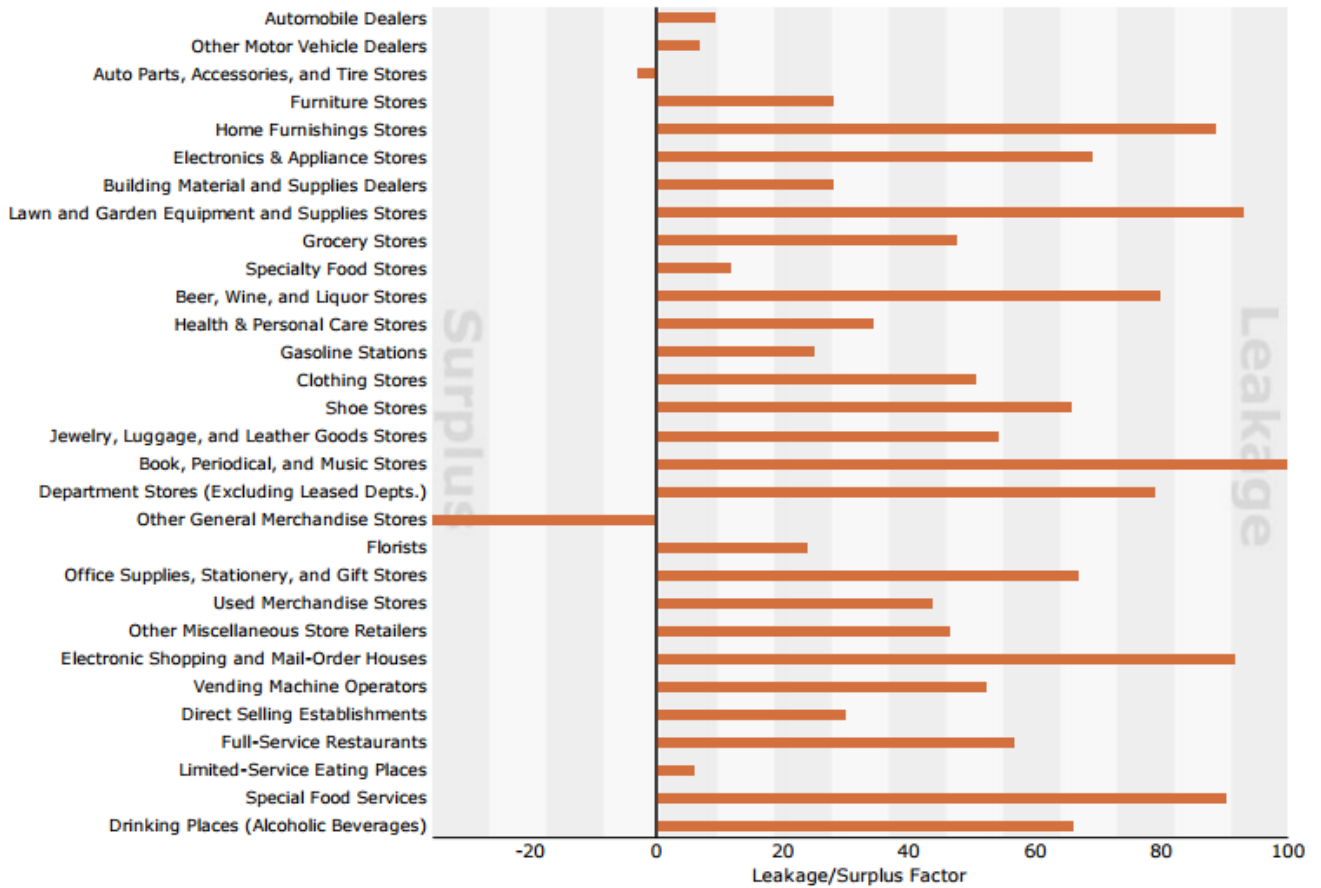
⁴⁴ LCTP. (2009). Liberty County Transit Plan, Final Report. Houston Galveston Area Council.

Chart 6.5.4: Leakage/Surplus Factor by Industries in Liberty County, Texas 45

Leakage/Surplus Factor by Industry Subsector



Leakage/Surplus Factor by Industry Group



⁴⁵ Retrieved from Esri. Retail Market Place Profile. Liberty County, Texas

7 ENVIRONMENT

7.1 FACTUAL BASIS

As shown in the Land Cover map in Figure 7.1 and the comparative analysis in Table 7.1, Liberty County is mostly rural with a few impaired streams in the northwest and east of the county. A significant part (39%) of the county is wetlands, which makes it an environmentally sensitive area. This is due to the important role the wetland plays by holding water during flooding and acting as a buffer zone to protect the Trinity River as it flows through the county into Trinity Bay. The role of the buffer is to reduce the influence of surrounding developments on ecologically sensitive areas, the Bay, and the wetlands⁴⁶. The buffer filters nutrients and sediments, captures rainfall and regulates stream flow, moderates stream and air temperatures, creates and maintains fish and wildlife habitats, stabilizes erodible soils, ameliorates the water quality and preserves biodiversity.

Landcover Map

Legend

	Barren Land
	Cultivated Crops
	Deciduous Forest
	Developed, High Intensity
	Developed, Low Intensity
	Developed, Medium Intensity
	Developed, Open Space
	Emergent Herbaceous Wetlands
	Evergreen Forest
	Hay/Pasture
	Herbaceous
	Mixed Forest
	Open Water
	Shrub/Scrub
	Woody Wetlands
	Highway
	Liberty County Boundary

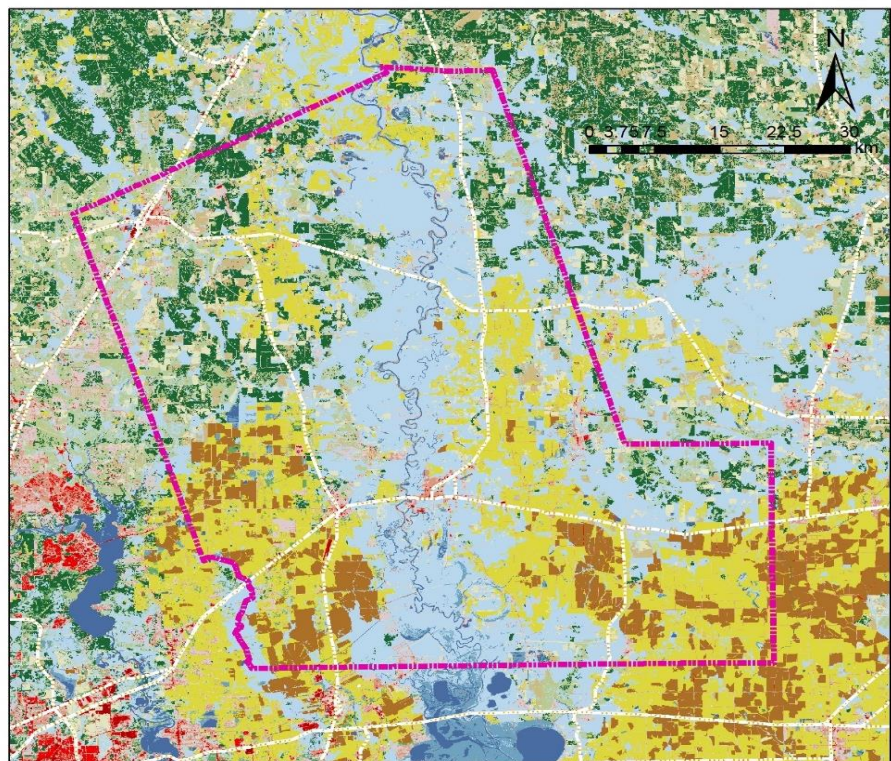


Figure 7.1: Liberty County Land Cover Map

⁴⁶ Dramstad, W. Olson, J. and Forman, R. (1996). Landscape Ecology Principles in Landscape Architecture and Land-Use Planning. Harvard University: Island Press.

Table 7.1: Environmental Fact Basis⁴⁷

	Liberty County		Houston Metro Area	
Wetlands	460.8 sq. mile	39%	2,373.5 sq. mile	17%
Grassland/Shrub	412.8 sq. mile	35%	4,545.2 sq. mile	33%
Residents living in 100-year floodplain	14%	14%		
Forest	158.8 sq. mile	13%	1,729.0 sq. mile	12%
Cultivated Land	82.4 sq. mile	7%	1,706.5 sq. mile	12%
Water	16.2 sq. mile	1%	1,627.3 sq. mile	12%
Low-Intensity Development	24.6 sq. mile	2%	585.2 sq. mile	4%
Medium-Intensity Development	5.9 sq. mile	1%	565.1 sq. mile	4%
Developed Open Space	6.9 sq. mile	1%	418.2 sq. mile	3%
High-Intensity Development	2.1 sq. mile	0%	229.6 sq. mile	2%

7.2 TRINITY RIVER WATERSHED

The main water feature in Liberty County is the Trinity River. The Trinity River flows from North to South through Liberty County and is an important part of the county’s agricultural activities. The county has enough surface water with the Trinity River, various lakes, and other water types including Long Island Cove to provide for its water needs. The map in Figure 7.2 shows the Trinity River watershed, in which Liberty County is located. Most of the surface water within Liberty County flows into the Trinity River, which is under U.S. Army Corps of Engineer’s jurisdictional control (EPA). Isolated ponds also make up a part of water area in the county.

⁴⁷ HGAC. (2013). *County Profile Liberty County*. HGAC as part of our great region 2040. Retrieved from <http://www.ourregion.org/Profiles/County%20Profile%20Liberty.pdf>



Figure 7.2: Trinity Watershed map provided by Agrilife ⁴⁸

7.3 WATER DEMAND

⁴⁸ <http://today.agrilife.org/2012/08/17/workshops-trinity-river/>

7.3.1 Water Demand Projection

Liberty County is one of the four (out of 16) largest irrigation demand counties in Region H water planning area in Texas⁴⁹. The total water demand is expected to increase by around 12% in the County, by year 2060 (refer to table 7.3.1.2). The total water shortage is expected to increase by 173% by year 2060 (refer to table 7.3.1.3). On the other side, Liberty County is one of the three counties with the largest decline in groundwater use from year 2000 till 2004, increase in the surface water use, but a decrease in the total water use (refer to table 7.3.1.1). Groundwater is mostly allocated to non-irrigation purposes, which increases the demand of surface water, and therefore lead to further shortages in the Trinity River Basin. The County is served by the Dayton Canal and the Devers Canal Systems. These systems divert water from Trinity River and deliver irrigation water to Liberty County.

Table 7.3.1.1: Water Use by Source in Liberty County, Years 2000 and 2004⁵⁰

Water Use by Source (Acre-feet)	Year 2000	Year 2004
Groundwater	40,199	13,786
Surface Water	61,761	69,480
Total Water Use	101,960	83,266

Table 7.3.1.2: Water Demand projection (in acre-feet/year)⁵⁰

Liberty County	2010	2020	2030	2040	2050	2060
Municipal	10,470	11,759	12,980	14,211	15,629	17,362
Manufacturing	393	465	537	611	678	736
Steam-Electric Power	2,962	4,240	4,957	5,831	6,896	8,195
Mining	8,730	8,753	8,766	8,778	8,790	8,800
Irrigation	89,901	82,901	82,901	82,901	82,901	82,901
Livestock	757	757	757	757	757	757
Total Water Use	106,213	108,875	110,898	113,089	115,651	118,751

⁴⁹ 2011 Regional Water Plan. Prepared by Region H Water Planning Group with AECOM USA Group, Inc Assistance. August 2010. Project No. 60095519. Retrieved from http://www.twdb.texas.gov/waterplanning/rwp/plans/2011/H/Region_h_2011_RWP.pdf

⁵⁰ 2011 Regional Water Plan. Prepared by Region H Water Planning Group with AECOM USA Group, Inc Assistance. August 2010. Project No. 60095519. Retrieved from http://www.twdb.texas.gov/waterplanning/rwp/plans/2011/H/Region_h_2011_RWP.pdf

Table 7.3.1.3: Water Shortages projection by category (in acre-feet/year)

Liberty County	2010	2020	2030	2040	2050	2060
Municipal	0	-1,281	-2,494	-3,719	-5,127	-6,874
Irrigation	-11,846	-12,444	-13,930	-15,555	-17,478	-19,640
Manufacturing	0	-72	-144	-218	-285	-343
Mining	0	-67	-124	-178	-237	-300
Power	0	-1,278	-1,995	-2,869	-3,934	-5,233
Total	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363

7.3.2 Groundwater Supply and Demand

Liberty County relies on groundwater supply for both municipal and industrial purposes. The County lacks a groundwater conservation district to control permitting, apply pumping limits, or regulate subsurface storage capacity⁵¹. Table 7.3.2 shows that the groundwater supply in Liberty County is sufficient for non-irrigation demand through 2040. The groundwater supply of 43,033 ac-feet per year is estimated by the Texas Water Development Board’s model for available water. The County shall take into consideration unexpected drought periods which will impact surface water supplies, and therefore will speed up the groundwater aquifer drawdown.

Table 7.3.2. Projected Groundwater Supply versus Non-Irrigation Demands in Liberty County, Texas

Supply/Demand	Balance Component	2020	2030	2040
Supply	Gulf Coast Aquifer	43,033	43,033	43,033
Demand	Non-Irrigation Demand	25,974	27,997	30,188
Remaining Available Groundwater		17,059	15,036	12,845

7.3.3 Water Wells

Both the City of Liberty and the City of Cleveland have three wells. The estimated combined capacity for the wells is about 1,100 gallons per minute (gpm) in the City of Cleveland, and 1,400 gpm in the City of Liberty. However, by 2030, the demand in Cleveland is 1,197 gpm which

⁵¹ Report. Do We Need A New Water Source? Long Range Water Planning Incorporating Reuse. By Corrie Bondar, Freese & Nichols, Inc.

exceeds the supply⁵². And that in Liberty City, by year 2050, is 1,684 gpm which exceeds the supply as well⁵². As a conclusion, both cities need to drill additional well in order to be able to meet the estimated future demand.

7.4 NATURAL RESOURCES

Liberty County is rich in many different natural resources. They include deposits of lignite, iron ore, sulfur, brick clay, salt, lime, and glass sand, as well as oil and gas. As covered earlier in the economic section, oil and gas extraction is the largest economic driver for the county.

It will be important going into the future to protect and plan for the environmental impact that such activities will cause on the environment. Diversifying Liberty County's economic reach will be an important factor in ensuring that the county will be able to remain economically sustainable while also protecting their environment for over utilization and extraction of natural resources.

7.5 WETLAND & FORESTS

7.5.1 Daisetta Swamp Mitigation Bank

Environmental mitigation process comprises the sale and transfer of environmental credits, following strict regulatory requirements. The main purpose behind this process is to protect and restore lands in order to preserve its functionality as ecological habitat.

Liberty County, through a conservation partnership with Advanced Ecology and the Texas Land Conservancy, put effort to restore the Daisetta Swamp Mitigation Bank. The bank belongs to Trinity watershed, and in 2012, 704 acres of land in the watershed was acquired under conservation easement program. This land was once used for agricultural production but will now be restored to its original status as a wetland. Its position adjacent to a 1,600 acre Wetland Reserve Program easement to the west is vital to wetland consolidation and conservation efforts (TLC).

⁵² Analysis of Current Water Supplies in Region H. Brown & Root, Inc. January 3, 2001. Retrieved from <http://www.regionhwater.org/downloads/documents/Task3Report.pdf>

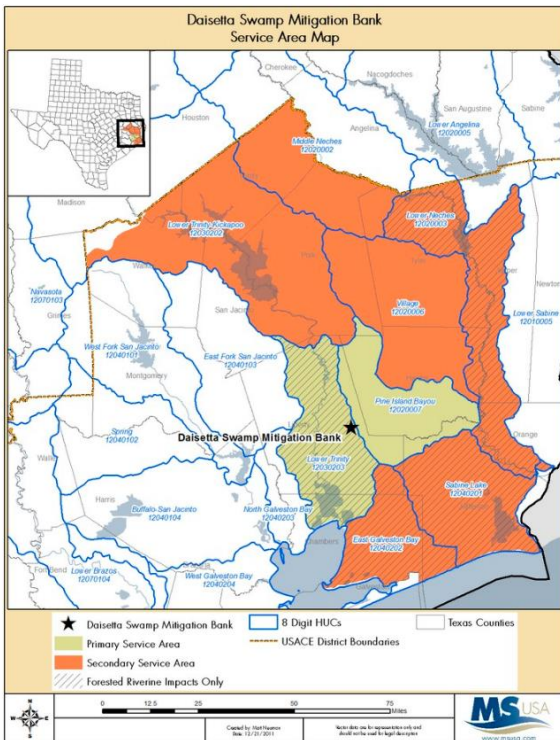


Figure 7.5.1: Daisetta Swamp Mitigation Bank Service Area Map

As shown on the land cover map, there is a huge area of wetland surrounding the Trinity River down to Trinity Bay, which is not under their jurisdictional control. This means it is at risk of being converted easily into agricultural land.

Regarding the protection of wildlife in private lands, Texas Park and Wildlife Department prefer to practice mitigation credit mechanism to protect wetlands along Trinity River, where state-preserved habitats are interspersed with private land units in disconnected segments. By engaging in mitigation banking (MS USA), landowners who unavoidably need to develop their land may purchase mitigation credits from the mitigation bank to compensate for their impact on the wetland.⁵³

7.5.2 Agriculture Land Program: Swampbuster Program

Regarding the large area of agricultural land in Liberty County surrounding Trinity River, to control the potential wetland conversion, Swampbuster Program (NRCS) “discourages farmer from altering wetlands by withholding Federal farm program benefits” from any person who wishes to develop the wetland for the production of agricultural commodities.

7.5.3 Forests

The forests within Liberty County are mainly in the northwest and the northeast, adjacent to the Big Thicket Natural Preserve. These timberlands have historically been a valuable resource for the region, serving as the raw material for its first major industry, lumber production. Also, there are some woody wetlands near the forests.

⁵³ Daisetta Swamp Mitigation Bank Service Area Map Retrieved from <http://msusa.com/app/uploads/2013/10/DaisettaSwamp.pdf>

The Trinity River National Wildlife Refuge is located along the Trinity River in the middle of Liberty County and encompasses 25,000 acres. Established in 1994, its primary purpose is to protect the bottomland hardwood forest ecosystem located there.

7.6 CRITICAL HABITATS AND DISTURBANCES

In Liberty County, the vegetation types include Pine Hardwood, Crops, and Delta Lake Aquatic vegetation. As mentioned above, the landscape in the Trinity River watershed is made up of disconnected patches and dredged sites alongside the ship channel. Furthermore, as shown in Figure 16, there is no buffer zone along the stream corridor, which makes the watershed vulnerable to disturbances.

7.6.1 Types of Disturbances

There are two types of ecological disturbances in Liberty County:

- The first is due to the issuance of building permits and new developments in wetland areas and critical habitats (see Figure 7.6.1). Due to the important role of the wetlands in preserving the ecosystem functioning and hazard mitigation, it is necessary to push developments outside these critical habitats.
- The second disturbance is due to potential nutrient runoff from agricultural lands into the river. In general, Liberty County is rural, which means the main disturbances are not due to development but due to potential nutrient runoff.

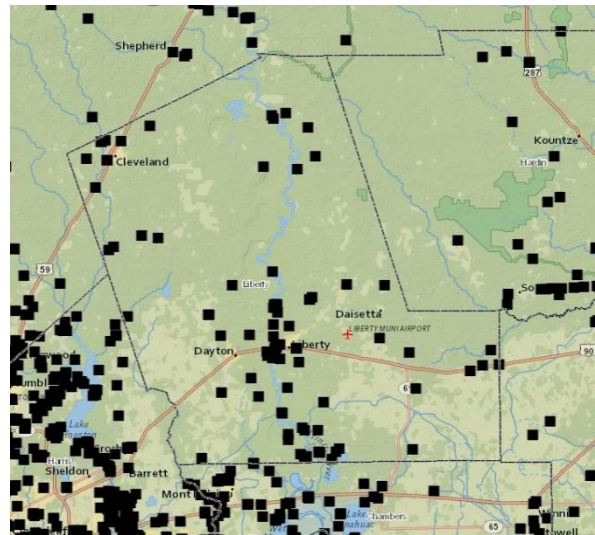


Figure 7.6.1: Building Permits Issued in Wetland Sites

The disturbed areas are represented spatially in figure 7.6.2

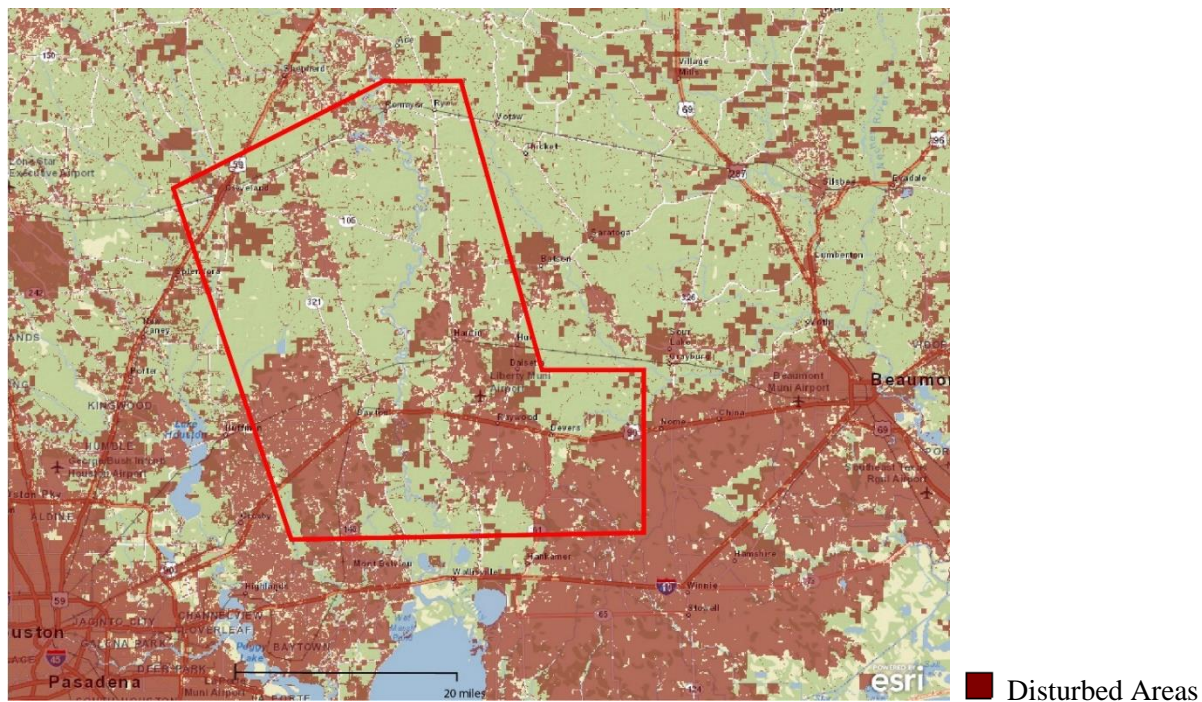


Figure 7.6.2: Spatial Representation of Disturbed Areas in Liberty County⁵⁴

7.7 VEGETATION

Liberty County contains many different kinds of vegetation. Trees found in the county include Pines, Bluejack, Post Oaks, Eastern Redbud, Southern Sugar Maple, American Elm, American Wisteria, Yaupon Holly, Dogwood, Black Tupelo, Sweetgum, Sweetbay Magnolia, Hickories, Bald cypress, Spanish moss, Water lilies, Purple bladderwort, Prickly pear cactus, Yucca, Texas trailing phlox and etc.

There are several types of soil found in Liberty County, they are sandy, sandy loam, black sandy, and black waxy. Between 41 and 50 percent of the county's land is considered to be prime farmland due to the greater variety and fertility of soil in the County.

The Sam Houston National Forest (near Huntsville) is also located in Liberty County and contains many kinds of vegetation. Unfortunately, as the city has developed, the vegetation has come under

⁵⁴ Retrieved from <http://www.wind.tnc.org/#app=1db9&5362-selectedIndex=1&509c-selectedIndex=0>

threat. Urban development and wild fires are the main causes of vegetation and forest loss currently in Liberty County.

7.8 AGRICULTURAL LAND

In figure 7.1, most of the agricultural land is distributed in the southern half of the county. It is notable that the boundaries of hayfields and croplands are largely defined by the highway. The highway seems to have blocked the conversion of wetland into agricultural lands, which especially occurs to the east of SH 321. Furthermore, US 90 is another boundary to agricultural activity, where a large area of farmland contiguously occurs south of the highway. SH 321 and 146 also delineate the growth pattern of the agricultural land, especially hayfields.

We may infer that agriculture plays an important role in Dayton, where half of the surroundings are hayfields and crops. In addition to the highways defining the boundaries of the hayfields, they may also serve as boundaries to dense human activity. It should also be noted that the cultivated crops are gathered some distance away from the highway intersection, likely due to the development of the urban area.

7.9 SUSTAINABILITY

A study was done by Texas A&M University in Galveston to monitor sustainability by developing quantitative indicators of sustainable development within the state (figure 7.9). Sustainability indicators include: urban population change, infant mortality, health insurance, toxic waste, education level, unemployment rate, poverty level, housing affordability, air pollution, crime rate, workers driving alone, travel times, and energy consumption⁵⁵. Liberty County was ranked 174 out of 254 counties in Texas with a sustainability score of 18.4. This score is not far from the minimum sustainability threshold of 14.0. The methodology is a statistical evaluation based on benchmark criteria in which the scores are relative to the 254 studied counties only, and not with respect to the USA.

⁵⁵ Sam Brody, J. A. (2006). Sustainability Indicators for Texas. Galveston: Texas A&M University

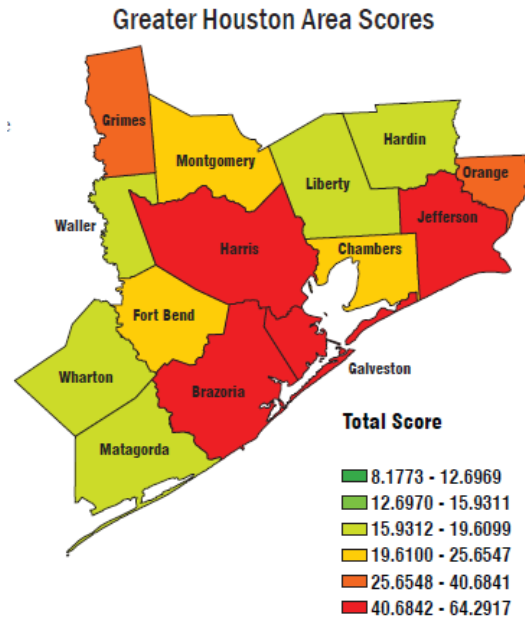


Figure 7.9: Sustainability Scores for Greater Houston Area (Sam Brody, 2006)

7.10 WILDLIFE

Liberty County has many native species of wildlife (refer to table 7.10).

Table 7.10: List of Native Wildlife Species in Liberty County by Type

Mammals	Reptiles	Birds	Fish
Eastern Cottontail rabbits	Cottonmouth Water	Sandhill Cranes	Catfish
Eastern Gray Squirrels	Moccasins	Black and Turkey	Crayfish
Virginia Opossums	Prairie Kingsnakes	Vultures	
Nine- banded Armadillos	Slender glass	Vulnerable Red-	
White-tailed deer	lizards	cockaded Woodpecker	
North American Cougars	Squirrel Treefrogs	Northern Mockingbirds	
Gray Foxes			
Bobcats			
Ring-tailed Cats			
Rafinesque's Big-eared Bats			
Seminole Bat			

7.11 THREATENED AND ENDANGERED SPECIES

Liberty County has a total of 12 threatened and endangered species as per Texas Department of Parks and Wildlife⁵⁶. The below threatened and endangered (state and federally) species, are as listed by United States Fish and Wildlife Service in Liberty County (November, 2009)⁵⁶:

1. Alligator Snapping Turtle
2. American Peregrine Falcon
3. Artic Peregrin Falcon
4. Bald Eagle
5. Creek Chubsucker
6. Houston Toad
7. Paddlefish
8. Piping Plover
9. Swallow-tailed Kite
10. Timber/Canebrake Rattlesnake
11. White-faced Ibis
12. Wood Stork

⁵⁶ 2011 Regional Water Plan. Prepared by Region H Water Planning Group with AECOM USA Group, Inc Assistance. August 2010. Project No. 60095519. Retrieved from http://www.twdb.texas.gov/waterplanning/rwp/plans/2011/H/Region_h_2011_RWP.pdf

8 HAZARD VULNERABILITY

8.1 OVERVIEW

According to NOAA, Liberty County is a coastal county in Texas, because at least 15% of its total land area is located within a coastal watershed⁵⁷. The elevation in Liberty County ranges from 20 to 200 feet above sea level. The fact that Liberty County is coastal makes it more vulnerable to hazards. There have been 111 presidential or Small Business Administration (SBA) declared disasters in the Liberty County as well as Houston-Galveston region since 1980, including hurricanes, floods, severe storms, wildfires, and freezing, which have caused the most damages for the County (refer to Table 8.1).

Table 8.1: Major disasters in Liberty County⁵⁸

Year	Disaster Number	DEM Incident Type	Presidential Declaration	SBA Declaration
2008	1791 DR	Hurricane	Yes	Yes
2007	1709 DR	Severe Storms, Tornadoes and Flooding	Yes	Yes
2006	1624 DR	Extreme Wildfire Threat	Yes	No
2005	1606 DR	Hurricane	Yes	Yes
2002	1439 DR	Severe Storms and Tornadoes	Yes	Yes
2001	1379 DR	Tropical Storms	Yes	Yes
2000	3259	Flood	Yes	Yes
1998	1257 DR	Flood	Yes	Yes
1994	1041 DR	Flood	Yes	Yes
1992	937 DR	Flood	Yes	Yes
1991	930 DR	Flood	Yes	Yes
1990	863 DR	Flood	Yes	Yes
1989	828 DR	Flood	Yes	Yes
1989	836 DR	Hurricane	Yes	Yes
1983	2091	Flood	No	Yes
1983	2115	Freeze	Yes	Yes
1983	689 DR	Hurricane	Yes	Yes

⁵⁷ Texas General Land Office and the National Oceanic and Atmospheric Administration. (2011). Status and Trends of Coastal Vulnerability to Natural Hazards Project, Annual Report for Phase 4. College Station, TX: Hazard Reduction and Recovery Center.

⁵⁸ Source: H-GAC, HMP 2011 update, September 4, 2012

As a whole, flooding has a great impact on Liberty County, and it is identified as second highest flood damages among the Texas coastal Counties (Fig 8.1).

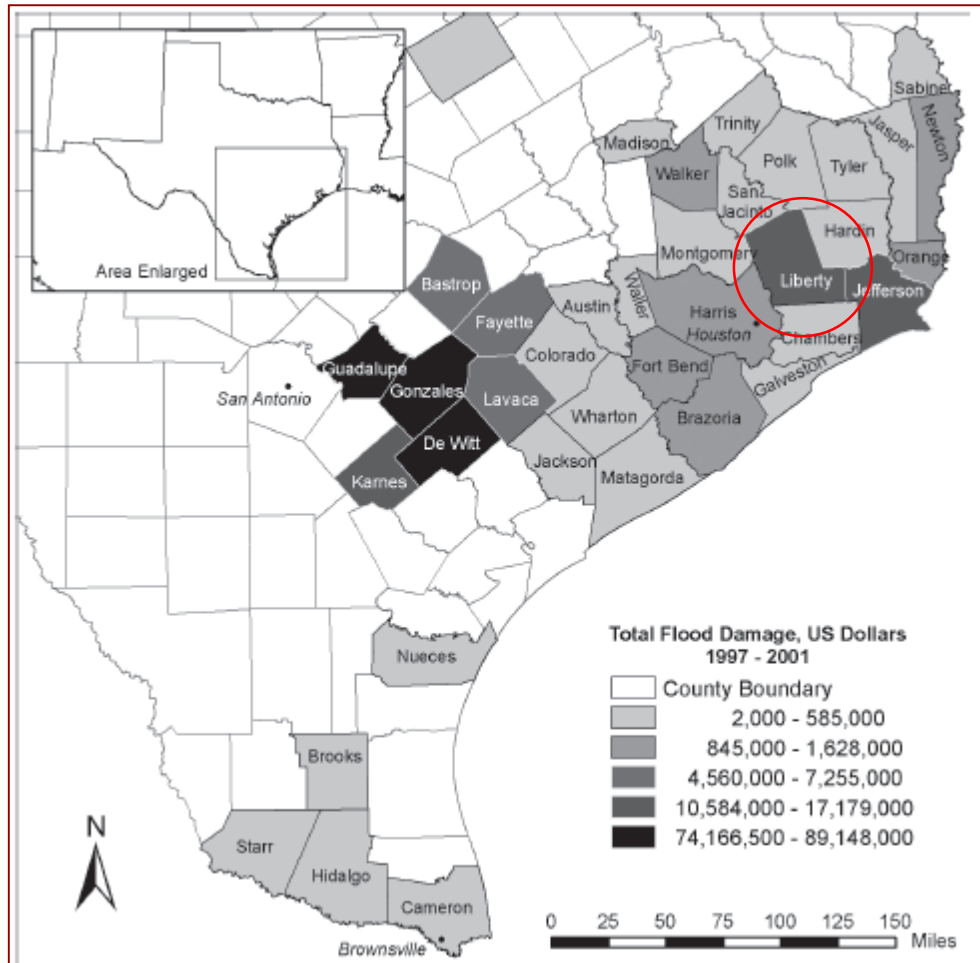


Figure 8.1: Cumulative flood damages from 1997 to 2001⁵⁹

8.2 FLOODS

Liberty County has experienced two types of floods such as riverine and coastal flood due to its geographic settings.

8.2.1 Risk from Riverine Flooding

Riverine flooding poses a serious threat to Liberty County and heavy rainfall has caused flash flooding. Any future development should consider the flood zone map of this County (Fig 8.2.3).

⁵⁹Samuel D. Brody et al. Identifying the impact of the built environment on flood damage in Texas. Retrieved from http://research-legacy.arch.tamu.edu/epsru/pdf/FL_TX.pdf

Based on the potential annualized losses of the Houston-Galveston area council Counties, Liberty County has the highest annualized loss ratio (2.04%) among all the Counties (Table 8.2.1.1). In addition, table 8.2.1.2 shows that that single family residential buildings are at the highest risk in comparison to commercial and multi-family buildings.

Table 8.2.1.1: Potential annualized loss ratio for Liberty County due to Riverine Flood ⁶⁰

Jurisdiction	Total Exposure to Flood	Single Family Residential Buildings at Risk	Multi-Family Residential Buildings at Risk	Commercial Buildings at Risk	Critical Facilities at Risk	Total Potential Annualized Losses	Total Annualized % Loss Ratio
Liberty	630	8	0.6	3	1.5	12	2.04 %
Harris	72,873	283	77	99	N/A	459	0.63 %
H-GAC	80,922	355	91	151	4	597	0.74%

(All values except the Ratio Loss are in Hundred Thousand US. Dollars and are rounded to the nearest Hundred Thousand)

Table 8.2.1.2: Vulnerability and Estimated Exposure by Jurisdiction due to Riverine Flood ⁶⁰

Jurisdiction	People at Risk	Single Family Residential Buildings at Risk		Multi-Family Residential Buildings at Risk		Commercial buildings at Risk	
	Number	Number	Value in \$	Number	Value in \$	Number	Value in \$
Liberty	8,722	2,673	445,045,816	17	49,677,750	131	1,215
Harris	N/A	N/A	45,894,847,531	N/A	12,516,414,043	N/A	14,461,722,000
H-GAC	76,165	23,280	50,391,627,844	182	13,497,594,346	3,619	17,032,653,389

⁶⁰ Regional Hazard Mitigation Plan 2011 Update. HGAC. September 4, 2012. Retrieved from <http://videos.h-gac.com/CE/hazard/2011-Hazard-Mitigation-Plan.pdf>

8.2.2 Risk from Coastal Flooding

Liberty County is at low risk with Exposure at Risk Ratio equals to 1.1, 2.0, 3.8, 4.9, and 4.5 for surge categories 1, 2, 3, 4, and 5 respectively, according to the following scale (refer to table 8.2.1.3):

- Exposure at risk ratio < 1% Very Low Risk
- 1 ≤ Exposure at risk ratio < 5% Low Risk
- 5 ≤ Exposure at risk ratio < 20% Medium Risk
- 20 ≤ Exposure at risk ratio < 40% High Risk
- 40 ≤ Exposure at risk ratio Very high Risk

Table 8.2.1.3 Vulnerability and Estimated Exposure by Jurisdiction (Coastal Flood)⁶¹

Jurisdiction	People at Risk	Single Family Residential Buildings at Risk		Multi-Family Residential Buildings at Risk		Commercial buildings at Risk	
	Number	Number	Value in \$	Number	Value in \$	Number	Value in \$
Liberty	773	114	15,399	0	0	1	847
Harris	22,199	7,092	1,089,943	223	376,892	141	283,295
H-GAC	119,756	45,951	6,561,352	1,687	1,496,278	505	975,508

8.2.3 Floodplains

Most of the urban areas in Liberty County have substantial flood risks, including Cleveland, Liberty, Daisetta, and so on. Fortunately, the core area of Cleveland is not in the floodplain. The City of Liberty has most of its urban developed area within the 100-year floodplain. This is probably because Liberty historically based its development upon proximity and access to the Trinity River.

Nearly one third of Liberty County is located in the 100 Year Floodplain with the highest risk of 1.0% Annual change. The lands located along the Trinity River in Liberty County belong to AE floodplain by FEMA 100-Year Flood Risk. This flood zone is defined by FEMA as “areas subject to inundation by the 1-percent-annual-chance flood event in which mandatory flood insurance

⁶¹ Regional Hazard Mitigation Plan 2011 Update. HGAC. September 4, 2012. Retrieved from <http://videos.h-gac.com/CE/hazard/2011-Hazard-Mitigation-Plan.pdf>

purchase requirements and floodplain management standards apply”⁶². Because of the affluent surface water and rainfall, Liberty County should take large precautions to avoid its large flood hazard.

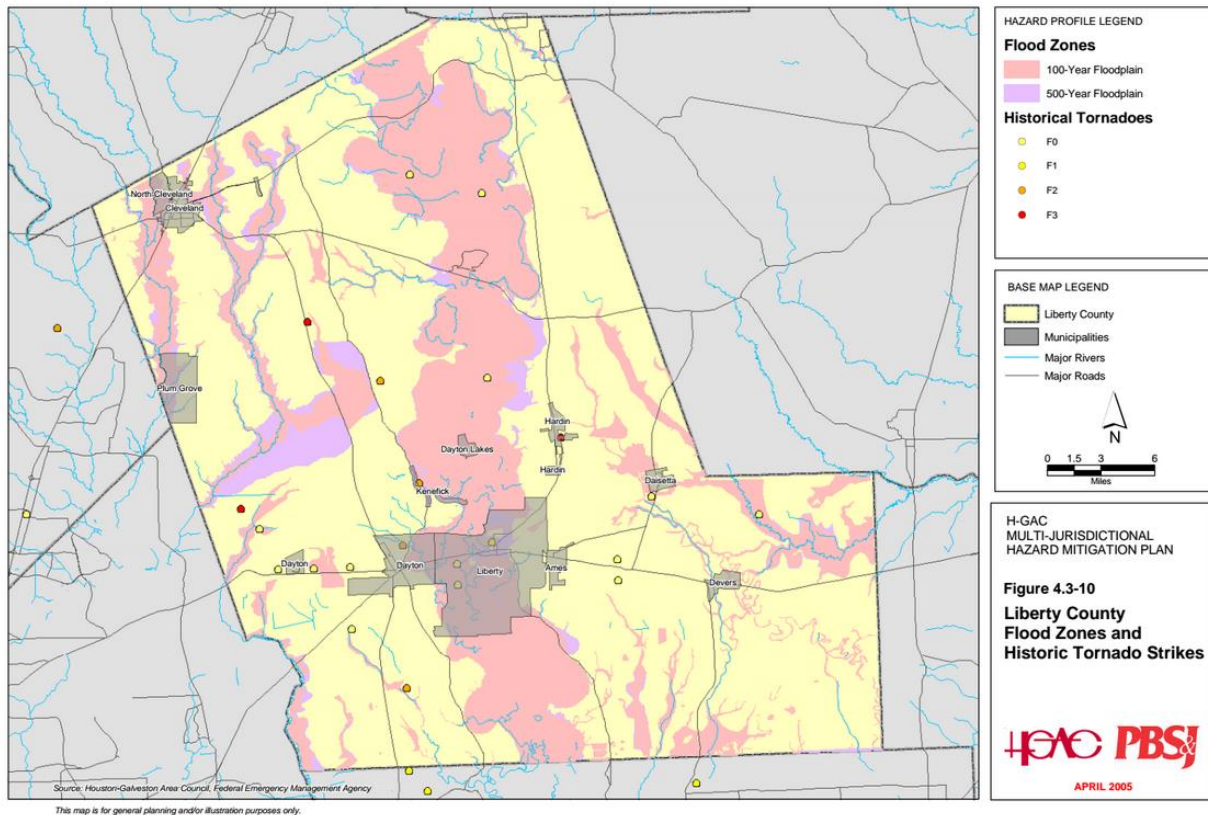


Figure 8.2.3: Liberty County, Flood Zones and Historic Tornado Strikes⁶³

8.2.4 Building Permits in Floodplain

Liberty County allows building in the floodplain under specific permits. The building permit fees were set by the Engineering and Permit Department in Liberty County, effective August 1st, 2011, and include additional \$0.15 per sq. foot.

There are two specific requirements that must be met before a building permit will be issued for a parcel inside the floodplain or flood way in Liberty County. The first is a no-rise certificate, which

⁶² FEMA. (2014, July 07). Zone AE and A1-30. Retrieved from Federal Emergency Management Agency, U.S. Department of Homeland Security: <https://www.fema.gov/floodplain-management/zone-ae-and-a1-30>

⁶³ H-GAC & PBSG. (2005, April). Flood Zones and Historic Tornado Strikes in Liberty County. In Multi-Jurisdiction Hazard Mitigation Plan.

indicates whether the new construction will increase the flood heights in the future. The second is an elevation certificate, which takes the flood level into consideration while designing a building in order to reduce building damage, maintenance cost, flood insurance premiums, number of residents to be displaced during a flood event, need for temporary shelter, and job loss⁶⁴. These certificates must be issued by a registered professional engineer⁶⁵.

8.3 STORM SURGE

Most of the lands in Liberty County, which are located in the estuary of Trinity River at Trinity Bay, belong to Surge category 3 with a maximum sustained wind speed of 130 mph and extensive damages (see table 8.3). The county is affected by sea level rise since it is exposed to storm surge.

Extensive damages means that well-built framed homes may incur major damage or removal of roof decking and gable ends, many trees will be snapped or uprooted, blocking numerous roads, and electricity and water will be unavailable for several days to weeks after the storm passes⁶⁶.

Table 8.3 shows the Saffir-Simpson Hurricane Wind Scale, which provides five categories for wind intensity and storm surge⁶⁷.

Table 8.3: Wind Scale and Storm Surge Categories

Saffir-Simpson	Central Pressure (mb)	Maximum Sustained Wind Speed (mph)	Storm Surge (ft.)	Damage Category
1	>980	74 to 95	4 to 5	Minimal
2	965 - 979	96 to 110	6 to 8	Moderate
3	945 - 964	111 to 130	9 to 12	Extensive
4	920 - 944	131 to 155	13 to 18	Extreme
5	<920	>155	>18	Catastrophic

⁶⁴ FEMA. (2010, December). Designing for Flood Level above the BFE: Home Builder's Guide to Coastal Construction. Retrieved from FEMA: <http://www.fema.gov/>

⁶⁵ Louis W. Bergman, I. P. (n.d.). Licenses and Permits. Retrieved from Libert County: http://www.co.liberty.tx.us/default.aspx?Liberty_County/Licenses

⁶⁶ Retrieved from <http://www.nhc.noaa.gov/aboutsshws.php>

⁶⁷ NOAA. (2013, May 24). Saffir-Simpson Hurricane Wind Scale. Retrieved from National Hurricane Center: <http://www.nhc.noaa.gov/aboutsshws.php>

Figure 8.3 below shows the areas that could be inundated by water in Categories 3, 4, or 5 hurricanes in Liberty County. Since Category 5 is the most severe, the surge will inundate further inland than the other categories and therefore cause more damage.

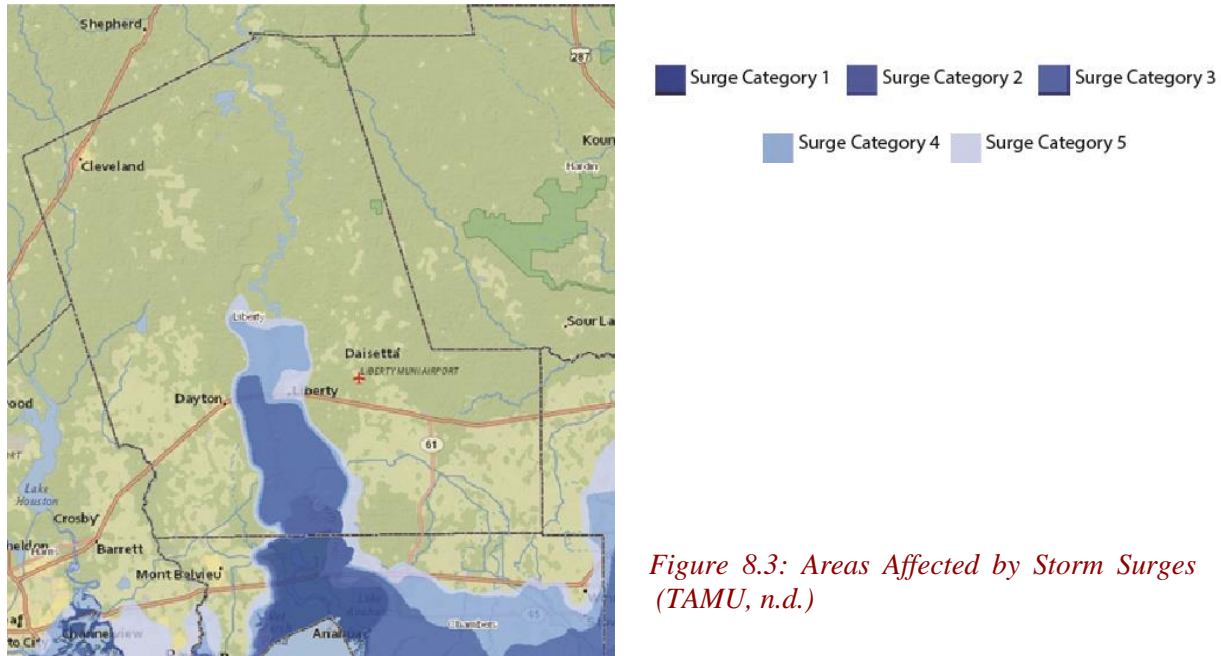


Figure 8.3: Areas Affected by Storm Surges (TAMU, n.d.)

8.4 HURRICANE AND TROPICAL STORMS

Liberty County is vulnerable to damage from hurricane winds and the inland impacts associated with coastal storms due to its geographic location. From 1983 to 2008 this area was impacted by four major hurricane hits and experienced a lot of damages. However, local and city authority of this County should consider and analyze the previous hurricane events before making any future development decisions.

Figure 8.4 shows the potential hurricane winds that could affect the study area assuming 100- and 500- year wind events.

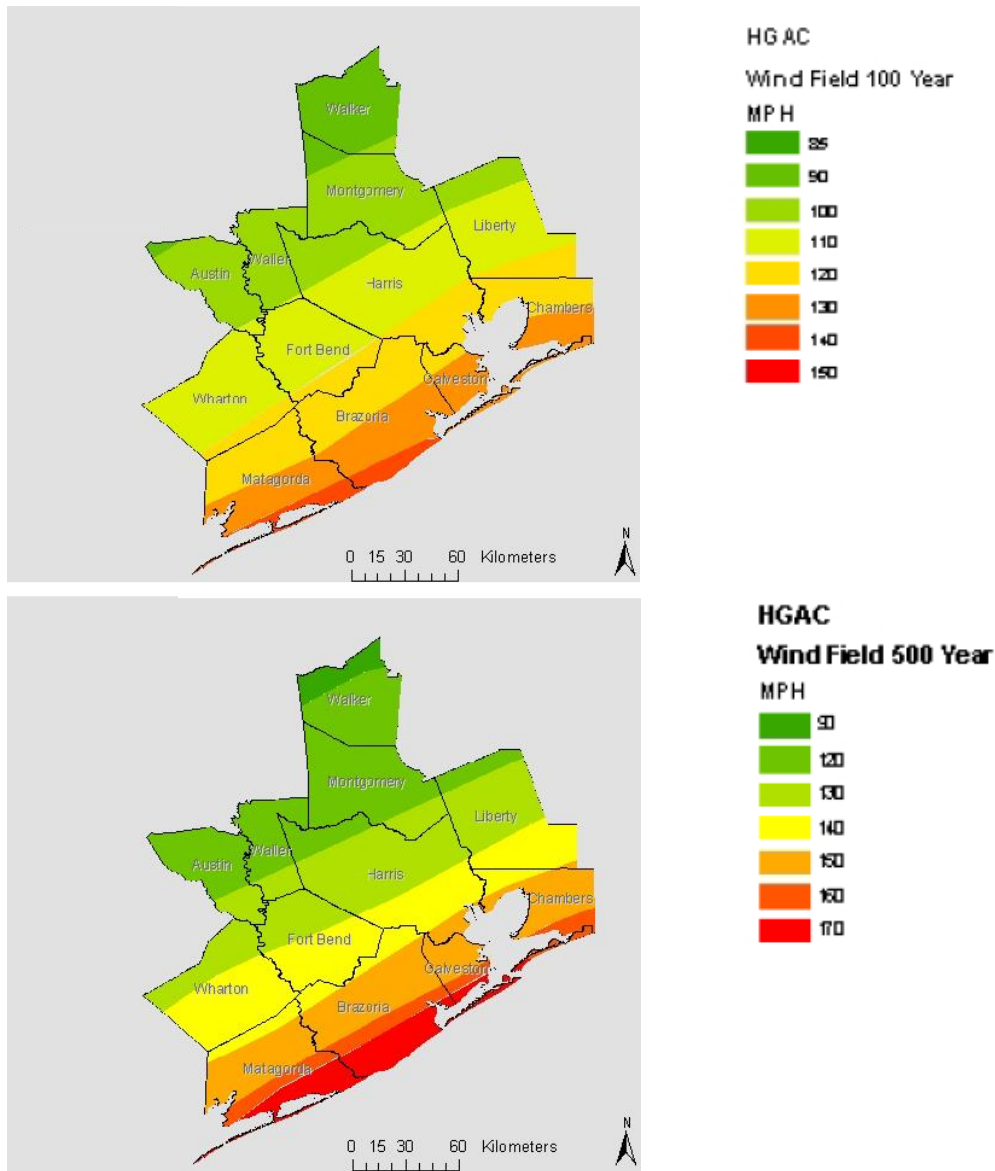


Figure 8.4: Potential hurricane wind speed for 100 and 500 year events⁶⁸

8.4.1 Hurricane Ike Impact

On September 13, 2008, Hurricane Ike hit north-northeast up Liberty County’s western border. The storm moved through the western part of the county with sustained winds of 110 miles-per-hour. It destroyed houses, diminished the beautiful forests, and collapsed the County’s power lines. According to the Disaster Impact Model, developed by Texas A&M AgriLife, the manufacturing

⁶⁸ H-GAC, HMP 2011 update, September 4, 2012) Retrieved from <http://videos.h-gac.com/CE/hazard/2011-Hazard-Mitigation-Plan.pdf>

sector still suffered \$227 million in losses⁷². The County also lost 25% of intermediate care facility beds, which serve people with intellectual disabilities⁶⁹. The main cause of such damage to Liberty County is strong southern winds from Ike. According to the Hurricane Ike impact report, Hurricane Ike damaged almost 234,000 acres of timberlands, and nearly 30% were located in this County. The recovery process was hampered due to debris, and the cost of debris removal also add \$26 million to the total cost.

However, as a report by the Texas Engineering Extension Service showed, Liberty County was the only affected county that managed to sustain economic growth during the four quarters following Hurricane Ike⁷⁰. Figure 8.4.1.1 shows that Liberty County experienced on average a 6% per quarter gain in gross sales during that period. As a total, Liberty County gained an estimated \$147.8 million. Numbers are based on the Disaster Impact Model’s accumulation of sales during the four quarters (2008 Q4 – 2009 Q3) following Hurricane Ike. Figure 8.4.1.2 shows the increase in actual sales after Hurricane Ike for both industries Mining and Construction, which are growing industries in the county⁷¹.

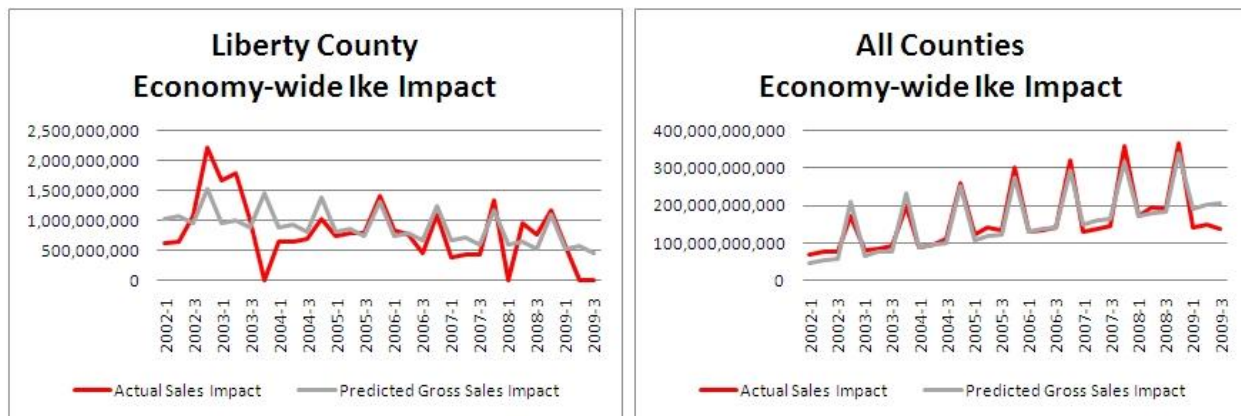


Figure 8.4.1.1⁷²: Actual sales after Hurricane Ike for Liberty County and all studied eight Counties⁷³

⁶⁹ Governor's Office of Homeland Security. (2008). Hurricane Ike Impact Report. Division of Emergency Management, Office of the Governor.

⁷⁰ Texas Engineering Extension Service. (2015, April 2). Hurricane Ike Impact Report: Liberty County. Retrieved from The Storm Resource:

www.thestormresource.com/Resources/Documents/county_reports/Liberty_County_Impact_Report.pdf

⁷¹ The analysis is based on actual sales in Liberty County, which ensure the continuation of vital business processes in the event of a disaster. Recovery-related businesses in the building construction and mining industries exemplify a pattern in which an initial loss is rapidly restored and followed by increased sales

⁷² Retrieved from

http://www.thestormresource.com/Resources/DocRepository/Full_Hurricane_Ike_Impact_Report.pdf

⁷³ The eight counties are Brazoria, Chambers, Galveston, Harris, Jefferson, Liberty, Orange, and Tyler

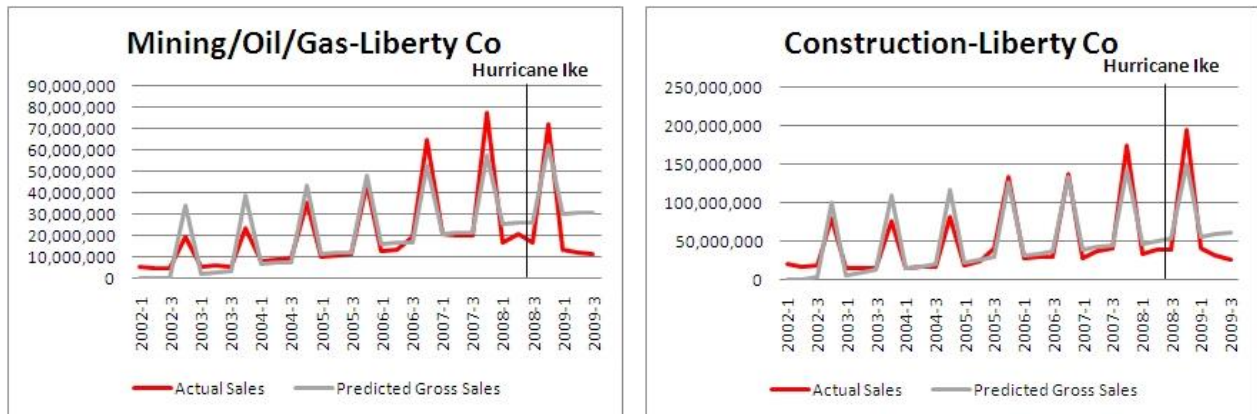


Figure 8.4.1.2. Increasing Actual sales after Hurricane Ike for both industries Mining and Construction⁷⁴

8.5 WILDFIRE RISKS

Wildfire is another hazard risk for Liberty County. Liberty County’s Wild land fire potential varies throughout its geography. The lower half of the county has the lowest fire potential due to its large amount of surface water and annual rainfall. However, the northern Liberty County is at higher risk to fires. In this area of study, wildfires occurred predominantly in forested and woody wetland areas, and damaged many natural resources. The Texas Forest Service has conducted wildfire risk assessment for the seven Counties including Liberty County. It identified ‘Areas of Concern’ based on the Wildfire Susceptibility Index (WFSI), which shows the locations where fire planning is needed and where communities are at risk (refer to figure 8.5).

⁷⁴Texas Engineering Extension Service. The Storm Resource. Retrieved from <http://www.thestormresource.com/countysingle.aspx?County=Liberty>

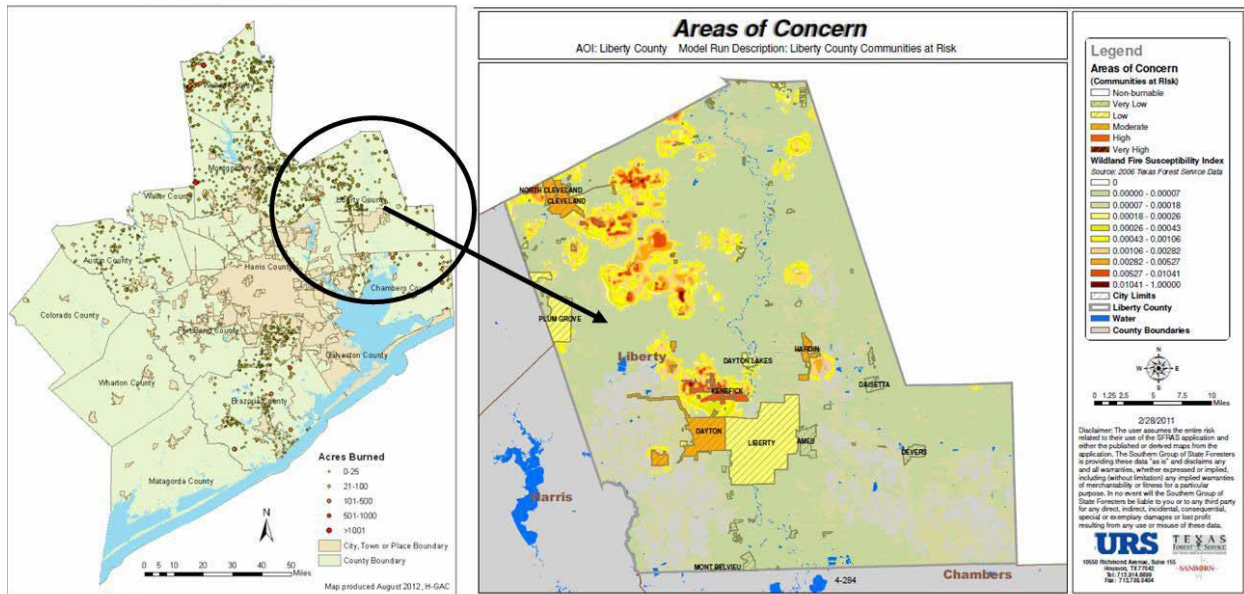


Figure 8.5: Wildlife risk Assessment, Liberty County ⁷⁵

Table 8.5: Risk Types by jurisdiction in Liberty County ⁷⁵

Jurisdiction	Areas of Concern (Community Risk)
City of Ames	Very Low
City of Cleveland	Moderate
City of Daisetta	Very Low
City of Dayton	Moderate
City of Dayton Lakes	Low
City of Devers	Very Low
City of Hardin	Moderate
City of Kenefick	High
City of Liberty	Low
City of North Cleveland	Moderate
City of plum Grove	Low

8.6 TOXIC RELEASE AND HAZARDOUS MATERIAL

Toxic releases location or hazardous material sites is an important consideration for sustainable and resilient development. Based on the Toxics Release Inventory (TRI) database, Liberty County has very few toxic sites compared to Harris County (Table 8.6).

⁷⁵ Regional Hazard Mitigation Plan, 2011 Update. H-GAC. September 4, 2012. Retrieved from <http://videos.h-gac.com/CE/hazard/2011-Hazard-Mitigation-Plan.pdf>

Table 8.6: Estimated exposure of people and buildings by Toxic releases, Liberty County ⁷⁵

Estimated Exposure of People and Buildings by County (Toxic Release)					
Jurisdiction	Potential Residential Buildings at Risk		Potential Commercial Buildings at Risk		Potential People at Risk
	Number	Value in \$	Number	Value in \$	
Liberty	531	95,428,206	3	13,396,658	1,215
Harris	35,309	10,400,342,646	344	1,449,013,809	96,548
H-GAC	47,265	13,643,848,460	478	1,966,202,329	12,317

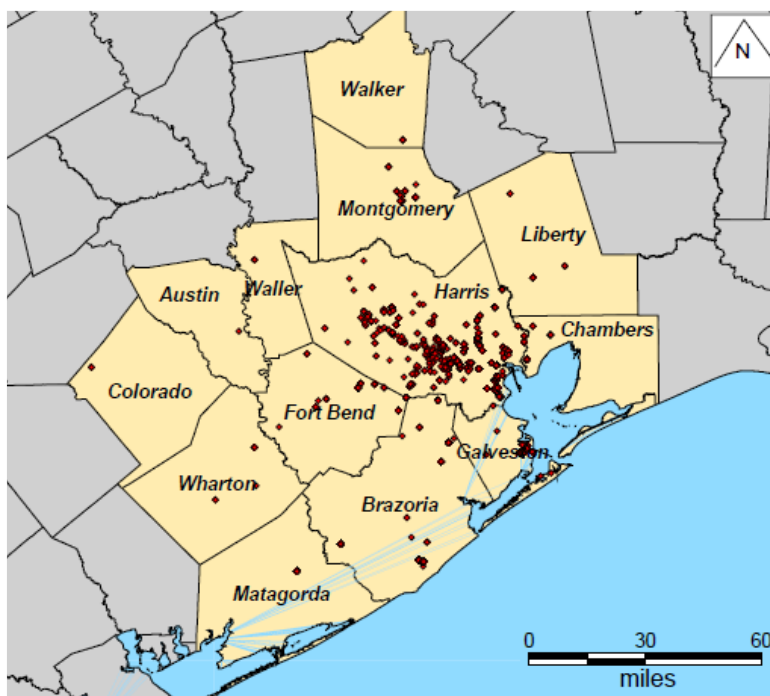


Figure 8.6: Location of Toxic sites in Houston – Galveston Area⁷⁶

⁷⁶ Retrieved from http://www.h-gac.com/community/community/hazard/documents/2006_section_4_2_hazard_analysis.pdf

8.7 POTENTIAL IMPACT OF HAZARDS

According to the 2011 HGAC Hazard Mitigation Plan risk assessment, potential impact has been classified in the following categories:

- **Catastrophic:** High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.
- **Critical:** Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than one week.
- **Limited:** Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than one day.
- **Minor:** Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Table 8.7: Summary of potential impact of hazards, Liberty County ⁷⁷

Jurisdiction	Flood	Hurricanes and Tropical Storms	Severe Thunder Storms	Tornadoes	Wildfires	Drought	Expansive Soils	Excessive Heat	Winter Storms	Hail	Coastal Erosion	Dam/Levee Failure	Toxic Release	Energy Pipeline Failure
Minor: 1	Limited: 2	Critical: 3			Catastrophic: 4									
Liberty County	3	4	1	3	1	1	1	3	3	1	NA	2	1	2
City of Ames	1	4	1	3	1	1	1	3	3	1	NA	NA	NA	1
City of Cleveland	3	4	1	3	1	1	1	3	3	1	NA	NA	1	1
City of Daisetta	3	4	1	3	1	1	1	3	3	1	NA	1	NA	1
City of Dayton	3	4	1	3	1	1	1	3	3	1	NA	NA	1	1
Town of Dayton lakes	3	4	1	3	1	1	1	3	3	1	NA	NA	NA	1
City of Devers	1	4	1	3	1	1	1	3	3	1	NA	2	NA	1
City of Hardin	1	4	1	3	1	1	1	3	3	1	NA	NA	NA	1
City of Kenefick	3	4	1	3	1	1	1	3	3	1	NA	2	NA	1
City of Liberty	3	4	1	3	1	1	1	3	3	1	NA	2	1	1
City of North Cleveland	3	4	1	3	1	1	1	3	3	1	NA	NA	NA	1
City of Plum Grove	3	4	1	3	1	1	1	3	3	1	NA	NA	NA	1

⁷⁷ H-GAC, HMP 2011 update, September 4, 2012

8.8 RECOVERY AND MITIGATION

8.8.1 Recovery Programs

Liberty County has several disaster recovery programs.

8.8.1.1 Community Development Block Grant (CDBG)

The Community Development Block Grant (CDBG) disaster recovery program was put in place after Hurricane Ike, and was funded by the U.S Department of Housing and Urban Development (HUD). It aims to provide safe and healthy housing in the hurricane impacted areas, especially for the elderly and disabled populations⁷⁸. In addition, it includes different steps such as impediments analysis, needs assessment, and complete environmental review. CDBG Disaster Recovery funds are also provided for affordable rental housing activities in order to restore the rental housing stock that was damaged, depleted, or destroyed by Hurricane Ike⁷⁹.

8.8.1.2 Regional Flood Management Council (RFMC)

Another disaster recovery program was formed in 2005, when the Regional Flood Management Council (RFMC) was created by Houston-Galveston Area Council's Board of Directors in order to assist elected officials in the flood management issue in the Gulf Coast region. These issues include, but are not limited to, flood hazard mapping studies and funding, multi-jurisdictional flood management districts, and authorities for counties, drainage districts and cities⁸⁰.

8.8.1.3 Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) provides funds to state and local governments after a disaster in order to implement long-term hazard mitigation measures. In 1994 and 2006, Liberty County was awarded HMGP \$4.3 million funds for the acquisition and demolition of 192 properties. These properties will remain as open space after being demolished⁸¹.

⁷⁸ Texas GLO, Housing Guidelines. (n.d.). Liberty County: Community Development Block Grant, Disaster Recovery Program Hurricanes Ike and Dolly Round 2. Retrieved from Texas General Land Office:

http://www.glo.texas.gov/GLO/_documents/disaster-recovery/housing/liberty-housing-guidelines-Rd-2.pdf

⁷⁹ Liberty County, Ike Disaster Recovery Housing Program, Notice of Funding Availability (NOFA) for Rental Housing Retrieved from

<http://tools.cira.state.tx.us/users/0091/docs/Public%20Management/Liberty%20County%20Rental%20Housing%20NOFA%20FINAL.pdf>

⁸⁰ Retrieved from <http://www.h-gac.com/community/water/rfmc/>

⁸¹ Regional Flood Management Council. (2009). Flood Management Handbook. Houston-Galveston Area

8.8.2 Capability Assessment by H-GAC

A capability assessment has conducted by Houston-Galveston area council Hazard Mitigation Plan 2011. The findings of the capability assessment are described below for Liberty County (Table 8.8.2).

Some of the findings from this assessment are:

- None of the cities of this County except the City of Liberty have Disaster Recovery Plan
- Except the City of Dayton, none of them have Comprehensive Land Use Plan
- Few cities have Floodplain Management Plan
- None of the cities have Zoning Ordinance and Historic Preservation Plan
- Good point is that all of the cities Hazard Mitigation Plan and national flood Insurance Program

Table 8.8.2: Relevant plans and programs in Liberty County (H-GAC, HMP 2011 update, September 4, 2012)

Table Key																			
HMP: Hazard Mitigation Plan					COOP: Continuity of Operations Plan					REG-PL: Regional Planning									
DRP: Disaster Recovery Plan					REP: Radiological Emergency plan					HPP: Historic Preservation Plan									
CLUP: Comprehensive Land Use Plan					SARA: SARA Title III Emergency Response Plan					ZO: Zoning Ordinance									
FMP: Floodplain Management Plan					TRANS: Transportation Plan					SO: Subdivision Ordinance									
SMP: Storm Water Management Plan					CIP: Capital Improvements Plan (that regulates infrastructure in hazard areas)					FDPO: Flood Damage Prevention Ordinance									
EOP: Emergency Operations Plan										NFIP: National Flood Insurance Program									
BC: Building Codes										CRS: Community Rating System									
Jurisdiction																			
	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Liberty County	▪			▪	▪	▪	▪		▪	▪	▪	▪			▪	▪	▪		
City of Ames	▪					▪						▪			▪				▪
City of Cleveland	▪			▪		▪	▪	▪		▪					▪	▪	▪		▪
City of Daisetta	▪			▪		▪			▪			▪					▪		
City of Dayton	▪		▪	▪	▪	▪				▪	▪	▪			▪	▪	▪		▪
City of Dayton Lakes	▪																▪		
City of Devers	▪																		
City of Hardin	▪																▪		
City of Kenefick	▪																		
City of Liberty	▪	▪				▪		▪	▪			▪			▪		▪		▪
City of North Cleveland	▪																		
City of Plum Grove	▪																▪		

9 TRANSPORTATION

9.1 MODE NETWORKS

9.1.1 Highways

The Liberty County transportation road network comprises interstate highways, freeways, and arterials. Figure 9.1.1 shows the transportation network in the County. Interstate Highway 69 crosses the northwest corner of the County. The main collector of vehicular traffic, U.S. Route 90, runs down the bottom of Liberty County and provides access to the Houston CBD⁸². The remaining roads, which are State Highways 321, 146, and 105, intersect with each other and connect at the bottom near Dayton City. Finally, IH-10 runs east west just south of Liberty County in Chambers County, carrying large volumes of passenger and freight vehicles.

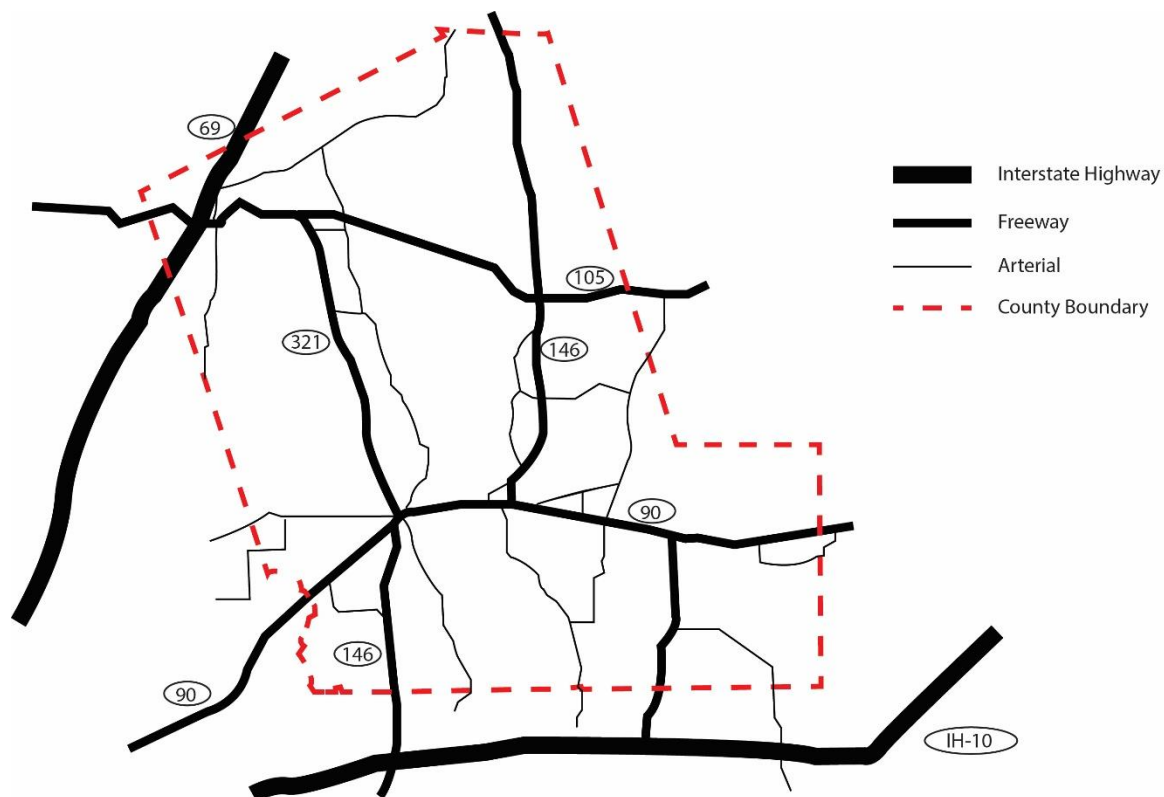


Figure 9.1.1: Transportation map (Courtesy of TAMU, 2015)

⁸² Texas Natural Resources Information System, n.d.

9.1.2 Railroads

Both Burlington Northern & Santa Fe Railroad (BNSF) and Union Pacific Railroad (UP) operate and have track rights on rail throughout Liberty County (see Figure 9.1.2).

Liberty County formed the first Rural Rail Transportation District (RRTD) in 2007 in order to support improvements to rail infrastructure within the county and to spur economic development along new and existing rail lines. The RRTD has supported the development of a 32-mile rail bypass route from the CMC rail yard west of Dayton northward to connect to the BNSF and/or UP to the east of Cleveland⁸³. In addition, in 2011 the RRTD received \$15,000 from the City of Liberty in order to preserve the 1.8 miles spur line in the City of Liberty. That line was going to be abandoned by Texas Department of Transportation.

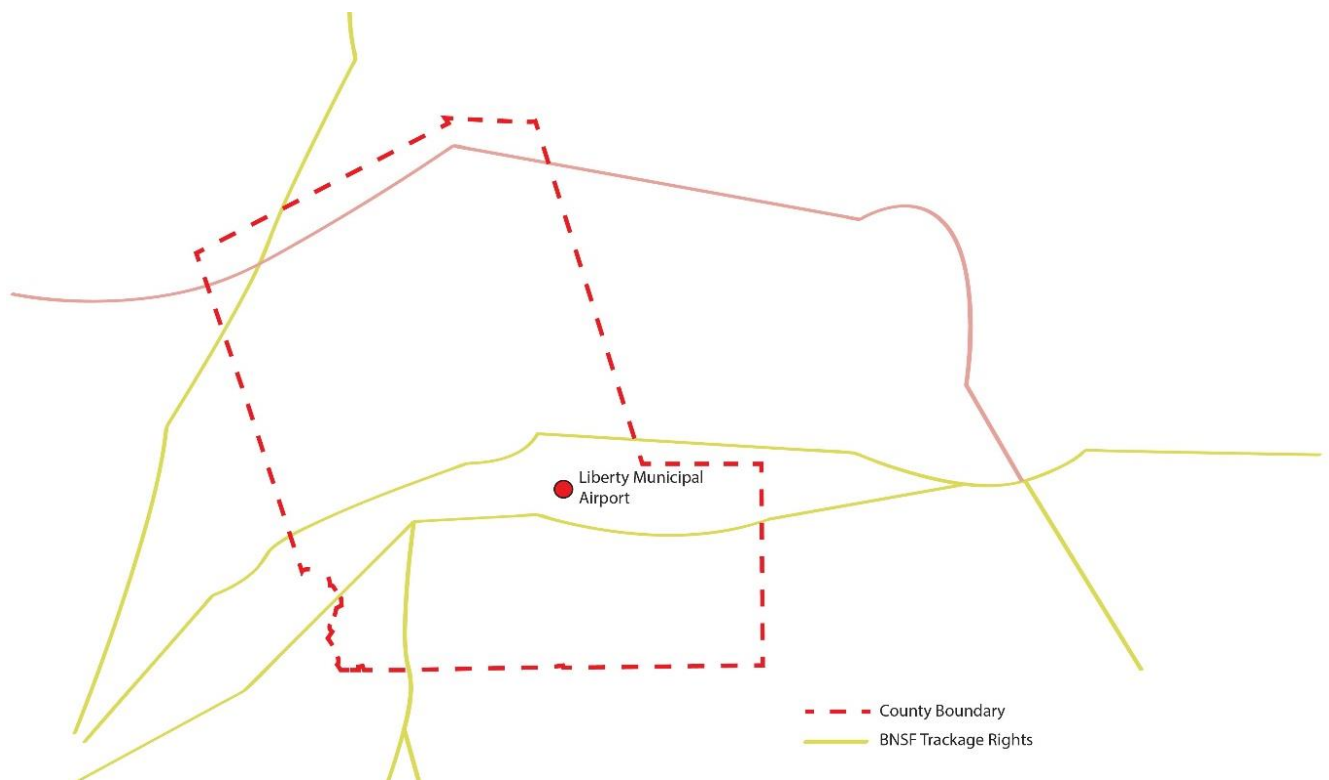


Figure 9.1.2: Railroad map, Liberty County (Courtesy of TAMU, 2015)

⁸³ Morgan, C., Warner, J., and Sperry, B. (2013). Rural Rail Transportation Districts (RRTDs) Update. College Station: Texas A&M Transportation Institute

9.1.3 Airports

9.1.3.1 Existing Airports

Liberty Municipal Airport and Cleveland Municipal Airport are two regional airports available to citizens in Liberty County⁸⁴. Liberty Municipal Airport is a general aviation airport located 6 miles northeast of downtown Liberty and covers an area of 127 acres. It is also used by Life Flight emergency helicopter services, disaster relief agencies, and private companies. The airport is owned and operated by the City of Liberty. The airport began in the 1950s as a grass landing strip and was upgraded in 2012. Currently, the airport has a lighted 3801-foot runway, 24-hour self-service, new hangars, courtesy vehicles, parking area, pilot lounge, and terminal with Wi-Fi⁸⁸. Many small airfields are present throughout the county, however they are used for agriculture purposes and aren't meant for public infrastructure uses.

9.1.3.2 Hypothetical New Airport

Based on the demand forecasts for aviation operation, the Regional Aviation System Plan (RASP) in H-GAC region includes the opening of new general aviation airport near urbanized areas in the region⁸⁵. Two hypothetical airports are suggested, in which one of them is located in Liberty County (refer to figure 9.1.3.2).

RASP studies current supply capacity with respect to future demand, and advises safe and efficient measures in order to maximize the local communities benefit. Two hypothetical airports are suggested, in which one of them is located in Liberty County. The suggested airport in Liberty County is a general aviation dedicated for business and personal aviation use. It is purely hypothetical and developed for planning purposes only.

This airport is proposed to be located in the proximity of the intersection of the proposed Grand Parkway and US 90, based on the project population and employment growth in the following 20 years. The study evaluate, based on 30 minute drive time areas, that 8,600 annual operations will move to the proposed airport located in Liberty County (refer to table 9.1.3.2). This will help in solving congestion problems of the aviation system in the long term.

⁸⁴ Retrieved from

<http://www.h-gac.com/taq/aviation/documents/Regional%20Aviation%20System%20Plan%20Appendices.pdf>

⁸⁵ The 2040 Regional Aviation System Plan. The Houston-Galveston Area Council. March 15, 2011. Retrieved from <http://www.h-gac.com/taq/aviation/documents/Regional%20Aviation%20System%20Plan.pdf>

Table 9.1.3.2 Estimated Annual Operations that will move from the mentioned airports to the hypothetical one located in liberty County, Tx

Donor Airport	30-Minute Drive Time	45-Minute Drive Time
George Bush Intercontinental	700	4,000
William P. Hobby	400	20,800
D.W. Hooks Memorial		53,500
Ellington	5,000	32,700
Houston Southwest		4,800
La Porte Municipal	2,000	7,300
Lone Star Executive		14,000
Pearland Regional		14,100
Sugar Land Regional		10,000
West Houston		12,900
Baytown	200	500
Chambers County		100
Cleveland Municipal	200	700
Eagle Lake		
Houston Executive		
Liberty Municipal	100	200
Weiser Airpark		2,700
Winnie-Stowell		100
Total	8,600	178,400

9.1.4 River Freight

Liberty County is located 40 miles by car, from the mouth of the Trinity River, which is navigable by boat. The Trinity Channel is sponsored by Chambers-Liberty Counties Navigation District and US Army Corps of Engineers⁸⁶. In addition, the County is located in proximity of two ports, the Port of Houston and the Port of Beaumont.

⁸⁶ CLCND. (2011). History. Retrieved from Chambers-Liberty Counties Navigation District: <http://www.clcnd.org/>

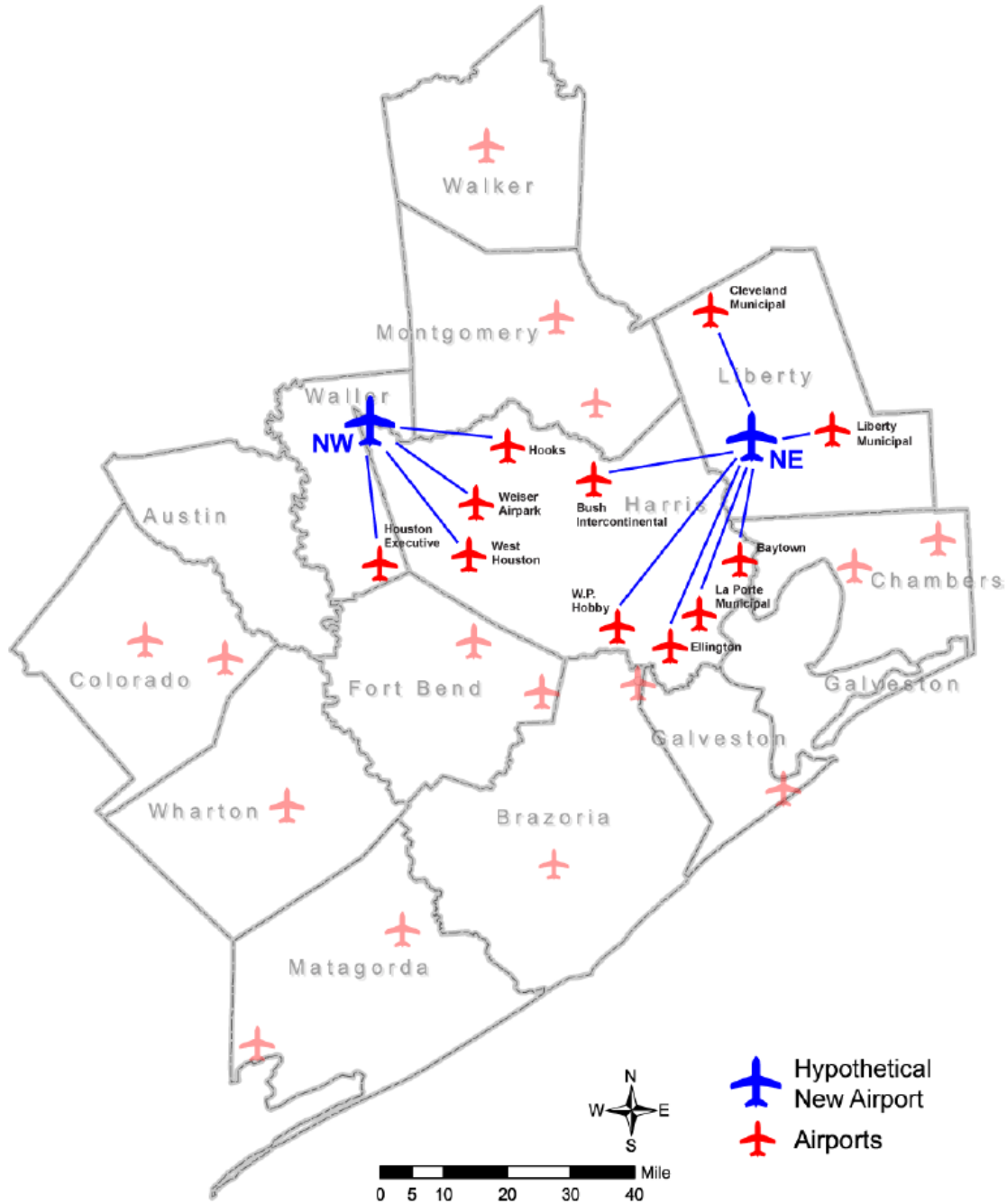


Figure 9.1.3.2: Proposed Locations for a Hypothetical New Airport⁸⁷

⁸⁷ The 2040 Regional Aviation System Plan. The Houston-Galveston Area Council. March 15, 2011. Retrieved from <http://www.h-gac.com/taq/aviation/documents/Regional%20Aviation%20System%20Plan.pdf>

9.1.5 Sea Ports

Liberty County is located in proximity to the Port of Houston, Port of Beaumont, and Port of Texas City (refer to figure 9.1.5). The Port of Houston is located within 45 minutes of Liberty and Dayton. It is ranked first in the US in foreign waterborne tonnage and second in total tonnage⁸⁸.

The port of Beaumont is located within 55 minutes of Liberty County. The port is accessible from the Gulf of Mexico and Intracoastal Waterway via the Sabine-Neches Ship Channel, 42 miles upstream from the Gulf⁸⁸. It also connects to the inland waterway system serving Minneapolis, Chicago, St. Louis, Kansas City, Louisville, Omaha, among others.

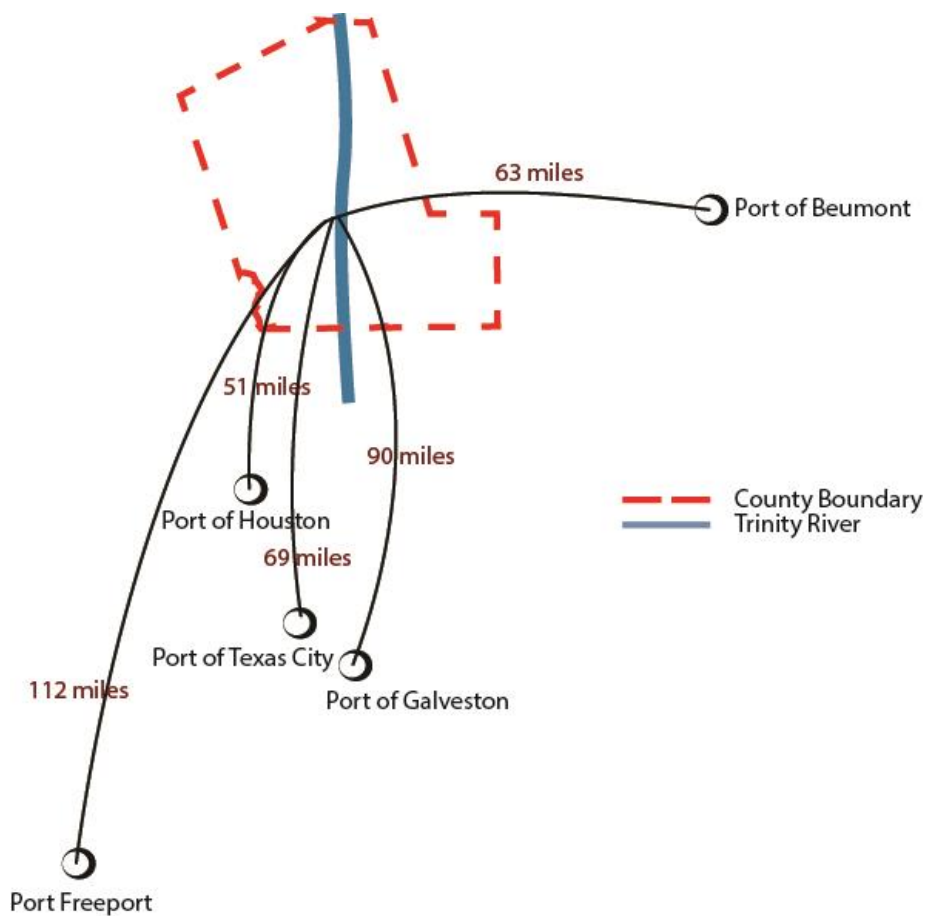


Figure 9.1.5: Distance from Liberty County to the nearby sea ports

⁸⁸ Liberty, C. o. (2009). Retrieved from http://www.cityofliberty.org/About/EconomicDevelopment/LCDC_CommunityProfile/LCDC_Transportation.aspx

9.2 MODE OF COMMUTES

Figure 9.2 compares the modes of transport between Liberty County, Texas and USA.

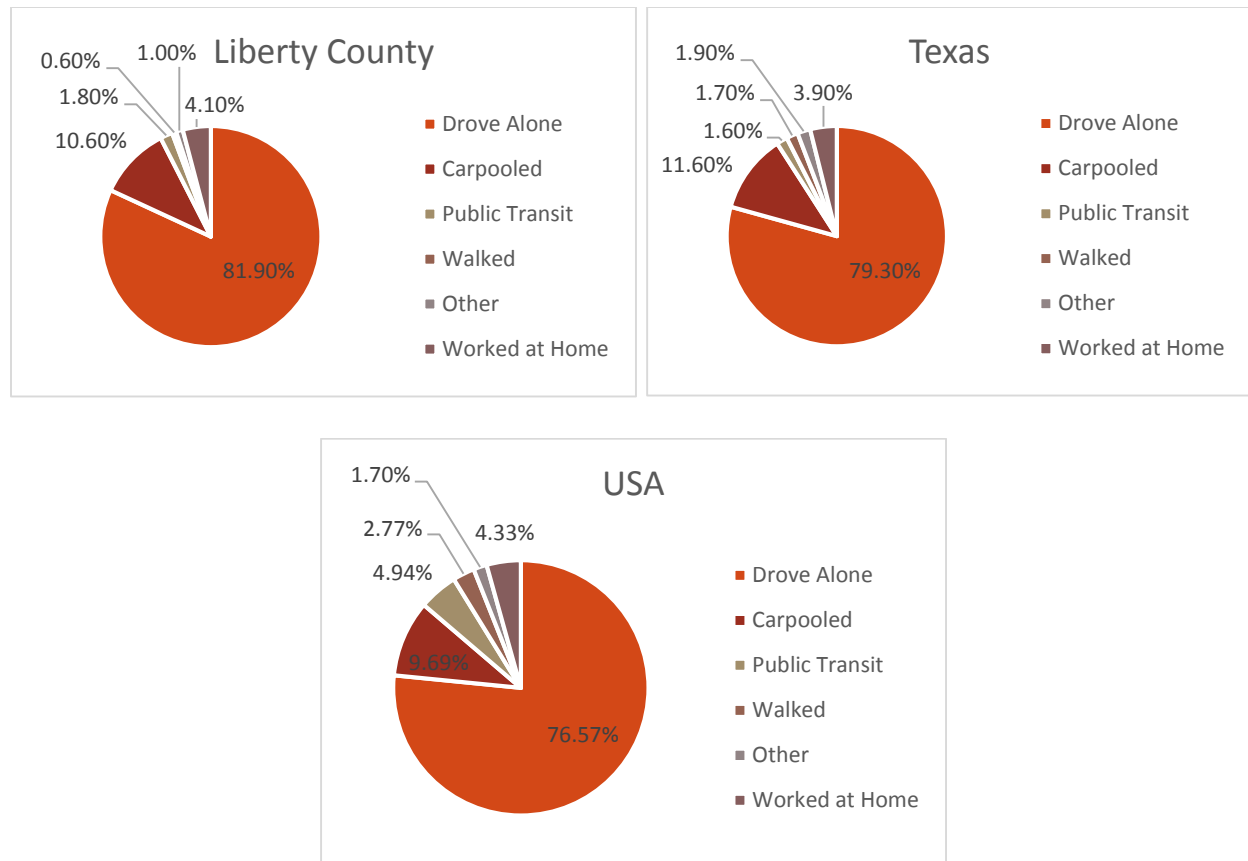


Figure 9.2: Mode of Commutes Circular Diagram for Liberty County, Texas⁸⁹, and USA⁹⁰

9.3 PUBLIC TRANSIT

9.3.1 Transit Plan

The County has developed a transit plan, which identifies short-, mid-, and long-term goals. The plan was approved by both the Liberty County Commissioners and Houston-Galveston Area Council in June 2009. The plan identifies two key recommendations for the County: a countywide

⁸⁹ HGAC. (2013). County Profile Liberty County. HGAC as part of our great region 2040.

⁹⁰ Commuting in America 2013. The National Report on commuting Patterns and Trends. October 2013. American Association of State Highway and Transportation Officials. Retrieved from <http://traveltrends.transportation.org/Documents/CA10-4.pdf>

demand response service and a park-and-ride facility from Dayton to the Houston central business district.

9.3.2 The Need for Expanded Transit Service

The 2009 Liberty County Transit Plan⁹¹ covers the need for expanded transit service in the County. The needs which are mentioned in the LCTP report include the projected population density in 2035, the projected employment densities in 2035 (figure 9.3.2.2), the potential number of commutes within and outside Liberty County, the increase in gas price, the use of state and federal transportation funds, and the need for public transit by special needs populations.

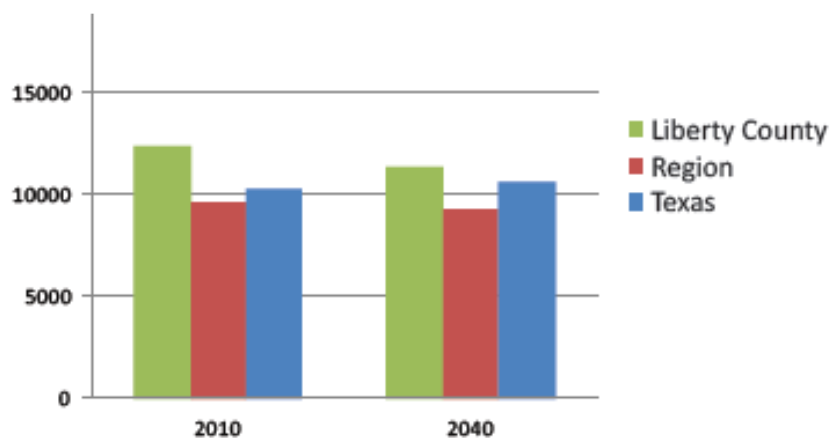


Figure 9.3.2.1: Chart Showing Vehicle Miles Traveled Per Person⁹²

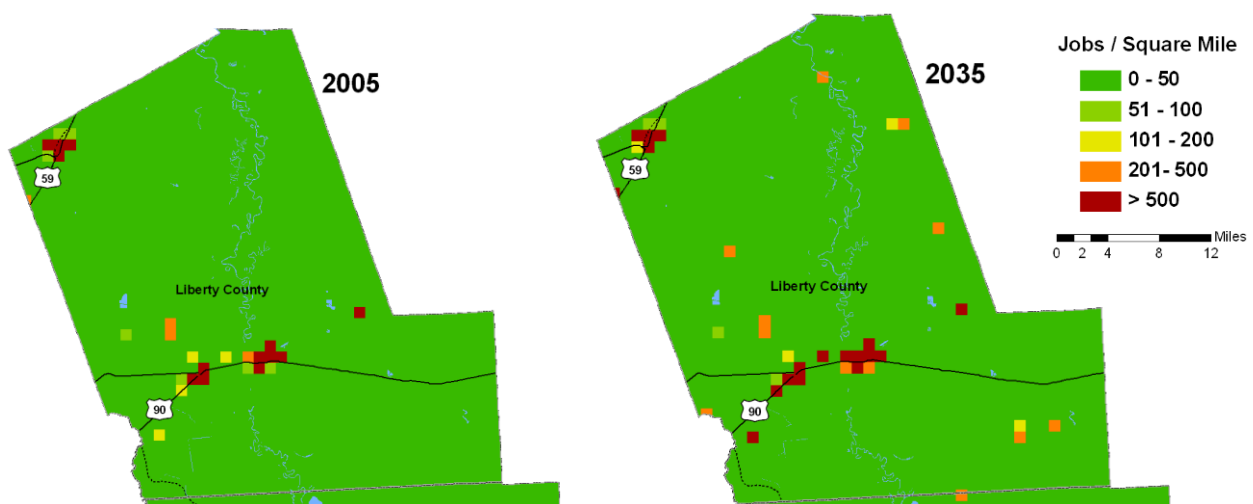


Figure 9.3.2.2: Employment Densities in Liberty County for 2005 and 2035 (Projected)

⁹¹ LCTP. (2009). Liberty County Transit Plan, Final Report. Houston Galveston Area Council

⁹² HGAC. (2013). County Profile Liberty County. HGAC as part of our great region 2040

9.3.2.1 Spatial Representation for Transit Need

Figure 9.3.2.3 to the right shows that Liberty City, Dayton City, and Devers City are greatly in need of public transit. The Liberty County Transit Plan aims to expand the existing routes to cover the areas in accordance with the community needs. The existing public transit route covers Liberty, Cleveland, and Ames. This is mentioned in details under Brazos Transit District Section below.

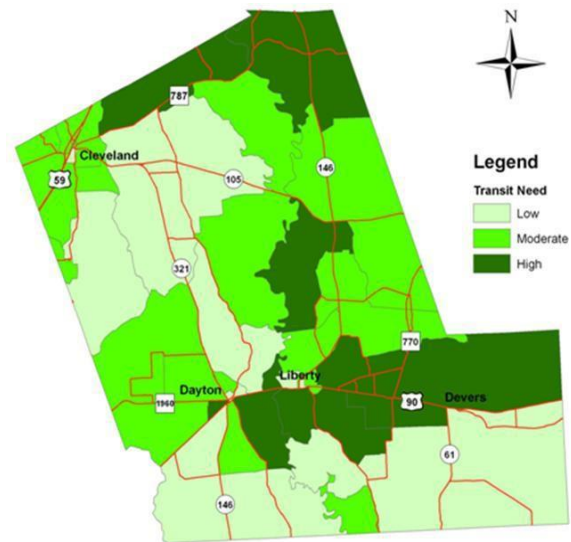


Figure 9.3.2.3: Liberty County Transit Needs Index

9.3.2.2 Intra-county Commutes

Figure 9.3.2.4 shows the potential number of commutes outside Liberty County. There are 12,095 intra-county commutes within Liberty County, with work trips from Liberty to Montgomery County (1,498) and Harris County (9,760) constituting the majority of trips outside the county, in addition to relatively fewer trips to counties such as Fort Bend, Chambers, Walker, Brazoria, and Matagorda counties.

9.3.2.3 Projected Population Densities (2035):

The current and projected (2035) population densities show that a few areas in Liberty and Cleveland have more than 2,000 people per square mile. The benchmark provided by METRO's Service Standards to support fixed route transit services in moderate density areas is 2,000 people per square mile. Furthermore, the current and projected (2035) employment densities show concentration of more than 500 jobs per square mile primarily in Liberty, Dayton, and Cleveland (refer to figures 4.3.3.1 and 9.3.2.2)

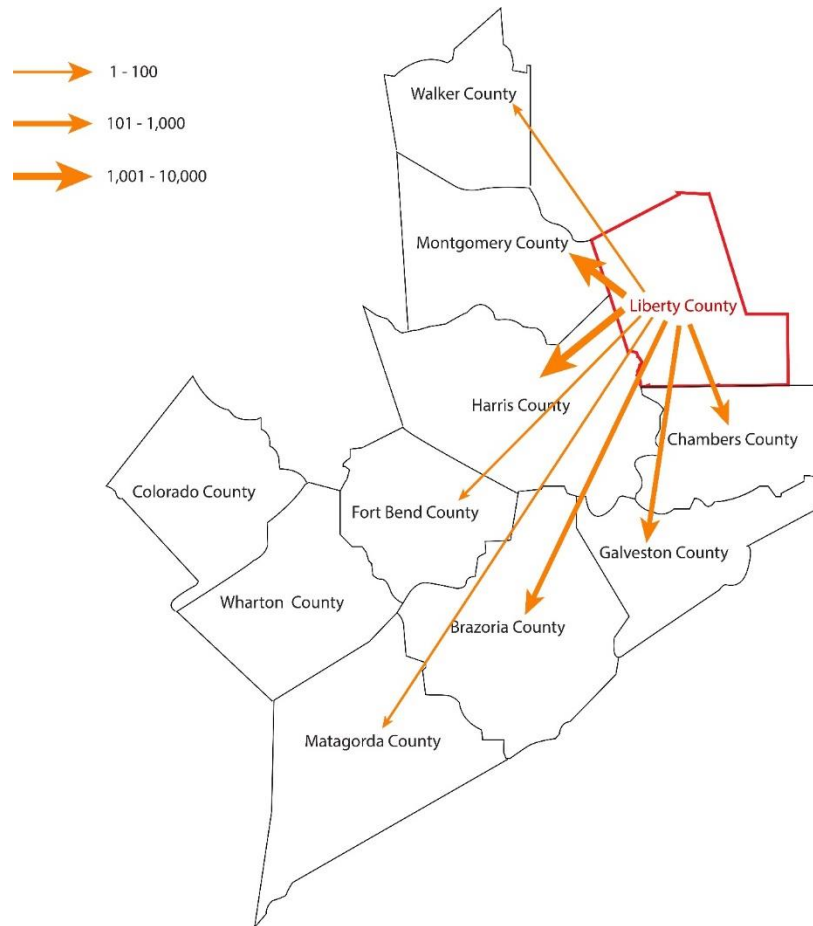


Figure 9.3.2.4: Liberty County: Inter-County Journey-to-work flow⁹³

9.3.2.4 Special Needs Population

In addition to demand for transit by commuters, there are also special needs populations who have unmet transit needs. According to the 2006 Census estimates, 18.8% of the population (5 years of age and over) report a sensory, physical, mental or self-care disability; 10.4% of Liberty County citizens are 65 and older and thus may have driving limitations; and 7.6 % of the households in Liberty County do not own automobiles. Transportation is needed by special needs populations for daily essential errands such as medical appointments, grocery shopping, job training, college, employment. Finally, the state has created a mandate to coordinate and consolidate health and human service transportation delivery for eligible members of the County, which encourages investment in public transit.

⁹³ Hackett, K. (2008). Liberty County: Transit Plan (LCTP). H-GAC

9.3.3 Brazos Transit District

Currently there is no countywide public transit, but the cities of Cleveland, Dayton, and Liberty all have fixed route public transportation systems. All three routes are operated by Brazos Transit District, under a contract with the Texas Department of Transportation (TxDOT) which provides rural transit⁹⁴.

Brazos Transit District (BTD) carries out an estimated 48,000 trips annually in the Liberty/Dayton community, serving an estimated 34% of Liberty County's population within the developed urban clusters⁹⁵. The fixed routes travel the same path every hour and forty five minutes on the hour beginning and ending at the Transfer Point⁹⁶. The bus leaves the transfer point in Liberty starting at 9:00 AM, and reaches Ames and Dayton at 9:27 AM and 9:50 AM respectively, and the last departure from Liberty is at 2:15 PM⁹⁶. The buses are designed for the disabled and are wheelchair accessible. The one-way fares are \$1.50 with 50% discounts for certain populations (children, senior citizens, the disabled). Multi-ride, seasonal, and student passes are also available for reduced rates.

⁹⁴ Texas Department of Transportation. (n.d.). Current TxDOT Projects: Liberty County. Retrieved May 4, 2015 from http://www.txdot.gov/apps-cq/project_tracker/projects.htm?view=cnty&dist=Beaumont&cnty=Liberty

⁹⁵ HGAC. (2009). Liberty County: Transit Plan. Houston: Houston-Galveston Area Council.

⁹⁶ BTD. (2012, September). Schedule of Circulation. Retrieved from Brazos Transit District: <http://www.btd.org/LibertyDayton.htm>

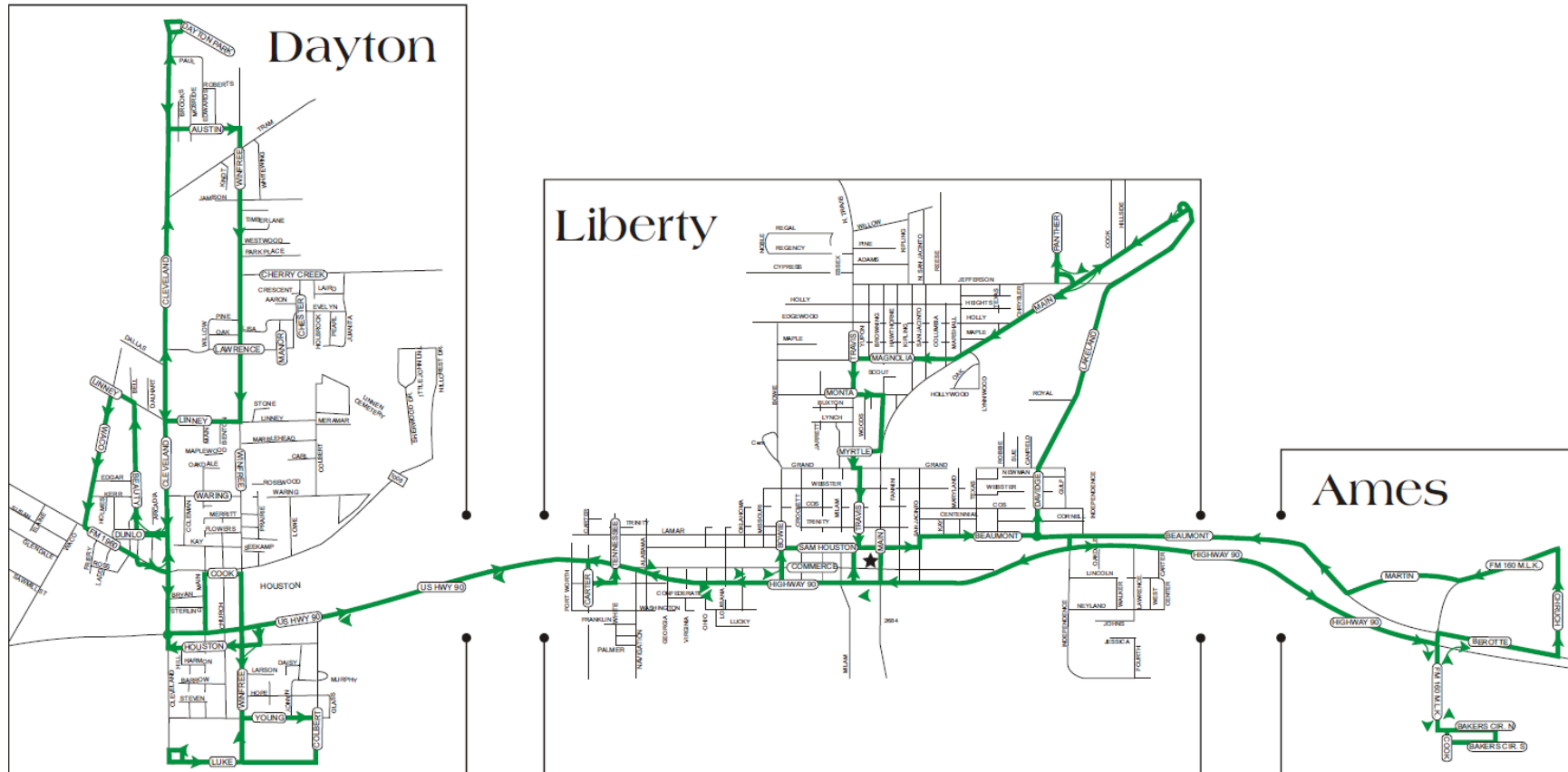


Figure 9.3.3: Liberty / Dayton Ground Transportation by Brazos Transit District (BTD, 2012)

9.3.4 Transportation Modes for Health Services

9.3.4.1 Medical Transportation Program

The Medical Transportation Program is part of the Texas Health and Human Services Commission, and is based on non-emergency Medicaid⁹⁷. It is used by county residents to get to their doctor's office, drugstore, or any medical services location. Requesting a ride should take place at least 2 working days prior to the appointment if within the town, or at least 5 working days prior if outside the town. The program provides 3,132 urban trips and 5,568 rural trips annually⁹⁸.

9.3.4.2 Indigent Health Care Program

The Liberty County Indigent Health Program is a demand-responsive paratransit service provided by the County to its residents. It comprises health care services, Children's Health Insurance Program, and transportation to medical appointments for eligible residents. The eligible criteria for the program includes residency in Liberty County, income and family size requirements, supporting documentation, and ineligibility for state or federal programs⁹⁹. The program's annual trips are a total of 78 urban trips and 139 rural trips⁹⁸.

9.3.5 Park and Ride Service

Park and Ride facilities are intended to reduce urban traffic congestion by offering the opportunity for commuters to leave their cars in parking lots on the outskirts of a city and travel to the city center on public transportation. Liberty County residents can park at a parking area near Dayton or Liberty cities, and travel non-stop or one stop into Harris County to the Houston central business district. The one-way route length is approximately 47 miles (refer to figure 9.3.5). The proposed service span and frequency is 3 roundtrips for AM peak, 1 roundtrip for mid-day and 3 roundtrips for PM peak¹⁰⁰. This service is not yet implemented in Liberty County.

⁹⁷ MTP. (2014, August 14). Medical Transportation Program. Retrieved from Texas Department of State Health Services: <https://www.dshs.state.tx.us/cshcn/mtp.shtm>

⁹⁸ LCTP. (2009). Liberty County Transit Plan, Final Report. Houston Galveston Area Council

⁹⁹ Burt, D. (n.d.). Indigent Health Care Program. Retrieved from Liberty County Website: <http://www.co.liberty.tx.us/>

¹⁰⁰ HGAC. (2009). Liberty County: Transit Plan. Houston: Houston-Galveston Area Council

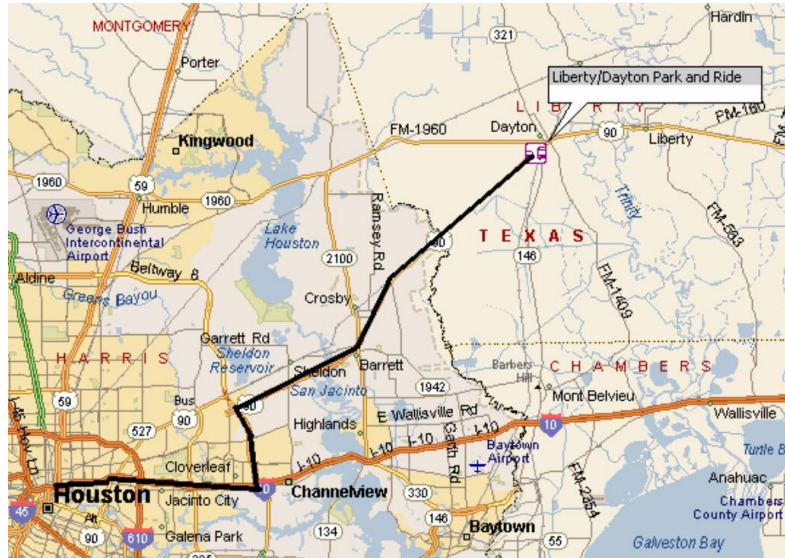


Figure 9.3.5: The proposed Park-and-Ride Service by H-GAC¹⁰¹

9.4 GRAND PARKWAY

9.4.1 Grand Parkway Association

The Grand Parkway Association is a non-profit State Transportation Corporation authorized by the Texas Department of Transportation minute order number 82325 on October 25, 1984. The association was established to facilitate the efficient development of Houston's third outer highway loop to serve the regional mobility needs of the metropolitan Houston area. The association operates on funds received from various sources including TxDOT, METRO, Harris County, Fort Bend County, Chambers County, Galveston County, and Brazoria County. The association is governed by a seven member board of directors appointed by the Texas Transportation Commission and is required to make semi-annual reports to TxDOT detailing the status and financial information of the various project segments.

9.4.2 Third Loop around Houston Metropolitan Area

The third loop of the Grand Parkway is a proposed 37-mile, four-lane controlled access toll road, with a 400-foot right-of-way width (refer to figure 9.4.2.2). It will run from US 59 in the north, pass through the eastern portion of Liberty County and then connect to IH-10 in Chambers

¹⁰¹ Hackett, K. (2008). Liberty County: Transit Plan (LCTP). H-GAC

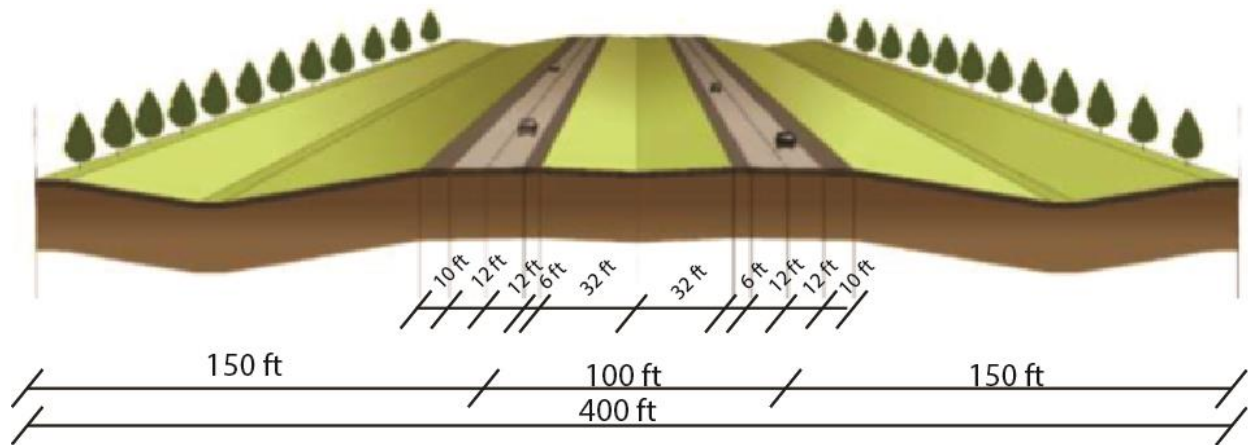


Figure 9.4.2.2: Highway Section for Grand Parkway Road, Segments H and I-1, US 59 (N) to IH 10 (E)
106

9.5 TxDOT

Liberty County is part of the Beaumont TxDOT district. There are currently 13 funded and active projects with the County, most being roadway maintenance and updates¹⁰⁷ (refer to figure 9.5). There is one major project active along US Highway 90, where the roadway is being widened in a five mile stretch from SH 61 east towards Beaumont. The project is expected to cost about 21 million dollars and is presently approximately 30% complete. Other projects include road resurfacing and repairs, a bridge replacement, and safety treating of fixed objects.

¹⁰⁶ Segments H & I-1. (n.d.). Retrieved from Grand Parkway: <http://www.grandpky.com/segments/h/>

¹⁰⁷ Retrieved from http://www.txdot.gov/apps-cq/project_tracker/projects.htm?view=cnty&dist=Beaumont&cnty=Liberty

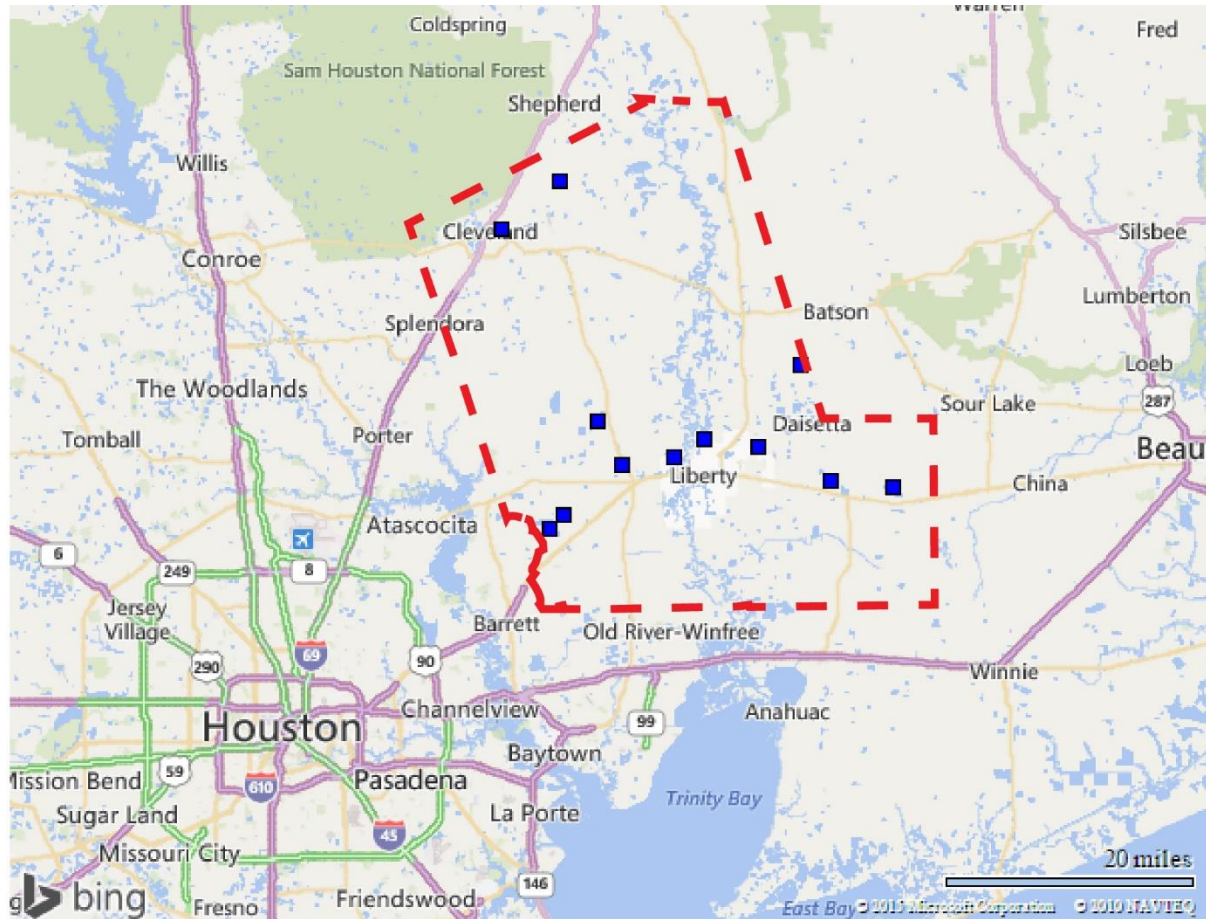


Figure 9.5: Location of projects by TxDOT in Liberty County¹⁰⁸

9.6 URBAN DEVELOPMENT

Between the Houston Metro Area and Beaumont-Port Arthur Metro Area, the main human activities occur along the US and State highways. As a relatively dense town in Liberty County, Cleveland plays a role in connecting the Houston Metro Area with other northern cities. Dayton and Liberty are actively developed areas along one of the highways connecting Houston and Beaumont (refer to figures 9.6.1 and 9.6.2). Overall, transportation vitally contributes to the urban development of Liberty County, as is discussed in further detail in the Transportation section.

¹⁰⁸ Retrieved from http://www.txdot.gov/apps-cq/project_tracker/maps/default.htm?View=cnty&FN=Liberty

Regional Developed Land

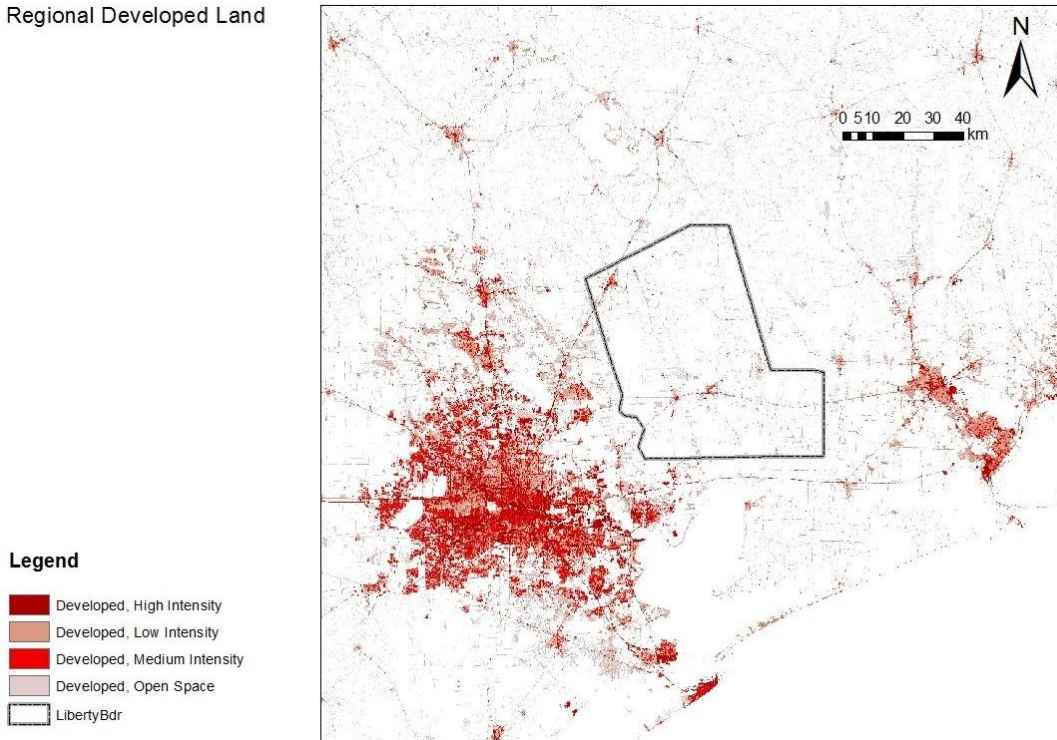


Figure 9.6.1: Liberty County versus Regional (Houston Metropolitan Area) Developed Land

Urban Development Map

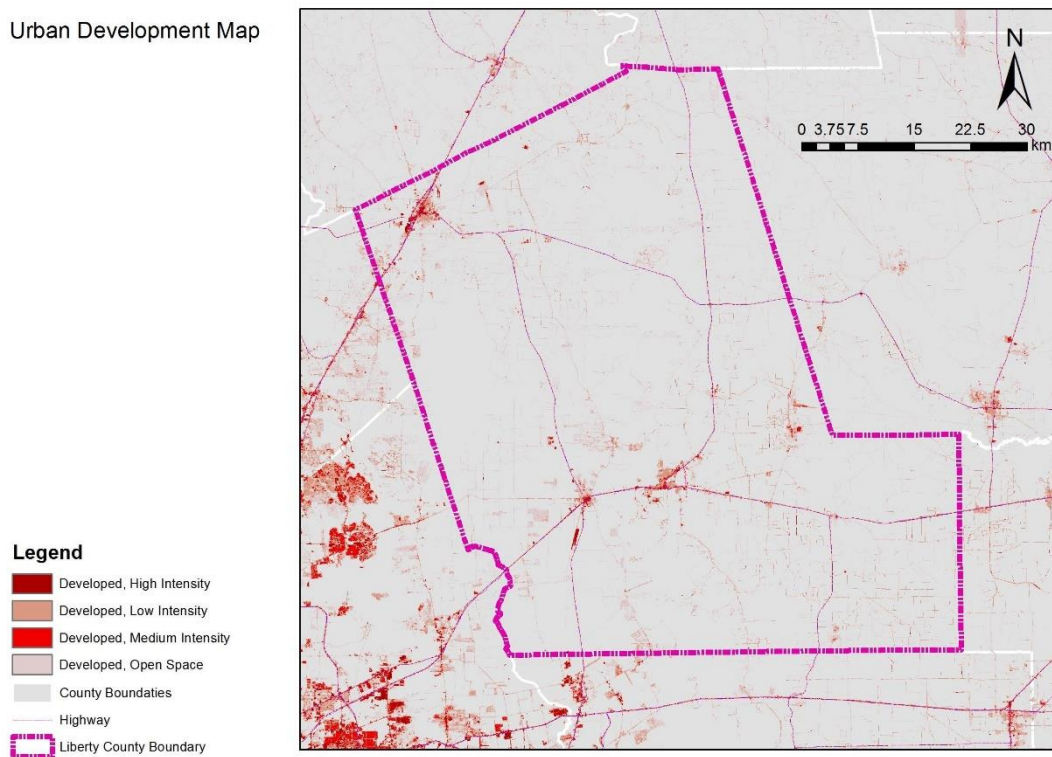


Figure 9.6.2: Liberty County, Urban Development Map showing High, Medium and Low Intensity

10 COMMUNITY FACILITIES

10.1 SCHOOLS

Liberty County’s territory is divided into seven independent school districts. Figure 10.1 displays the seven school districts within Liberty County. Table 10.1.1 illustrates the presence of the several school levels within in each district. And table 10.1.2 describes the school districts in terms of rating, number of schools, number of students, number of teachers, and student-teacher ratio.

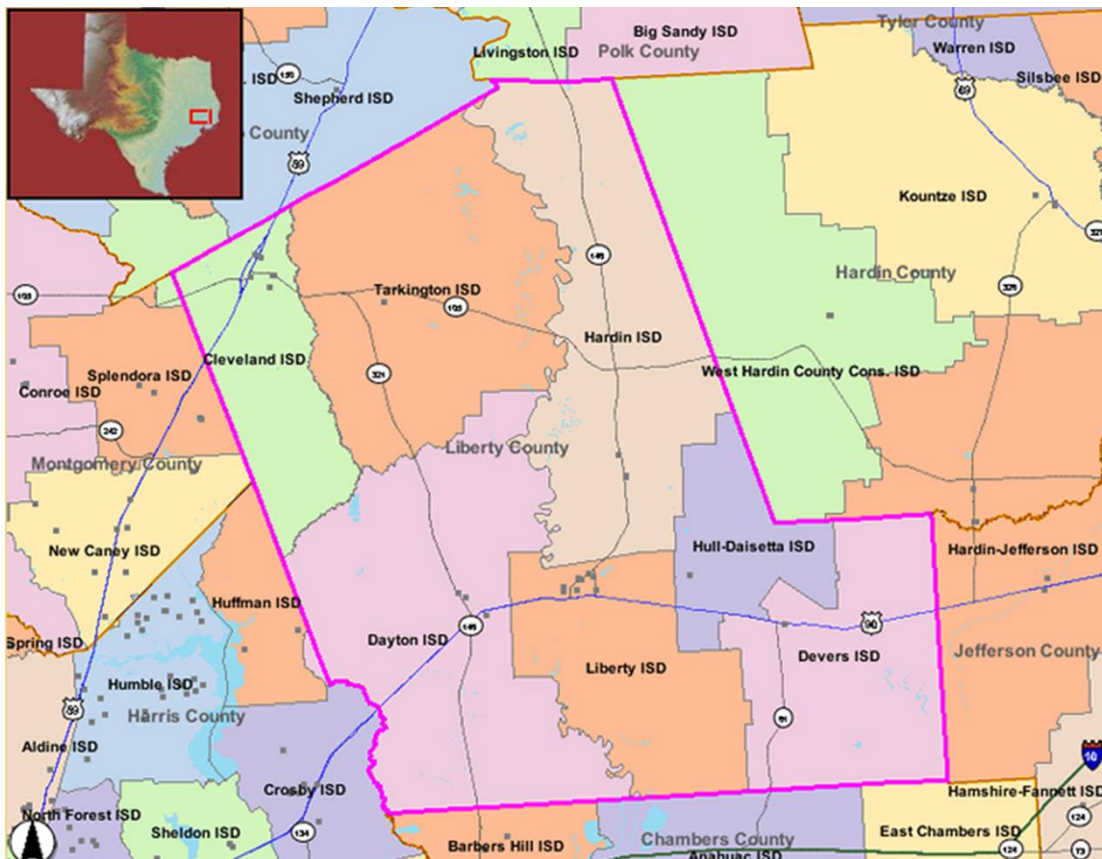


Figure 10.1: School Districts in Liberty County, Texas ¹⁰⁹

¹⁰⁹ Retrieved from
<http://static1.squarespace.com/static/52290ff2e4b0af57b790aaef/t/523b32d5e4b0efa44f09af37/1379611349963/Liberty-school-dist.png>

Table 10.1.1: Schools per Independent School Districts in Liberty County, Texas¹¹⁰

	Cleveland ISD	Dayton ISD	Devers ISD	Hardin ISD	Hull-Daisetta ISD	Liberty ISD	Tarkington ISD
Elementary School	3 Eastside Elementary School Northside Elementary School Southside Primary School	3 Austin Elementary School Colbert Elementary School Richter Elementary School	1 Devers Elementary Primary School	1 Hardin Elementary School	1 Hull-Daisetta Elementary Primary School	2 Liberty Elementary Primary School San Jacinto Elementary Primary School	1 Tarkington Primary School
Intermediate School	1 Hardin/Chambers Center	1 Hardin/Chambers Center		2 Hardin Intermediate School Hardin/Chambers Center	1 Hardin/Chambers Center	1 Hardin/Chambers Center	1 Tarkington Intermediate School
Middle School	1 Cleveland Middle School	2 Kimmie M Brown El Middle School Nottingham Middle School				1 Liberty Middle School	1 Tarkington Middle School
Junior High School		1 Wilson Junior High School	1 Devers Junior High School	1 Hardin Junior High School	1 Hull-Daisetta Junior High School		
High School	2 Cleveland High School Frederick A Douglass Learning Academy	2 Dayton High School Dayton Night School Academy		1 Hardin High School	1 Hull-Daisetta High School	1 Liberty High School	1 Tarkington High School

¹¹⁰ Cleveland Independent School District, Dayton Independent School District, Devers Independent School District, Hardin Independent School District, Hull-Daisetta Independent School District, Liberty Independent School District, and Tarkington Independent School District. Retrieved from <http://www.usa.com/liberty-county-tx-school-district.htm>

Table 10.1.2: Description of Independent School Districts in Liberty County, Tx¹¹¹

	Cleveland ISD	Dayton ISD	Devers ISD	Hardin ISD	Hull-Daisetta ISD	Liberty ISD	Tarkington ISD
Accountability Rating	Academically Acceptable	Academically Unacceptable	Exemplary	Academically Acceptable	Academically Acceptable	Academically Acceptable	Academically Acceptable
Rank #	215	809	910	434	653	315	775
Number of Schools per District	7	9	3 (including 1 temporarily closed)	5	4	5	4
Number of Students per District	3,663	5,082	180	1,282	521	2,122	1,852
Number of Teachers per District	220	313	13	88	42	151	133
Student - Teacher Ratio	16.66	16.21	13.78	14.59	12.53	14.03	13.89

¹¹¹ Accountability Ranking as provided by Texas Education Agency in 2009 (<http://ritter.tea.state.tx.us/cgi/sas/broker>)

Number of Students, number of teachers and Student-Teacher Ratio are for 2011-2012. Retrieved from <http://www.usa.com/liberty-county-tx-school-district.htm>

10.2 HOSPITALS

The health care facilities in Liberty County are mainly distributed in Cleveland, Dayton, and Liberty. Below is an overview of the important hospitals in the County¹¹² (Table 10.2).

Table 10.2: Health Care Facilities Description in Liberty County

	Hospital Type	Number of Doctors	Number of Beds	Number of People Served
Liberty-Dayton Community Hospital	General medical & surgical	6	17	8,329 (Emergency Room) and 370 (Admissions)
Cleveland Regional Medical Center (currently closed)	General medical & surgical	49	98	17,843 (Emergency Room) and 2,108 (Admissions)
Doctors Diagnostic Hospital	General medical & surgical	1	4	N/A
Liberty Health Care Center	Nursing Home & rehabilitative programs	N/A	118	N/A
Quality Care Plus, Liberty, Tx ¹¹³	Urgent Care Center	1	N/A	N/A
Mann Eye Institute and Laser Center, Cleveland, Tx	General Eye Care Service	1	N/A	N/A

10.2.1 Liberty-Dayton Community Hospital

Liberty-Dayton Community Hospital was founded in 2002 and was the only hospital which served the southern part of Liberty County. It provided health care services and special services for critically ill and injured patients in case of emergency. The debt-ridden hospital was closed on September 18, 2009¹¹⁴.

¹¹² Retrieved from <http://health.usnews.com/best-hospitals/area/tx/liberty-dayton-regional-medical-center-6742280>

¹¹³ <http://www.healthgrades.com/provider/sandra-rasbeary-4b7w7/patient-ratings#TopOfMain>

¹¹⁴ Horswell, C. (2009, September 26). Debt forces S. Liberty County's only hospital to close. Chron

On August 3, 2010, Liberty-Dayton Community Hospital was purchased by the Liberty County Hospital District #1 in two phases. The first transaction purchased the hospital land and building for \$350,000 in a foreclosure sale, and the second transaction purchased the medical licenses, Medicare number and critical access designation for \$235,000¹¹⁵. The hospital property and building are now formally owned by the Liberty County Hospital District #1¹¹⁵.

10.2.2 Cleveland Regional Medical Center

Cleveland Regional Medical Center is a for-profit hospital located on the far northern edge of Liberty County. On August 29, 2014, the hospital was closed for repairs¹¹⁶. The hospital was found to have had unsanitary kitchen, which led to decertification and the loss of Medicare eligibility and funding¹¹⁷. The closure of the hospital affected not only the patients, but also the employees.

10.2.3 Doctors Diagnostic Hospital

Doctors Diagnostic Hospital is an acute care for-profit hospital located in Cleveland. The hospital provides a range of inpatient and outpatient procedures and services¹¹⁸.

10.2.4 Health Centers

Health centers operate in Health Professional Shortage Areas (HPSA) and provide primary and dental care. HPSA's are designated by US Department of Health and Human Services. The health centers in Liberty County include two free clinics, which are the Health Center of Southeast Texas in Cleveland and that in Liberty City. These two clinics provide various services, which comprise routine health maintenance for adults and adolescents, pediatric care, women's health, etc.¹¹⁹

¹¹⁵ Franco, M. (2010, November 20). Hospital district buys Liberty-Dayton Regional Medical Center. Cleveland Advocate.

¹¹⁶ Caserta, G. (2014, August 29). Cleveland Regional Medical Center closes until further notice. Retrieved from <http://www.click2houston.com/news/cleveland-regional-medical-center-closed-until-further-notice/27791330>

¹¹⁷ Jacobson, G. (2014, November 15). Few Texas hospitals lose funding after 'immediate jeopardy'. The Dallas Morning News

¹¹⁸ Hospital, D. D. (n.d.). Doctors Diagnostic Hospital - Cleveland, TX. Retrieved from Hospital Data: <http://www.hospital-data.com/>

¹¹⁹ Retrieved from http://www.freemedicalsearch.org/det/tx_77575_health-center-of-southeast-tx-liberty

10.3 GOVERNMENTAL INFRASTRUCTURE

Within Liberty County, there are four types of correctional facilities. The Cleveland Correctional Center is a privately owned prison for men operated by the GEO Group, Inc. However, the Texas Department of Criminal Justice operates one women's prison (L.V. Hightower Unit) and two women's state jails (Dempsie Henley State Jail and Lucile Plane State Jail).

10.4 FIRE SERVICES

Although the fire risk is low in Liberty County, the County provides fire services to its residents. Both Cleveland and Liberty Cities have their own fire departments which cover the territory outside their city limits. The Fire Departments are responsible for protecting the lives and property in their covered areas, as well as fire inspections, maintenance of station and equipment, training, and public fire education. The staff is a combination of both paid employees and unpaid volunteers. However, fire service in unincorporated areas relies solely on volunteers. Tables 10.4.1 and 10.4.2 describes in details the fire services provided in Liberty County.

The Fire Departments and fire service areas serving Liberty County are shown in Figure 10.4. This figure shows green, red, and blue zones. The green roads and zones means that they have closer access to the fire department, while the red roads means that they are located far from the fire service area and therefore it is much harder to be reached by the fire department. The blue circles show the 5-mile range which is accessible by the emergency service. This range is about 8 minutes' driving with an average speed of 58 mph through highways and community roads.

Service Area
Fire Department

Legend

- Fire Department
- Distance to Nearest FD**
- Far
- Close
- 5-mile Range
- Highway
- County Boundaries
- Liberty County Boundary

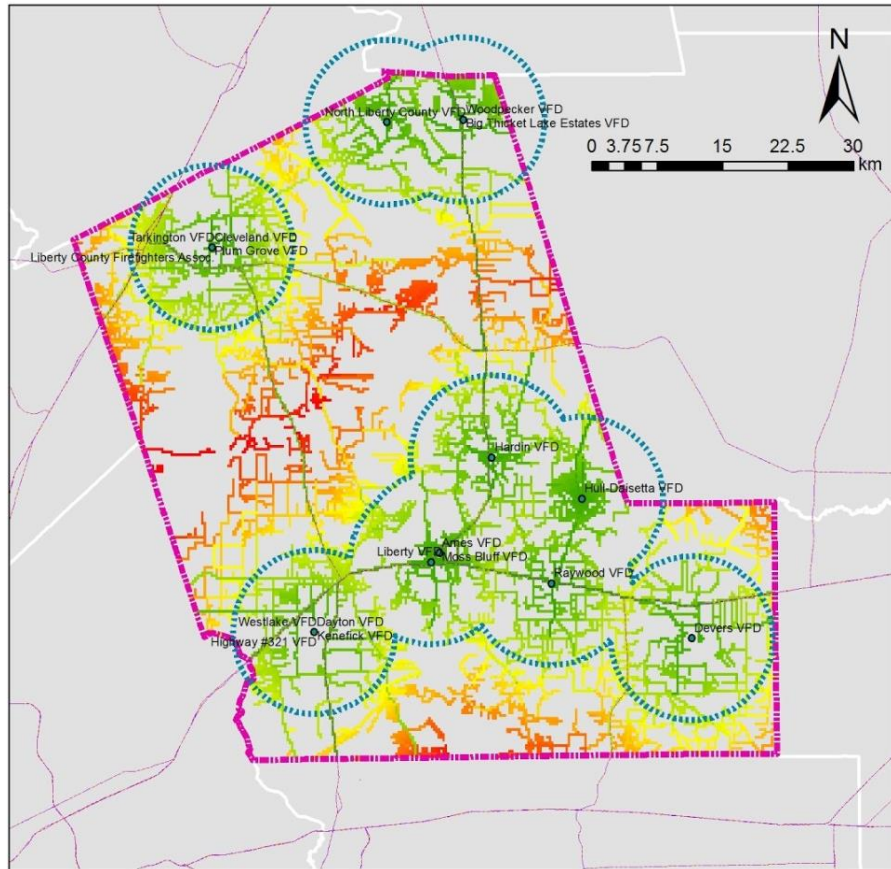


Figure 10.4: Liberty County, Fire Departments and Fire Service Areas (Courtesy TAMU, 2015)

Table 10.4.1: Fire services and firefighters per population 2009/2010 for both Houston and Liberty County¹²⁰

Agency	FF per 1,000 Residents	Trucks per 10,000 Residents	Stations per 50,000 Residents	Engines per 10,000 Residents
Houston ¹²¹	1.73	0.16	2.04	0.39
Liberty County	3.62	N/A	12.56	N/A

¹²⁰ US Census 2009 data and Individual Fire Department. Retrieved from <http://www.firedepartment.net/directory/texas/liberty-county>

¹²¹ Retrieved from <http://www.foia.org/researchfiles/file00000009.pd>

Table 10.4.2: Number of fire stations and firefighters for cities in Liberty County ¹²²

	Number of Fire Stations	Number of Full-time Firefighters	Number of Part-time Firefighters	Volunteer Firefighters
City of Liberty				
Liberty Fire Department	1	17	0	30
Moss Bluff VFD	2	0	0	10
City of Cleveland				
Cleveland Fire Department	2	1	0	24
Tarkington VFD	1	0	0	25
Plum Grove VFD	1			
City of Daisetta				
Hull Daisetta VFD	1	0	0	25
City of Dayton				
Dayton VFD	2	0	0	34
Highway 321 VFD	1	0	0	20
Kenefick Volunteer Department	1	0	0	33
City of Hardin				
Hardin VFD	1	0	0	20
City of Romayor				
North Liberty VFD	1	8	0	15
City of Rye				
Woodpecker VFD	1	0	0	12
Big Thicket Lake Estates CDP				
Big Thicket Lake Estates Fire Department	1			
City of Ames				
Ames VFD	1			
City of Devers				
Devers VFD	1			
Total	19	26	0	248

10.5 PARKS AND WILDLIFE REFUGE

Liberty County has several pertinent structures and parks, including the Trinity River Nation Wildlife Refuge in Northern Liberty County and the Big Thicket National Preserve. Table 10.5.2 lists the parks in Liberty County in terms of acreage, classification and ownership. The refuge

¹²² US Census 2009 data and Individual Fire Department. Retrieved from <http://www.firedepartment.net/directory/texas/liberty-county>

protects part of the bottomland hardwood forest ecosystem along the Trinity River while serving as a habitat to a myriad of waterfowl species, plants and other vertebrae. The Big Thicket National Preserve, in the northern part of the county, provided recreation with its several lakes. The Park Acreage per 1,000 people in Liberty County is extremely low with respect to that in the City of Houston (refer to Table 10.5.1).

Table 10.5.1: Park Acreage per 1,000 people in both Liberty County and Houston

	Liberty County	Houston
Park Acreage per 1,000 people without the large national/state parks	7.62	N/A
Park Acreage per 1,000 people with the large national/state parks	441.25	49,497 ¹²³

Table 10.5.2: Parks Details in Liberty County¹²⁴

Park Name	Acres	Classification	Owner
Cedar Grove R V	6.8	RV Park	Unknown
Liberty Stadium, Liberty City	2.05	Sports Venue & Stadium	Unknown
Fairlawn Memorial Park, Liberty City	45.96	Memorial Park	Unknown
Liberty Municipal park, Liberty City	78.88	Park	City/Municipal
Splendor motor cross park	168.00	MX Park	Private
Stancel Park	7.22	Unknown	Unknown
Campbell Park	2.51	City Park & Pool	City/Municipal
Travis Park	23.06	Park	City/Municipal
Daniels Park	32.96	City Park	City/Municipal
Henderson Day Memorial	7.79	Family Park	City/Municipal
John William Parker & Veronica Blake Parker	5.67	Children's Park	City/Municipal

¹²³ Retrieved from https://www.tpl.org/sites/default/files/files_upload/2014_CityParkFacts.pdf

¹²⁴ Texas Parks and Wildlife. Retrieved from <http://tpwd.texas.gov/gis/apps/lwrcrp/>

Sawmill Road Park	8.41	Soccer Park	City/Municipal
Marysee Prairie Preserve	9.27	Preserve	Texas Land Conservancy
Cleveland Park 1	5.28	Unknown	Unknown
Cleveland City Park	3.27	Family Park	City/Municipal
Other Private Parks	169.36	Private	Private Ownership
Davis Hill State Park	1,809.03	State Park	Texas Parks and Wildlife
Big Thicket National Preserve	6,153.95	National Preserve	USDO National Park Service (Federal)
Trinity River National Wildlife Refuge	24,677.94	National Wildlife Refuge	USDO Fish and Wildlife Service (Federal)
Total Acres without the large national/state parks	576.49 acres		
Total Acres with the large national/state parks	33,377.50 acres		

10.6 EVACUATION ROUTES

The key for hazards is to adapt and mitigate, instead of targeting recovery after the disaster. Liberty County provides hurricane evacuation routes for its residents as part of the adaptation process (see figures 10.6.1 and 10.6.2). The problem is that some of these routes are located within the floodplain, which means that they might not be accessible in case of a flood event. Furthermore, the County currently fails to provide access to critical facilities such as hospitals and medical centers during hazards. Although Liberty County was the only affected county that managed to sustain economic growth during the four quarters following Hurricane Ike, it should be proactive in case of hazards and invest more in critical facilities, especially for social vulnerable areas.

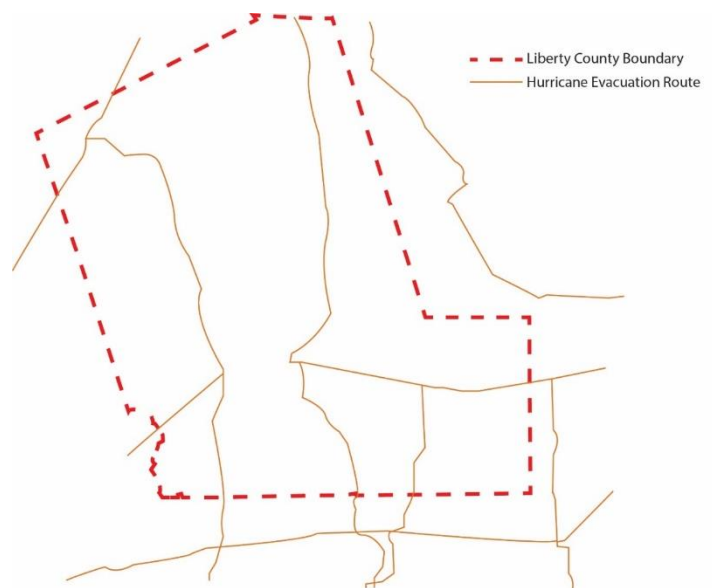
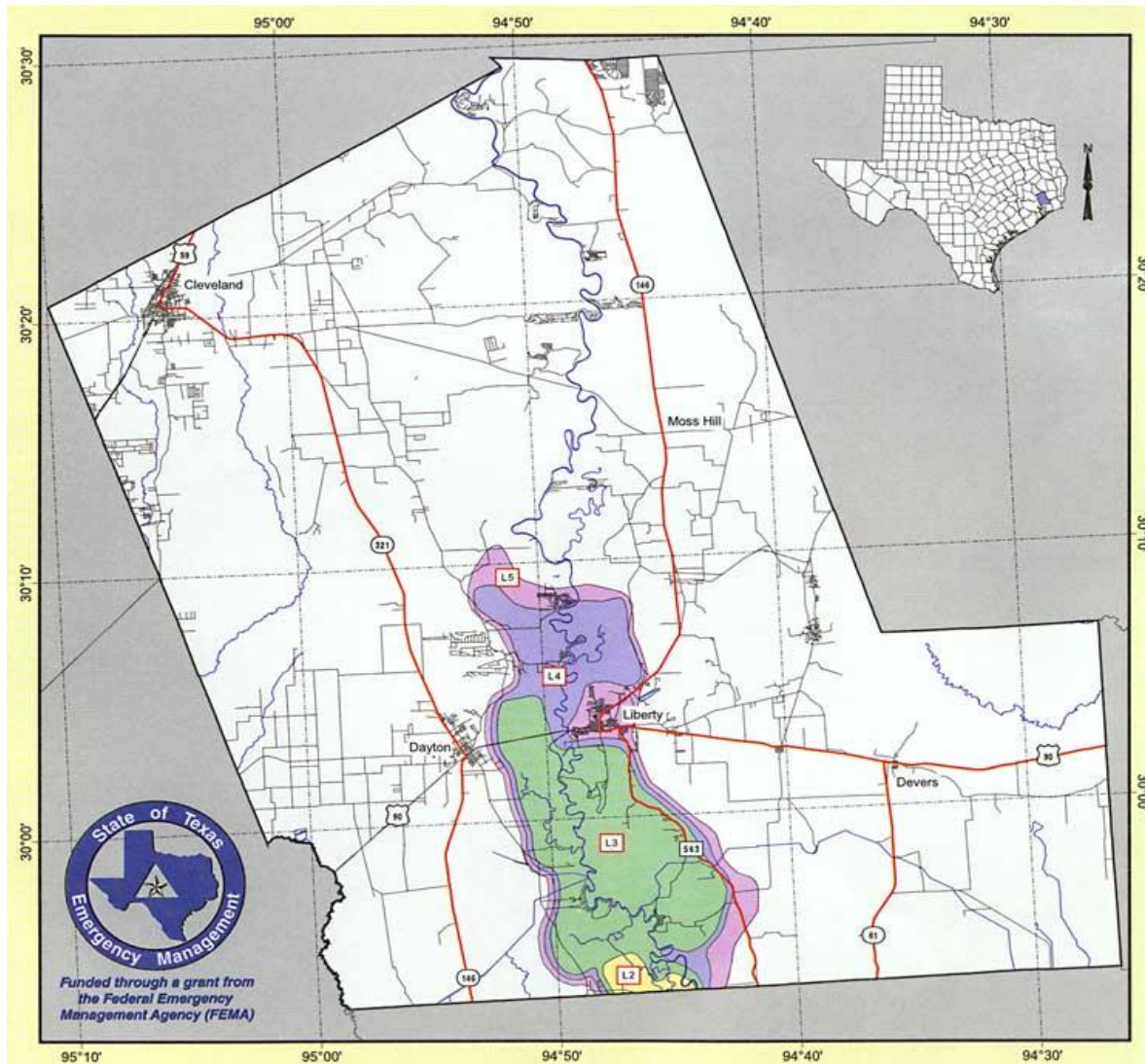


Figure 10.6.1: Hurricane Evacuation Routes in Liberty County



Estimated Evacuation Time in Hours by Risk Area

Risk Area	Category				
	1	2	3	4	5
L2		2	3	4	6
L3			3	4	6
L4				4	6
L5					6

Figure 10.6.2: Risk Areas Map on Liberty County¹²⁵

¹²⁵ Retrieved from http://www.co.liberty.tx.us/default.aspx?Liberty_County/Emergency

10.7 PROJECT 2020: HEALTHY COMMUNITY INITIATIVE

In 2009, Project 2020 was initiated in Liberty County by the Family & Consumer Sciences (FCS) Advisory Board¹²⁶. The main goal of this project is to strengthen the community in Liberty County by promoting education, health, workforce preparation and family services by year 2020. The project is based on a survey which identifies the current resources in the County and classifies the current needs of the communities. The below figure shows the results of the survey regarding the classification of the community needs. The major areas of need are public health services, local health care access, and activities for school-aged children.

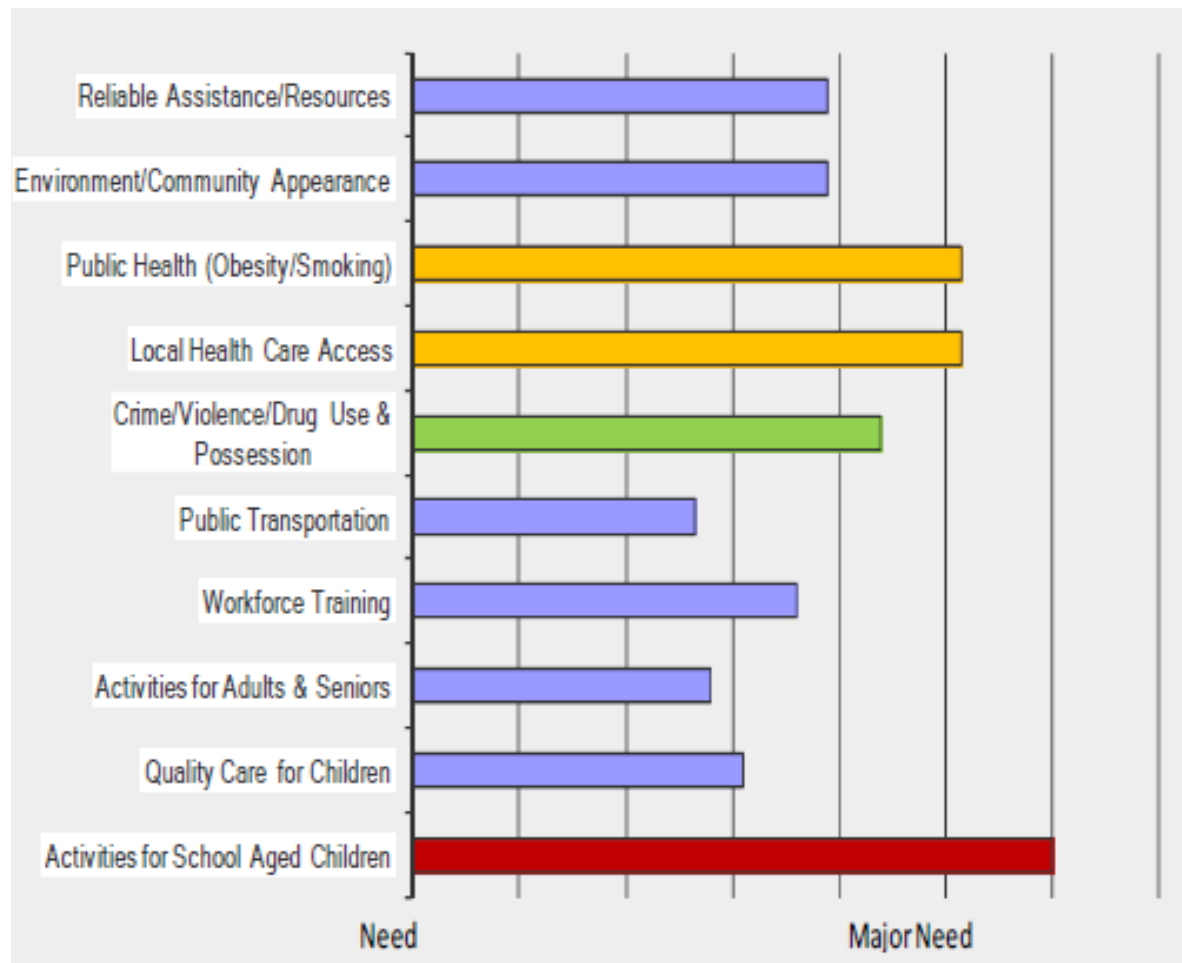


Figure 10.7: Liberty County Community Needs¹²⁶

¹²⁶ Texas A&M Agrilife Extension. (2009). Liberty County Resource Manual: making a Difference. Texas A&M University, U.S Department of Agriculture and Liberty County Commissioners

11 ZONING

There is no zoning map available for Liberty County. However, the main cities in the County which are Cleveland City, Liberty City and Dayton City have adopted zoning ordinances.

11.1 CLEVELAND CITY

11.1.1 Zoning Districts

The City of Cleveland is the only city in the County having a zoning map. Figure 11.1.1 shows Cleveland City's Zoning Map. The City has adopted a zoning plan to regulate its land use development. It includes 6 zoning districts with regulated heights, lot sizes, frontages, and setbacks (refer to table 11.1.1). A unique selling point of Cleveland is its nearby forests, such as Sam Houston National Forest to the north. They can serve as a tourist attraction for Houston area residents who enjoy camping, hiking, hunting, and fishing (USDA).

Table 11.1.1: Height and Area Regulations in City of Cleveland, Tx ¹²⁷

District	Height shall not exceed:	Lot size		Location on lot shall be not less than:
		shall not have less than:	and shall not be less than:	
R1	35ft.	7,500 sq. ft.	75 ft. wide at building line	25 ft. from front lot line 10 ft. from a side lot line 10 ft. from rear lot line
For townhouses or patio home specifications, refer to sec. 126-105 of the zoning ordinance				
R2	35 ft.	7,500 sq. ft. 2,500 sq. ft. (ea. dwelling unit over two)	75 ft. wide at building line	25 ft. from front lot line 10 ft. from side lot line 10 ft. from rear lot line
HD	35 ft.	7,500 sq. ft. 1,100 sq. ft. (ea. dwelling unit over 3)		25 ft. from front lot line 10 ft. from side lot line 25 ft. from rear lot line
GC		7,500 sq. ft.	50 ft. wide at building line	25 ft. from front lot line 5 ft. from side lot line 25 from rear lot line
CBD	N/A	N/A	N/A	N/A
GI	35 ft.	7,500 sq. ft.	50 ft. wide at building line	25 ft. from front lot line 10 ft. from side lot line 25 ft. from rear lot line

¹²⁷ Cleveland. (n.d.). Zoning. Retrieved from Cleveland Texas: www.clevelandtexas.com/business/Planning%20&%20Development/Zoning/default

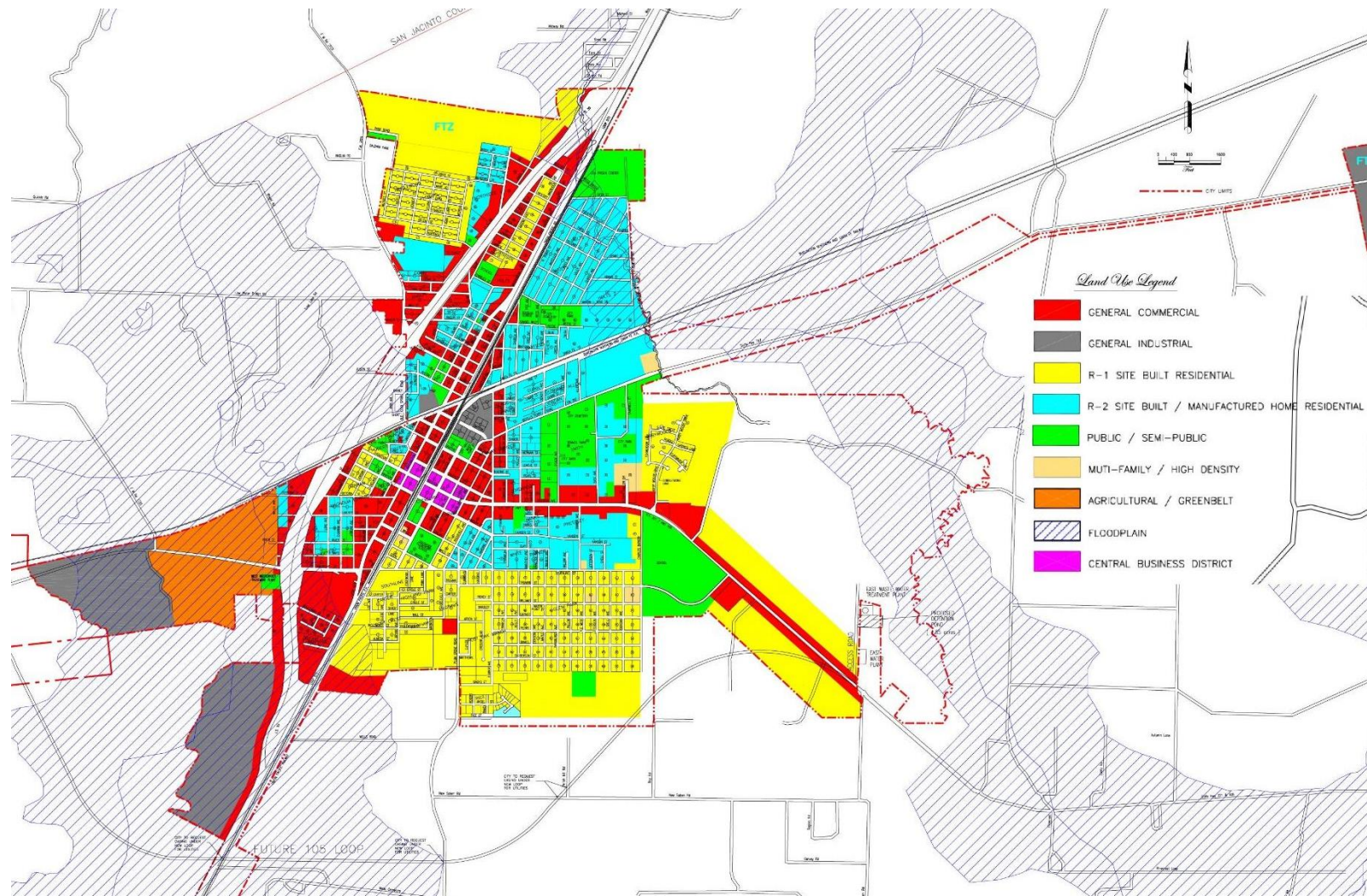


Figure 11.1.1: Cleveland Zoning Map 128

¹²⁸ Retrieved from <http://www.clevelandtexas.com/DocumentCenter/Home/View/60>

11.1.2 Mixed Use

The city is developing in a mixed-use pattern with its commercial lands clustered and growing along the railway, where the economic development of the city is centered. The zoning preserves the original industrial land situated near the Central Business Area. In terms of mixed land uses, the zoning tries to mix some commercial with the industrial land, since locating at the intersection of two railways means low accessibility for both vehicles and pedestrians.

Compensating for the fact that the railways divide the town into discrete sections, the zoning plan also attempts to bring mixed land uses into the northern part, which is relatively far from the current and planned downtown. The commercial land is densely planned along the US 59, which runs parallel to the north-south railway. In addition to providing convenient access to commercial enterprises for local residents, development along US 59 could bolster economic injections into the town by encouraging passing motorists to break their trip there.

11.1.3 Downtown

Surrounding the Central Business District, schools and other semi-public use land, single-family and multifamily housing are closely clustered within crowded commercially zoned parcels. This core area is planned to have a compact street network, which will be a walkable district and may increase demand for economic development.

11.1.4 Floodplain

According to the Cleveland Zoning Map 2010, there will be about 10 acres of affordable single-family residential land and 30 acres of industrial land located within the 100-year floodplain.

11.1.5 Residential

Other than the railway, the mixed-use plan focuses on several roads that spatially divide the different types of residential land uses. SH 105, as it crosses the railway and US 321 encourage residential development to sprawl into the southeast. The newly planned single-family residential area is in the south of the town and is surrounded by the sprawling commercial entities and other public lands along the railway and SH 105. This could indicate the tendency of the town boundary to spatially extend in this direction.

11.1.6 Affordable Housing

The zoning plan promotes a large area of affordable single-family housing along the railway and within the floodplain. Mixed with commercial and other public lands, convenient living conditions can boost the livability of the city.

11.2 LIBERTY CITY

The City of Liberty has a Planning and Zoning Commission which acts as an advisory board to the City Council. They are involved in issues related to public and civic improvements following City of Liberty's Code of Ordinances¹²⁹, and city planning including public utilities, traffic, etc. The land use restrictions mentioned in the zoning ordinance target the continued safety of air traffic only and omits use restrictions.

In addition, Liberty has a Municipal Airport Hazard Zoning map for properties located in the vicinity of Liberty Municipal Airport. The zoning map is prepared by the TxDOT Aviation Division and dated August 03, 2009 .There are four zoning districts adopted in the proximity of Liberty Municipal Airport. The districts are Approach Zones, Conical Zones, Horizontal Zones, and Transitional Zones.

11.3 DAYTON CITY

The City of Dayton has Development Services staff, who are responsible for enforcing the development regulation, ordinances, and building codes. The City provides guidance for commercial projects via the "City's Development Guide", and provide guidance for residential construction via the "Residential Permit Procedure"¹³⁰. The City does not have specific zoning including zoning maps in their ordinance, which is primarily in written form without any detailed graphical illustrations.

¹²⁹ Refer to Liberty's Code of Ordinances via
<http://z2codes.franklinlegal.net/franklin/Z2Browser2.html?showset=libertyset>

¹³⁰ City of Dayton Official Website. Retrieved from
http://www.cityofdaytontx.com/index.asp?Type=B_LIST&SEC=%7BFC3D1CE2-A385-4C8E-985D-2BA1F2EAF391%7D

12 APPENDICES

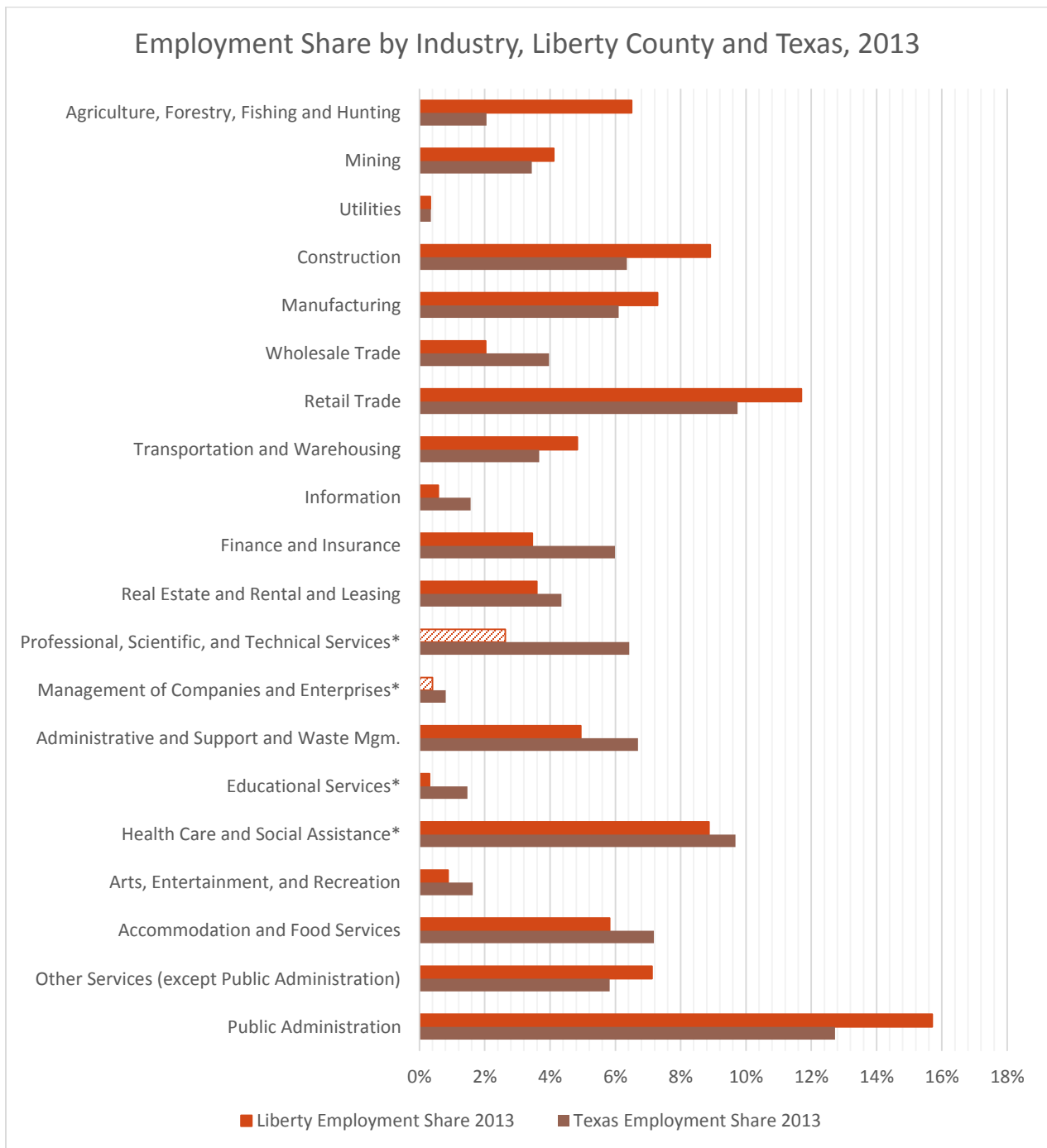
Table 12.1: Employment Figures¹³¹

NAICS Code	NAICS Title	Liberty Employment 2003	Liberty Employment 2013	Texas Employment 2003	Texas Employment 2013	US Employment 2003	US Employment 2013
11	Agriculture, Forestry, Fishing and Hunting	2,060	1,855	314,557	318,091	3,613,300	3,531,800
21	Mining	479	1,174	236,364	533,674	800,200	1,607,000
22	Utilities	61	96	50,375	53,908	583,200	577,600
23	Construction	2,510	2,545	853,416	984,874	9,920,300	9,267,400
31-33	Manufacturing	2,038	2,082	943,435	945,402	14,982,000	12,747,100
42	Wholesale Trade	535	579	498,667	614,839	6,066,500	6,343,500
44-45	Retail Trade	3,433	3,340	1,359,261	1,510,502	18,234,100	18,371,300
48-49	Transportation and Warehousing	1,136	1,382	441,651	568,715	5,316,500	5,998,600
51	Information	143	164	268,209	243,537	3,590,400	3,254,300
52	Finance and Insurance	834	988	602,360	927,766	7,948,500	9,783,900
53	Real Estate and Rental and Leasing	857	1,026	455,955	674,170	6,011,500	7,985,300
54	Professional, Scientific, and Technical Services*	658	750	730,306	996,696	10,266,300	12,453,000
55	Management of Companies and Enterprises*	100	114	52,790	124,955	1,773,500	2,265,400
56	Administrative and Support and Waste Mgmt.	1,195	1,412	762,575	1,037,739	9,757,400	11,325,100
61	Educational Services*	100	89	165,718	227,860	3,287,800	4,221,300
62	Health Care and Social Assistance*	2,300	2,532	1,084,630	1,500,081	16,187,100	20,585,600
71	Arts, Entertainment, and Recreation	239	250	185,481	252,510	3,289,800	4,114,500
72	Accommodation and Food Services	1,329	1,663	831,941	1,112,754	11,157,700	13,093,400
81	Other Services (except Public Administration)	1,903	2,035	745,897	903,323	9,550,400	10,617,100
92	Public Administration	4,308	4,486	1,803,339	1,973,911	23,690,000	24,045,000
Total		26,218	28,562	12,386,927	15,505,307	166,026,500	182,188,200

¹³¹ Bureau of Economic Affairs. (2013). Regional GDP and Personal Income Data

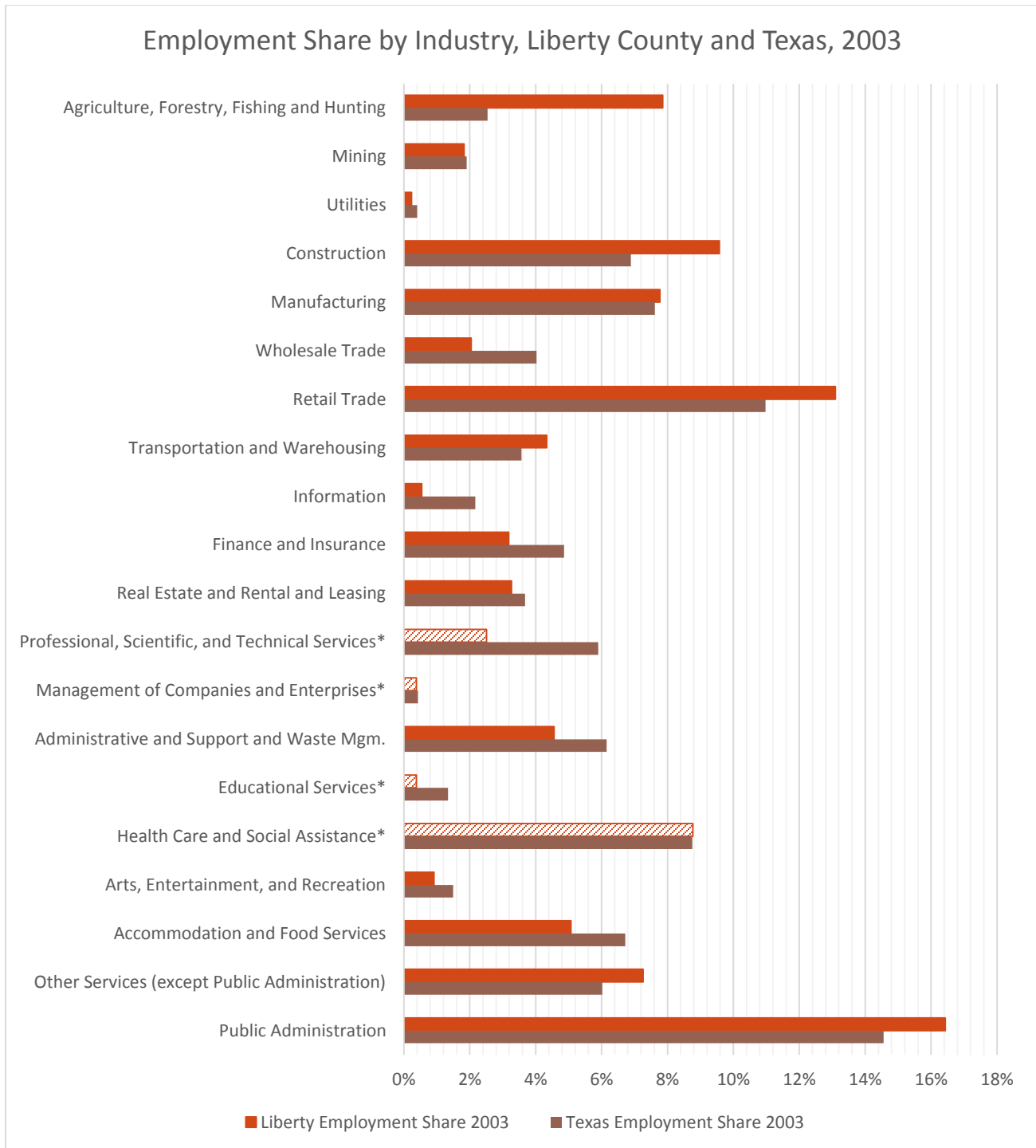
*BEA data for this industry was withheld at the county level to avoid disclosure of confidential information. The figures given here are the authors' best estimates based on BEA Total Employment and U.S. Census County Business Patterns and should not be relied upon for analysis until verified and/or adjusted.

Figure 12.1: Employment Share by Industry, 2013



**Diagonal fill indicates that the BEA data for this industry was withheld to avoid disclosure of confidential information. The figures used were the authors' best estimates based on BEA Total Employment and Census County Business Patterns and should not be relied upon for analysis until verified and/or adjusted.*

Figure 12.2: Employment Share by Industry, 2003



**Diagonal fill indicates that the BEA data for this industry was withheld to avoid disclosure of confidential information. The figures used were the authors' best estimates based on BEA Total Employment and Census County Business Patterns and should not be relied upon for analysis until verified and/or adjusted.*

Figure 12.3: Change in Employment Share (2003-2013)

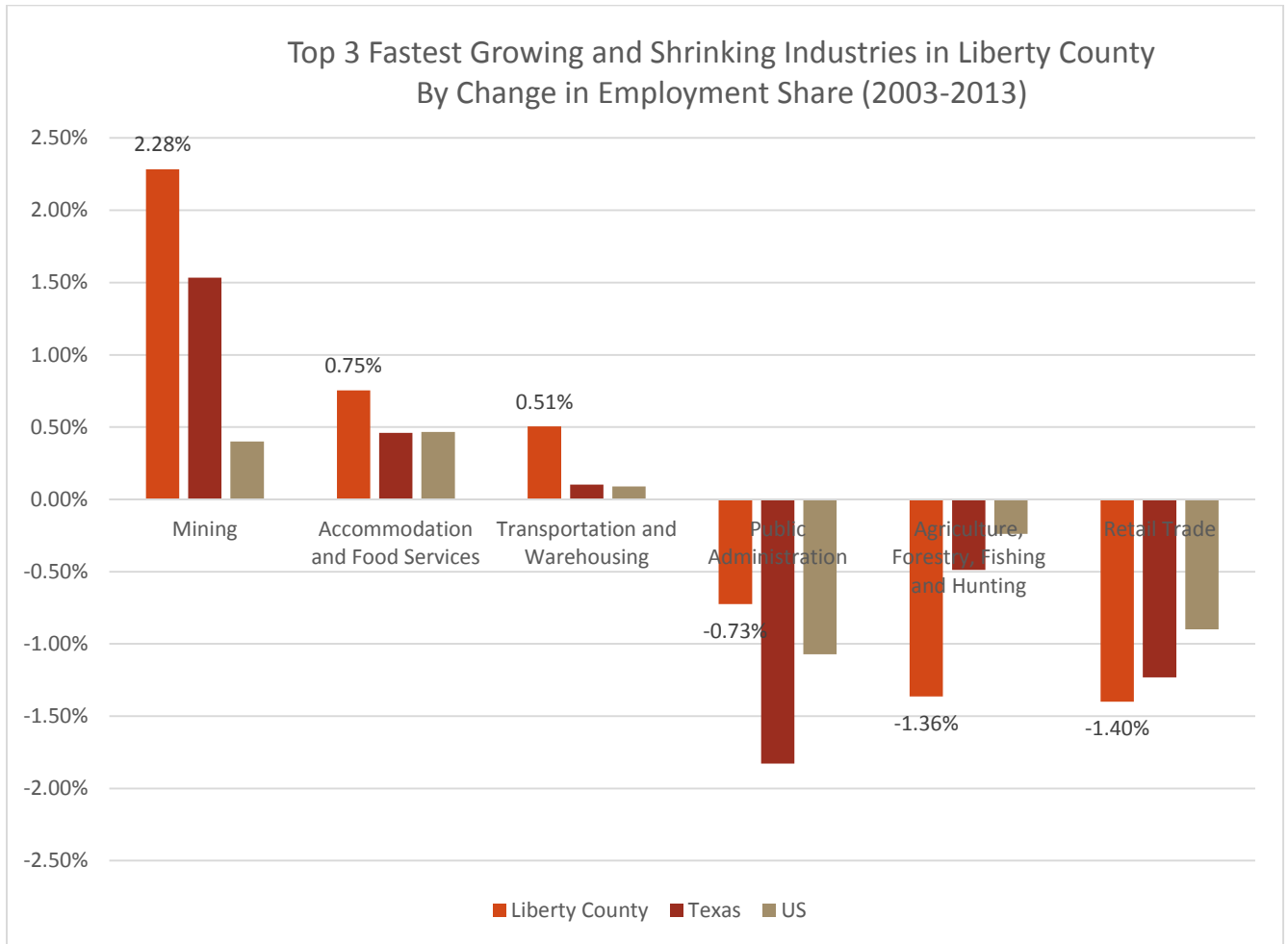


Figure 12.4: Shift Share Analysis

