

# Liberty County



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## Executive Summary

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This State of Community Report was prepared as the initial step in the plan-making process. It gathers data from a wide variety of sources in order to gain a more complete picture of current conditions in Liberty County. 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 19<sup>th</sup>-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.

The conditions summarized above (and explained in further detail in the following chapters) have been analyzed and recommendations made (see pages 41-42 for full list). Many weaknesses can be opportunities in disguise when they are considered in conjunction with other strengths. Some of the recommendations depend on funding availability or the development of public-private partnerships, such as building an intermediate-size county hospital or establishing a park-and-ride facility. Others can be implemented immediately, such as planning alternate evacuation routes in storm events or developing building standards for structures within the 100-year floodplain.

The recommendations are currently wide-ranging and can be prioritized and refined based on the vision set by the community and the goals of its inhabitants.



# Contents

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<i>Executive Summary</i> .....	<b>1</b>
<i>County Overview</i> .....	<b>4</b>
<i>History</i> .....	<b>5</b>
<i>Demographics</i> .....	<b>6</b>
<i>Economy</i> .....	<b>10</b>
<b>Industry Specialization by Employment Share</b> .....	<b>10</b>
<b>Industry Specialization by Location Quotient</b> .....	<b>10</b>
<b>Economic Base Analysis and Employment Multipliers</b> .....	<b>11</b>
<b>Employment Growth Components</b> .....	<b>12</b>
<b>Job Density and Inflow/Outflow</b> .....	<b>13</b>
<i>Land Cover and Environmental Resources</i> .....	<b>14</b>
<b>Environmental Factual Basis</b> .....	<b>14</b>
Water.....	15
Wetland and Forest.....	15
Agricultural Land.....	16
<b>Critical Habitats and Disturbances</b> .....	<b>16</b>
<b>Sustainability</b> .....	<b>17</b>
<i>Urban Development and Land Use</i> .....	<b>17</b>
<b>Urban Development</b> .....	<b>17</b>
Regional Development.....	17
Local Development .....	18
Residential Development .....	20
Affordable Housing.....	22
<b>Zoning and Land Use Plan</b> .....	<b>23</b>
Cleveland, TX .....	23
Liberty and Dayton, TX .....	24
<i>Transportation</i> .....	<b>25</b>
<b>Mode Networks</b> .....	<b>25</b>
Highways.....	25
Railroads .....	26
Airport.....	26
River Freight .....	26
Sea Ports.....	26
<b>Public Transit</b> .....	<b>27</b>
Liberty County Transit Plan .....	27
Brazos Transit District .....	29
Medical Transportation Program.....	30

Indigent Health Care Program.....	30
Park and Ride Service between Liberty County and Houston CBD .....	30
<b>Grand Parkway Toll Road .....</b>	<b>31</b>
<b><i>Public Infrastructure and Livability.....</i></b>	<b>33</b>
<b>Fire .....</b>	<b>33</b>
<b>Project 2020: Healthy Community Initiative .....</b>	<b>34</b>
<b>Hospitals .....</b>	<b>34</b>
Liberty-Dayton Community Hospital.....	35
Cleveland Regional Medical Center.....	35
Doctors Diagnostic Hospital .....	36
<b>Independent School District .....</b>	<b>36</b>
<b><i>Hazards Vulnerability .....</i></b>	<b>37</b>
<b>Flood Plains and Building Permits .....</b>	<b>37</b>
<b>Storm Surge .....</b>	<b>38</b>
<b>Hazard Recovery and Mitigation .....</b>	<b>39</b>
<b><i>SWOT .....</i></b>	<b>41</b>
<b>Strengths .....</b>	<b>41</b>
<b>Weaknesses .....</b>	<b>41</b>
<b>Opportunities.....</b>	<b>41</b>
<b>Threats.....</b>	<b>42</b>
<b><i>Recommendations .....</i></b>	<b>42</b>
<b><i>References .....</i></b>	<b>43</b>
<b><i>Appendices.....</i></b>	<b>46</b>



## 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 2013 county population is estimated to be 76,907 people, and the population of its largest town and county seat, Liberty, is 8,836. 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 setting (Kleiner, 2015).

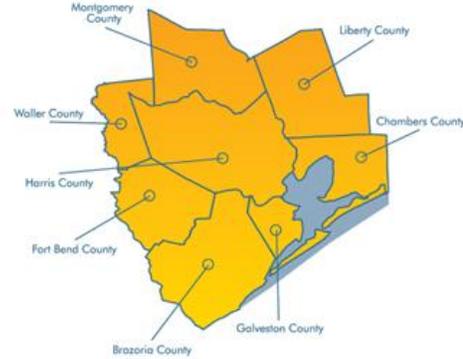


Figure 1: Houston-Galveston Regional Map (H-GAC, 2015)

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

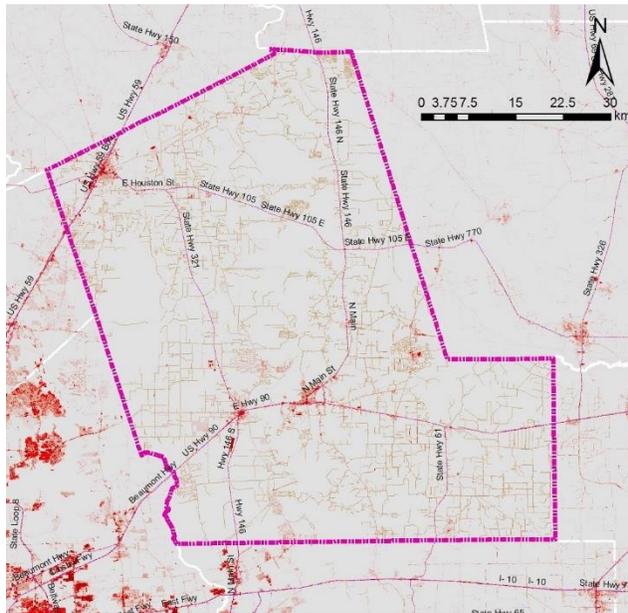


Figure 2: Liberty County

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 only affected county that managed to sustain economic growth during the four quarters following Hurricane Ike (Texas Engineering Extension Service, 2015).



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.

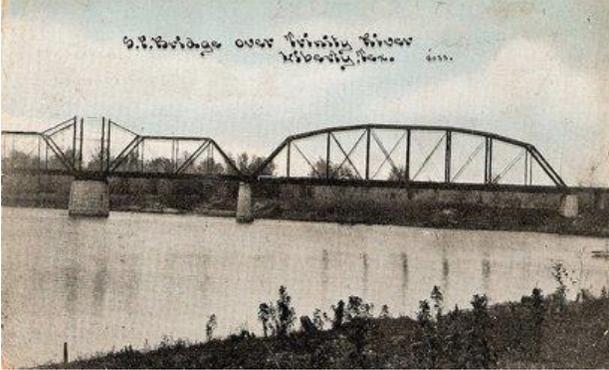


Figure 3: Bridge over Trinity River, Liberty, TX  
Source: Will Beauchamp Collection

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 activity (Liberty County Commissioners Court, 2015). 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.

## History

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The area was first inhabited by prehistoric Indians and artifacts dating to 1000 B.C. have been unearthed. Spanish and later Mexican settlement occurred in the 18<sup>th</sup> and early 19<sup>th</sup> 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 20<sup>th</sup> 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. 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. After the Civil War, many freedman remained in the area working either for their former owners or on small farms. The black 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 20<sup>th</sup> 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 factor (Kleiner, 2015).

## Demographics

The population of Liberty County is an estimated to be 76,907 as of 2013. As shown in Figure 4, the population has been increasing steadily since 1980 and is expected to grow even more rapidly in the next 25 years, reaching 130,612 by 2040. This is a 72.7% increase over 2010 population levels, which is significantly higher than the projected regional population growth of 60.7% and projected state population growth of 47.2%.

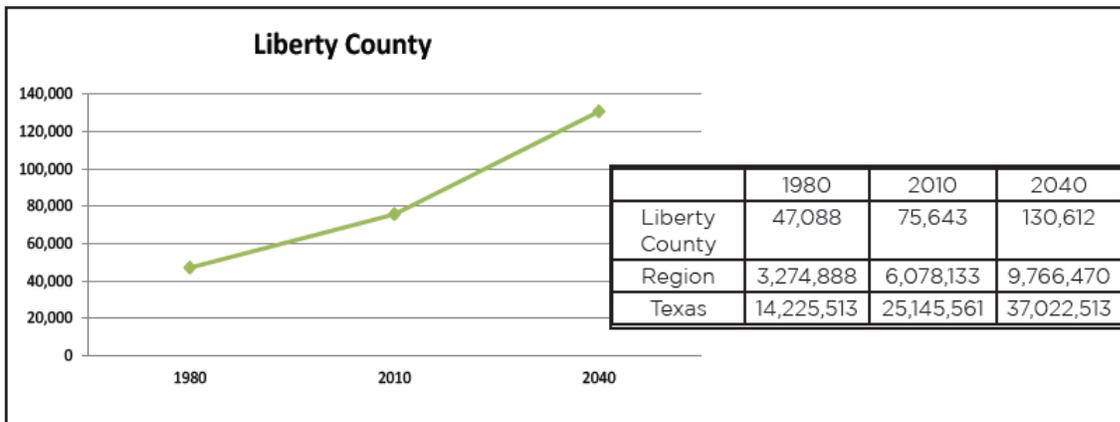


Figure 4: Liberty County Population Growth (HGAC, County Profile Liberty County, 2013, p. 3)

Population density patterns for both Liberty County and the greater Houston-Beaumont area can be seen in Figure 5. Liberty County’s population tends to be clustered in the north-east near US 59 and Cleveland, as well as in the center of the county near Liberty and Dayton. Family households make up 73% of total households, which is more than state average of 70% and outnumbers the non-family or single-person households in the county. The average family size is 3.38 people (HGAC, County Profile Liberty County, 2013).



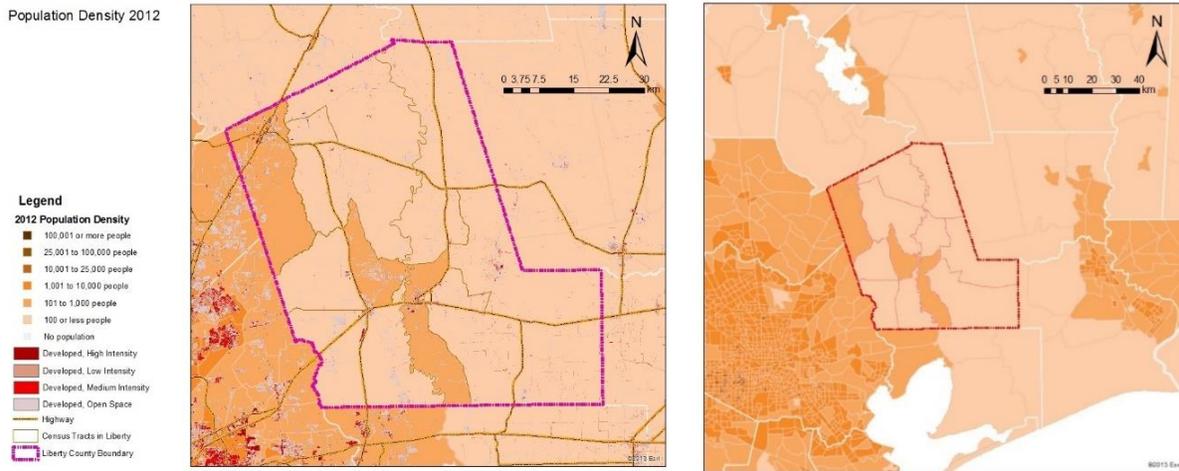


Figure 5: Population Density, Liberty County and Region

The percentages of various age groups are shown in Figure 6. These values are generally similar to statewide averages, but they do indicate that Liberty County’s population is slightly older. The percentage of people 35 and older in Liberty County is 51%, compared to 48% statewide.

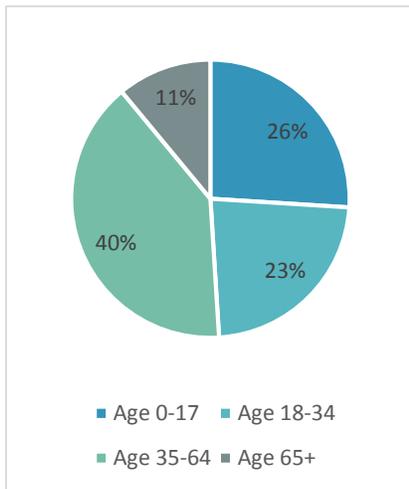


Figure 6: Liberty County Age Groups (HGAC, County Profile Liberty County, 2013)

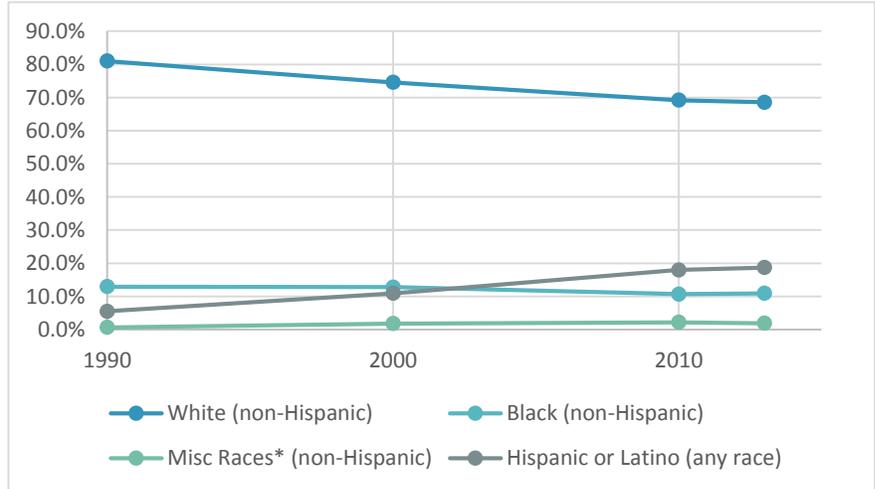


Figure 7: Liberty County Race Timeline (US Census, 2000, 2010; ACS 2013)  
\*Includes American Indian, Alaska Native, Asian, Hawaiian or Pacific Islander, Some Other Race, Two or More Races

In terms of racial composition, the county is predominately white, with roughly 10-13% black population holding fairly steady. 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% statewide (U.S. Census Bureau, 2010, 2013).



Turning to socioeconomic indicators, the spatial distribution of income levels can be seen in Figure 8. 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.

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 earnings (U.S. Census Bureau, 2013).

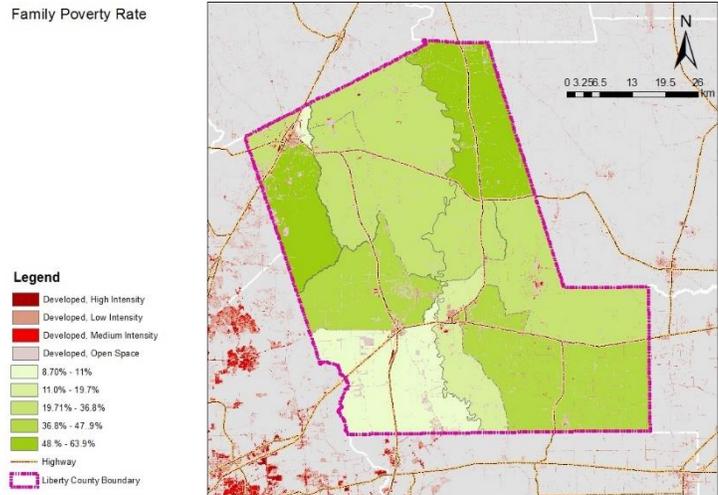


Figure 8: Percentage of Families in Poverty

As of 2013, the unemployment rate in Liberty County was 7.9%, with an estimated 30,289 employed in a workforce of 32,896 (BEA, 2013). The February 2015 estimated rate, not adjusted for seasonal variations, is 6.3%. Setting aside unemployment (which counts only those actively seeking work), Figure 9 shows that, compared with Texas, a smaller percent of the working-age population is actively in the labor force.

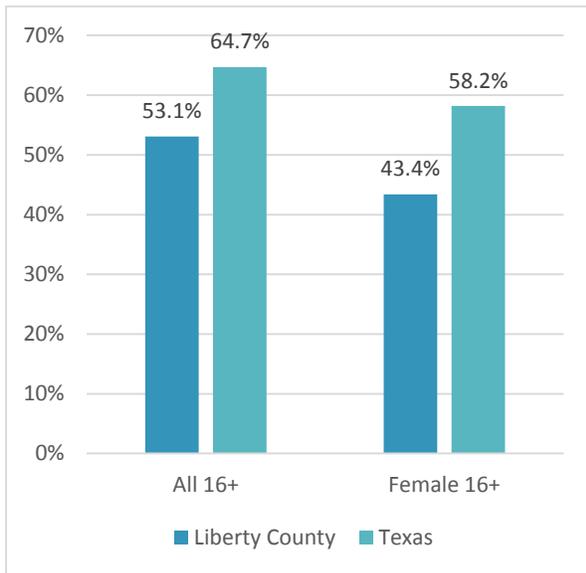


Figure 9: Percentage of Population in the Labor Force (U.S. Census Bureau, 2010, 2013)

The difference is even greater for the female population. This indicates that a great deal of human capital is not being utilized to its full productive capacity. Furthermore, taken together with the far lower earnings of female workers, conditions in Liberty County seem to hamper women’s ability to work and support themselves.

Relatively low earning levels in Liberty County may be due to the challenges in acquiring higher education. 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% statewide (U.S. Census Bureau, 2010, 2013). As shown in Figure

10, 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.



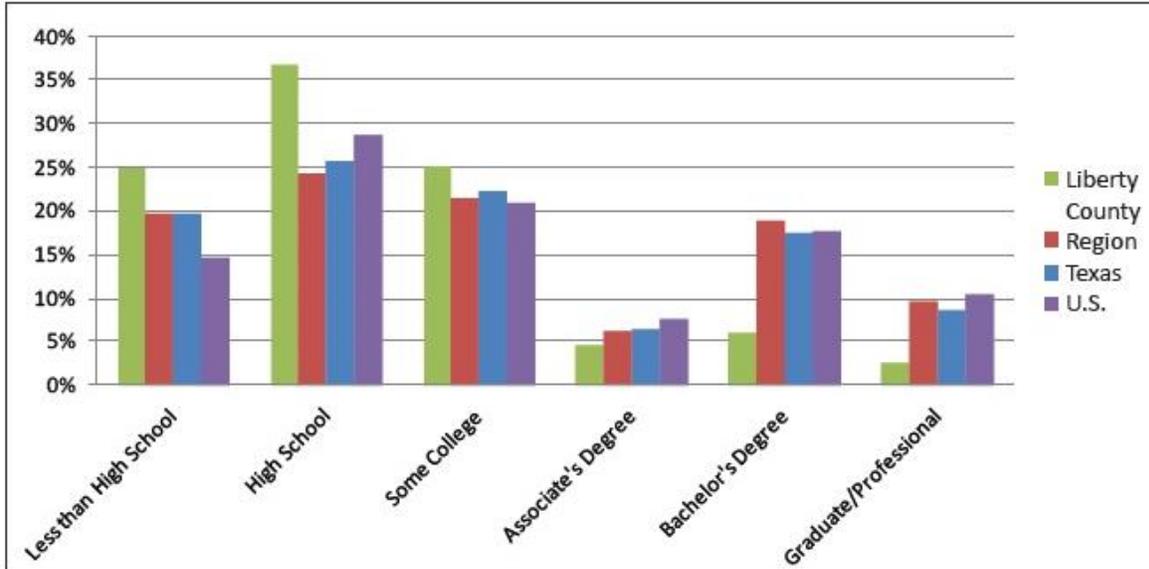


Figure 10: Educational Attainment (HGAC, County Profile Liberty County, 2013, p. 6)

Turning now to health, the three primary causes of death are shown in Figure 11. 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 (see Public Infrastructure and Livability for further information concerning healthcare provision in Liberty County).

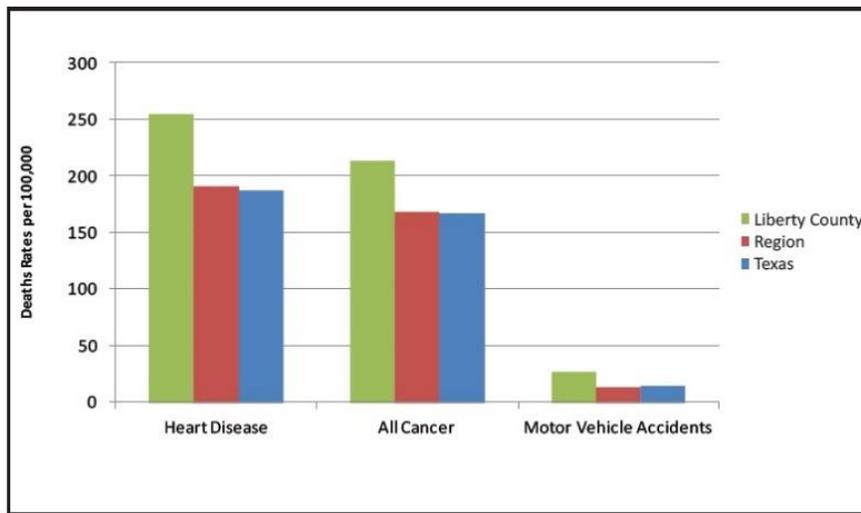


Figure 11: Major Causes of Death (HGAC, County Profile Liberty County, 2013, p. 7)

The deaths by motor vehicle accidents are nearly twice as high as in the comparison regions. This may be due in part to the problems with DWIs mentioned in the Liberty County Community Plan (see County Overview), but we cannot be certain.



## Economy

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As of 2013 there were 28,566 people employed in Liberty County earning an average of \$39,735 annually (Bureau of Economic Analysis, 2013). 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 include: Boomerang, Brookshire Brothers, Campbell Concrete & Materials, Cleveland ISD, Dayton ISD, Liberty County, Liberty ISD, Texas Department of Criminal Justice, Texas Home Health, and Wal-Mart (Texas Workforce Commission). The industry sectors with the largest absolute employment are Public Administration (4,486), Retail Trade (3,340), and Construction (2,545).

### 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 5, Figures 49 and 50 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%), and 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%), and perhaps Professional, Scientific, and Technical Services (data is insufficiently specific).

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 51 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.

### Industry Specialization by Location Quotient

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.



The most prominent specialization is in Agriculture et al. (LQ 3.17), which is even more notable with a U.S. benchmark. 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).

Table 1: 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.*

## Economic Base Analysis and Employment Multipliers

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 2 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.



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

Table 2: Liberty County Base Employment Multiplier (2013)

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, and Agriculture et al.

### Employment Growth Components

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 13 at right).

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.

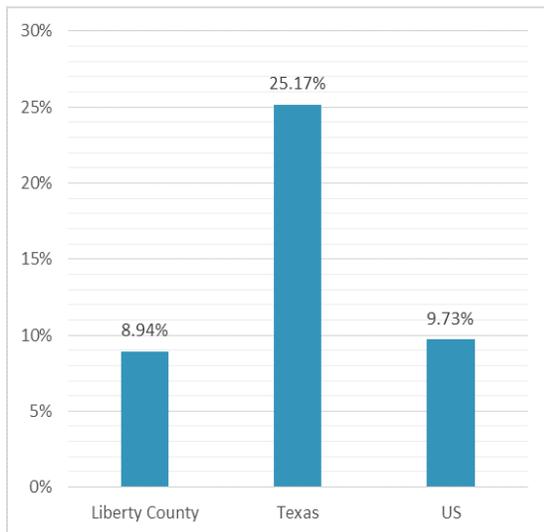


Figure 12: Employment Growth Comparison, 2003-2013

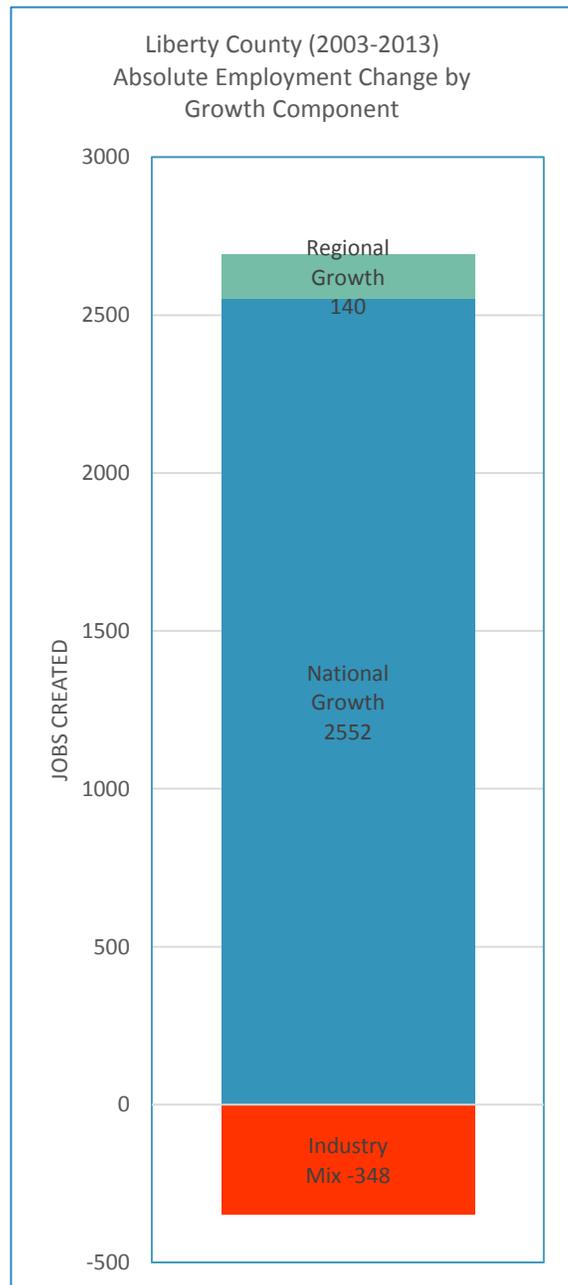


Figure 13: Shift Share Analysis



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. This information can be seen in the figure below. 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.

## Job Density and Inflow/Outflow

Figure 14 below 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.

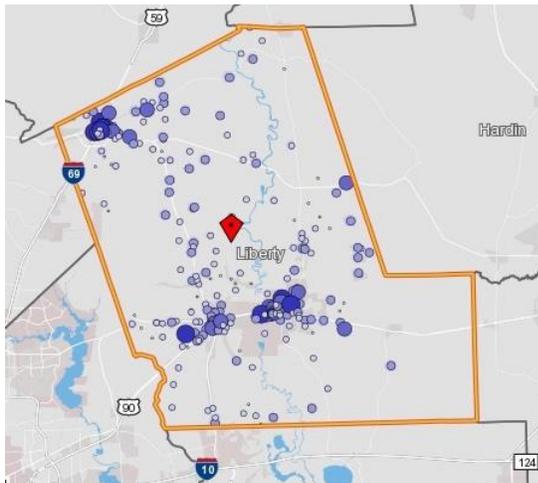
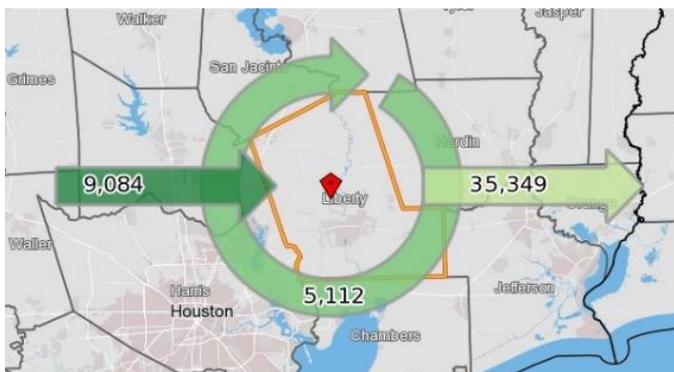


Figure 14: Job Density, Liberty County 2011  
(U.S. Census Bureau, 2011)

It is also important to keep in mind the amount of inter-county commuting that takes place in the Houston metropolitan area. Figure 15 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.

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.



(U.S. Census Bureau, 2011)



Source: BEA Liberty County Data

Figure 15: Employment Inflow and Outflow



# Land Cover and Environmental Resources

## Environmental Factual Basis

As shown in the Land Cover map in Figure 16 and the comparative analysis in Table 3, Liberty County is mostly rural with a few impaired streams in the northwest and east of the county. A significant part (35%) 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 wetlands (Dramstad, W. Olson, J. and Forman, R., 1996). 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

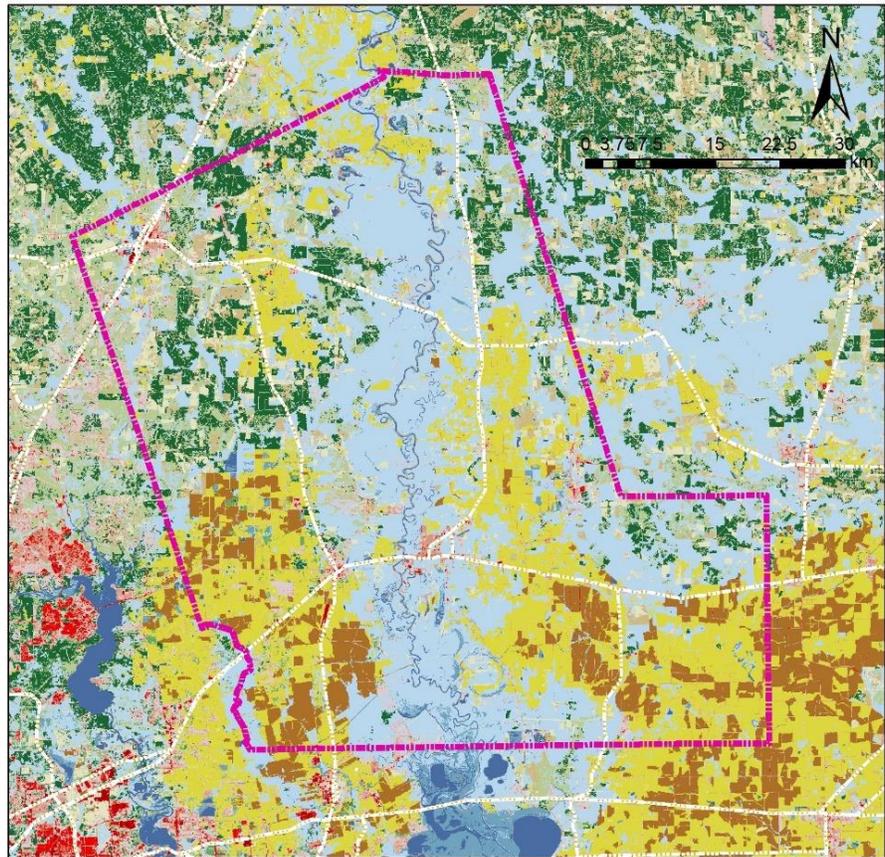


Figure 16: Liberty County Land Cover Map



Table 3: Environmental Fact Basis

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

## Water

The map in Figure 17 shows the Trinity River watershed, in which Liberty County is located (Texas Water Development Board). 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.

## Wetland and Forest

In 2012 land conservancy agencies acquired 704 acres of land in the Trinity River watershed called the Daisetta Mitigation Bank. 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). As shown on the land cover map, there is a huge area of wetland surrounding the Trinity River down to Trinity Bay that is not under jurisdictional control, which means it is at risk of easily being converted into agricultural land.

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.

The Trinity River National Wildlife Refuge is located along the Trinity River in the middle of Liberty County



Figure 17: Trinity Watershed Map, Source: Trinity River Valley Master Plan 2012, Trinity River Authority of Texas

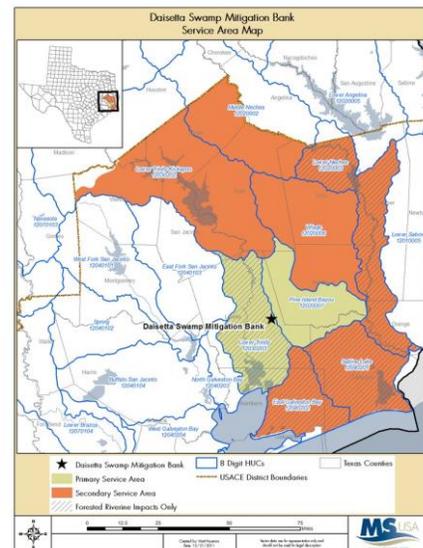


Figure 18: Daisetta Mitigation Bank

and encompasses 25,000 acres. Established in 1994, its primary purpose is to protect the bottomland hardwood forest ecosystem located there.

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.

## Agricultural Land

As shown on the map, 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.

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.

## 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

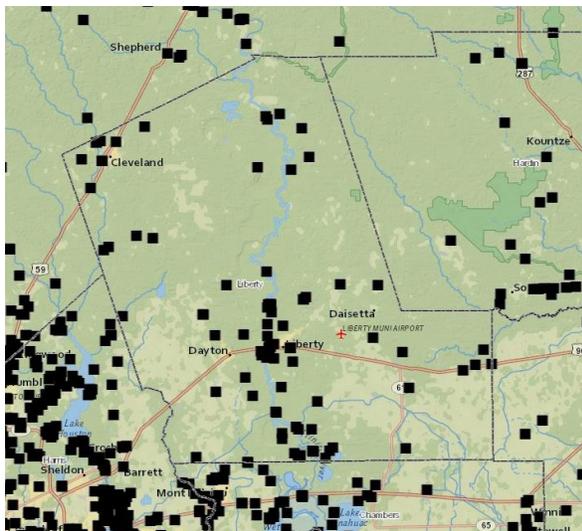


Figure 19: Building Permits Issued in Wetland

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.

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 19). 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 that main disturbances are not due to development but due to potential nutrient runoff.

## 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. 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 consumption (Sam Brody, 2006). 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.

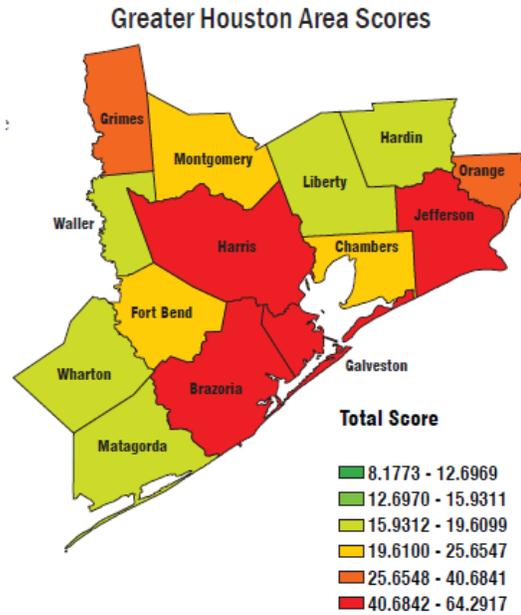


Figure 20: Sustainability Scores for Greater Houston Area (Sam Brody, 2006)

## Urban Development and Land Use

### Urban Development

#### Regional 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, as Figure 21 shows that urban development passes through Cleveland and grows the net shape into northern Houston. Dayton and Liberty are actively developed areas along one of the highways connecting Houston and Beaumont. Overall, transportation vitally contributes to the urban development of Liberty County, as is discussed in further detail in the Transportation section.



Regional Developed Land

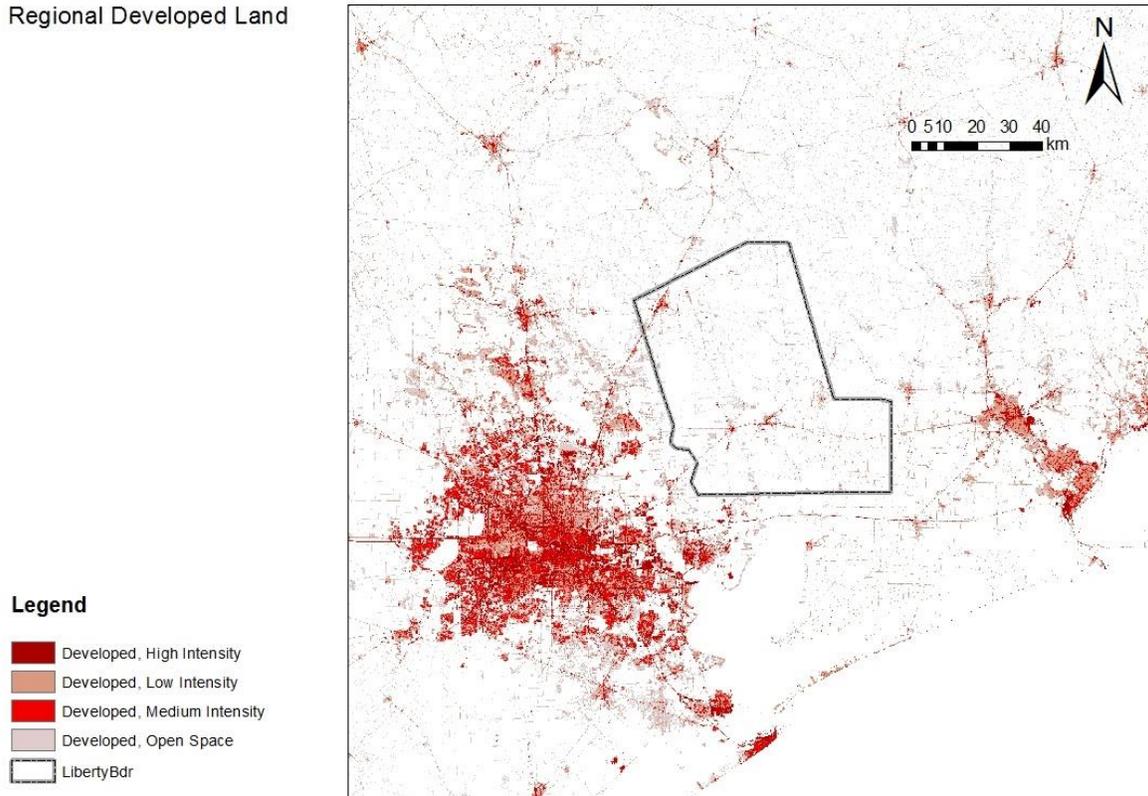


Figure 21: Liberty County versus Regional (Houston Metropolitan Area) Developed Land

## Local Development

Highways US 90 and Interstate 69 are the major links connecting Liberty communities with adjacent counties, as mentioned above. The most intensive development occurs at the intersections of these highways, indicating that highway access is a determining factor of land development. They are also the core area of economic activities in the county.

In terms of urban morphology, specifically, as the density of development in Dayton exactly resembles a node, it shows potential for increased transportation demand as the human activities gather near easy access points. While the dense area in Liberty exhibits corridor-style growth along the highways, there are signs of net-shaped development and a diffusing boundary, which is good for a long-lasting development with a city area attractive to human interaction patterns. This phenomenon is even more obvious in the development of Cleveland, which is good for a city that is trying not to base its economic solely on a limited range of accessibility (Webster C.).



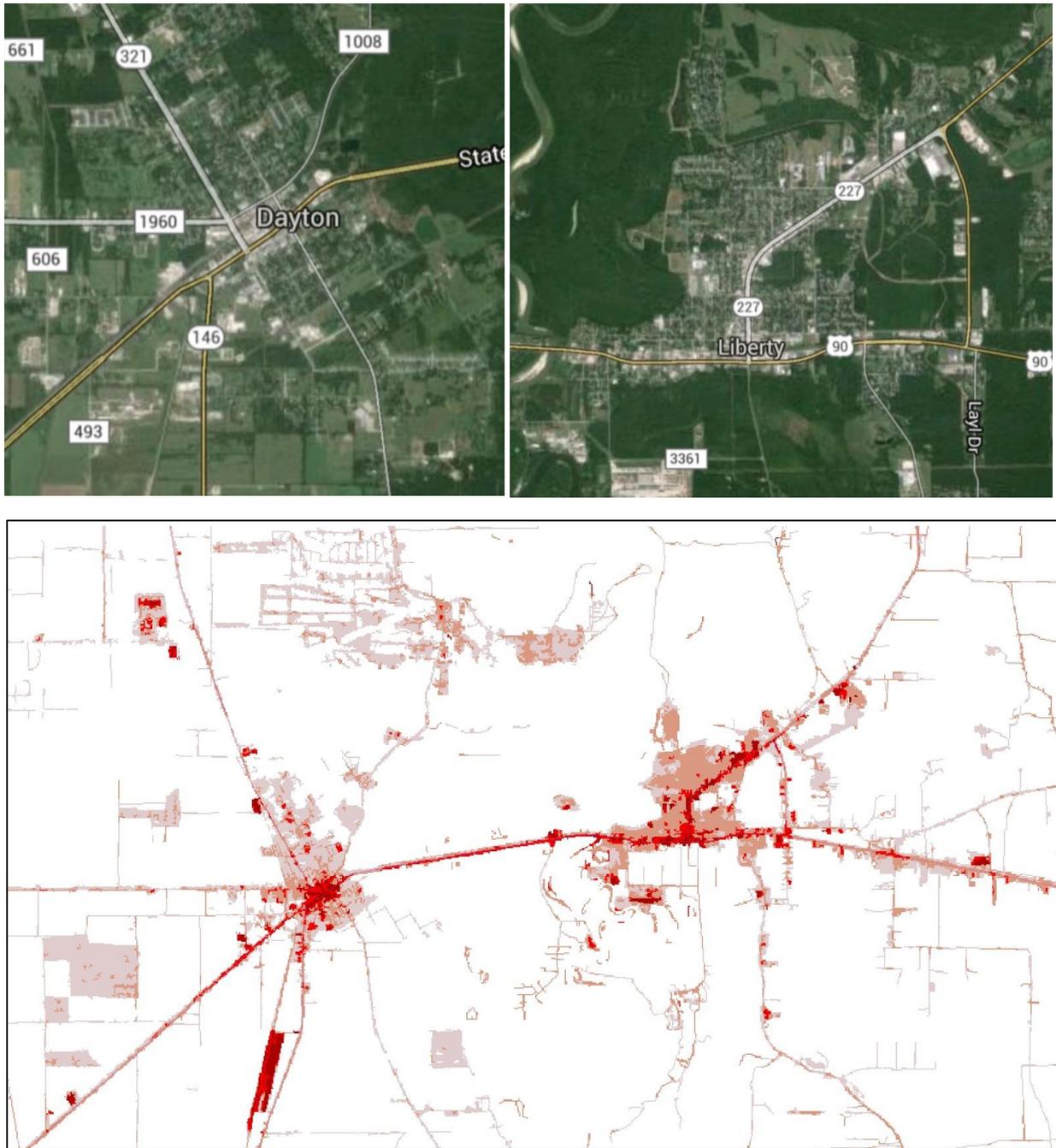


Figure 22: Liberty County, Developed Lands of Dayton and Liberty in Grey Shades



Aside from the towns, there are some areas away from the highway are still densely developed, as shown on Figure 23. The dense area north of Dayton is a jail, and the one in the east is Daisetta, a growing town.

Urban Development Map

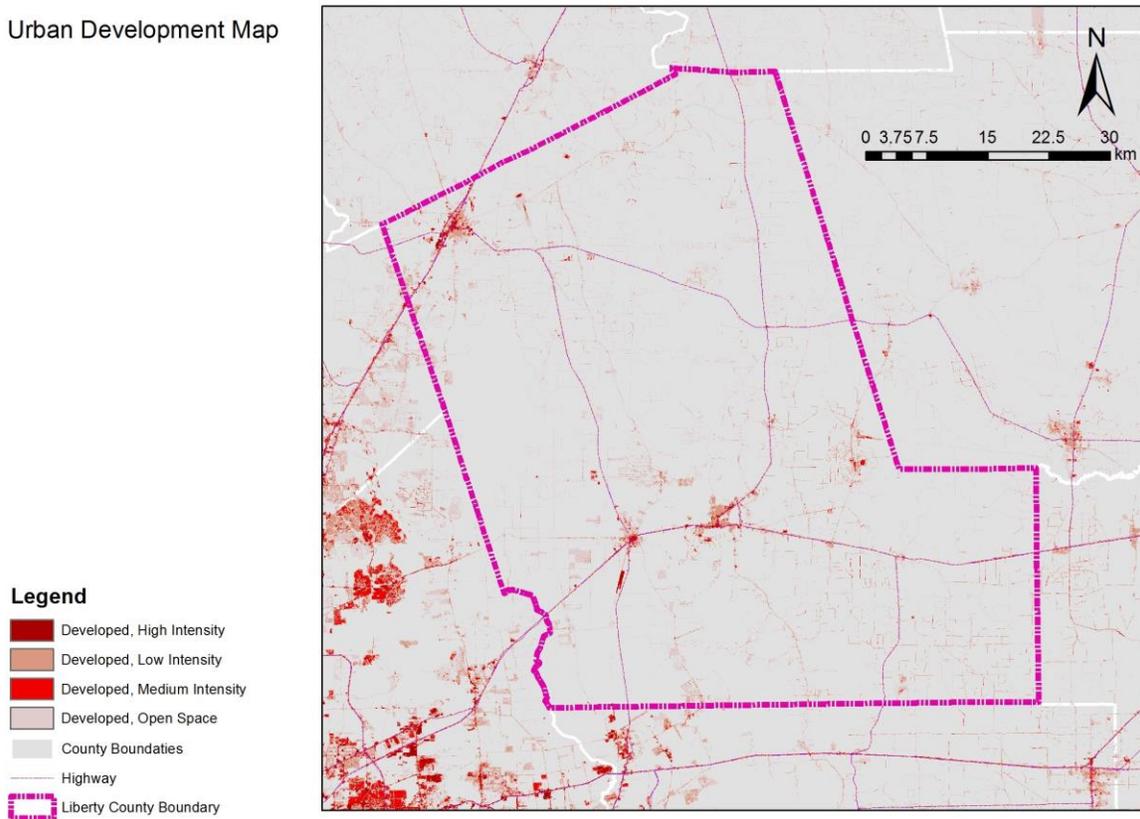


Figure 23: Liberty County, Urban Development Map showing High, Medium and Low Intensity

## Residential Development

The housing units are mainly located in Cleveland, Dayton, Liberty, Daisetta, and Hardin (see Figure 24 Housing Unit Density). Cleveland, Daisetta and Hardin have more areas with higher housing density than Dayton, while Dayton is denser in its overall urban development than Daisetta and Hardin. This might be due to the affordability of housing. On the other hand, the high family poverty rate doesn't occur in areas with high housing density, but rather in the northeast and the west, where housing density is relatively lower (see Figure 8 above, Family Poverty Rate).



Housing Unit Density 2010

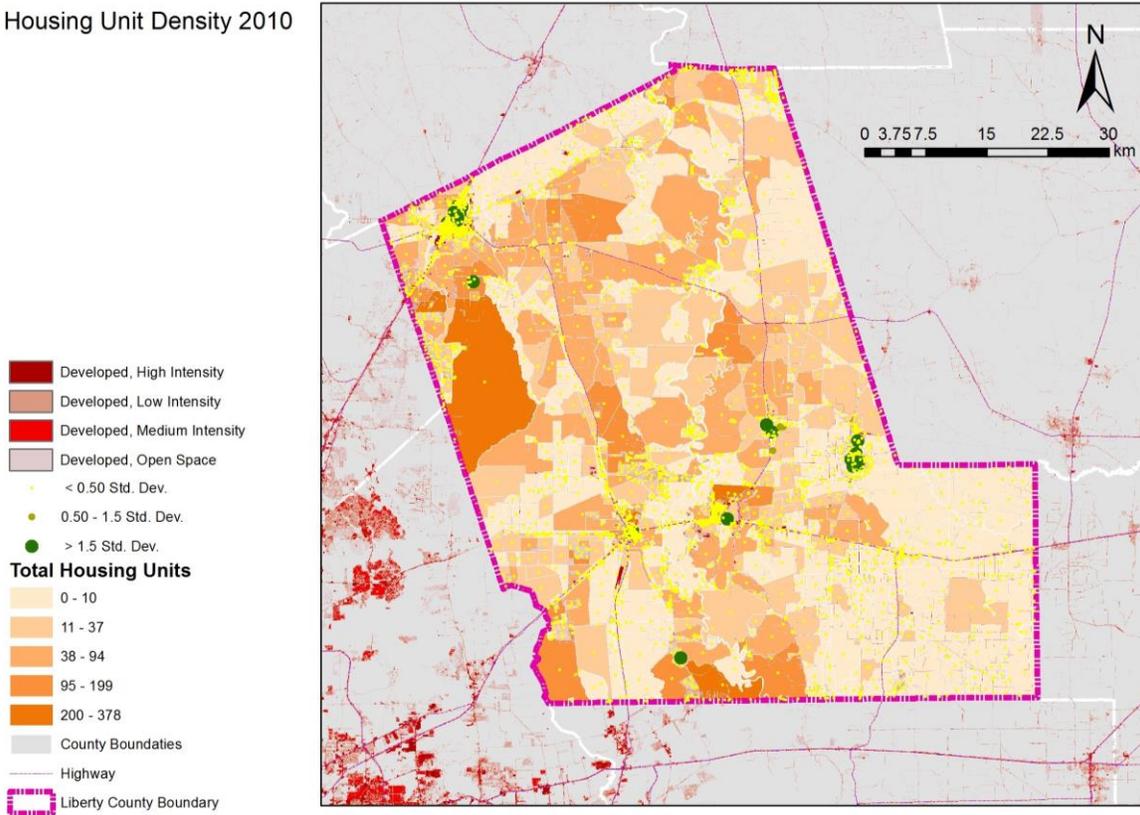


Figure 24: Liberty County, Housing Unit Density 2010

Housing types in Liberty County differ from Texas patterns, as can be seen in Figures 25 and 26. 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.

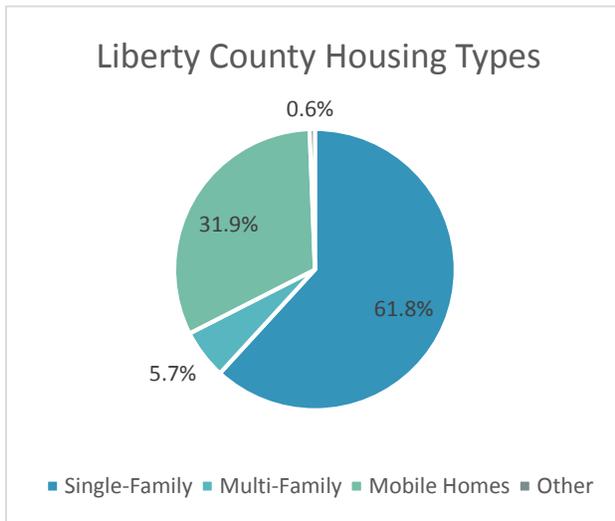


Figure 25: Liberty County Housing Types (HGAC, County Profile Liberty County, 2013)

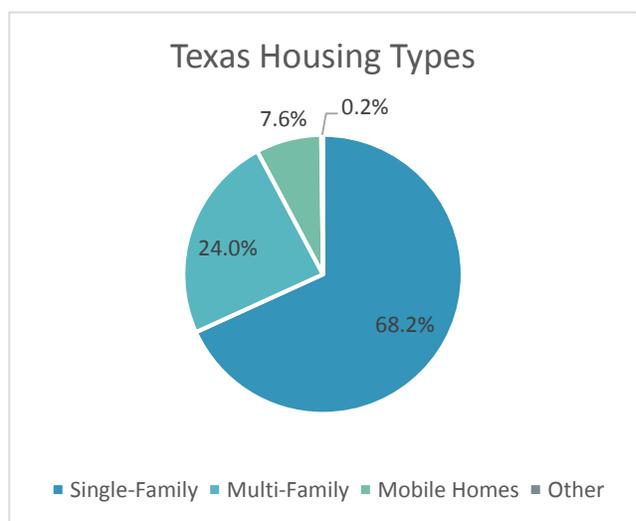


Figure 26: Texas Housing Types (HGAC, County Profile Liberty County, 2013)



## Affordable Housing

The affordable housing projects are mainly located in Cleveland and Dayton. Cleveland is promoting a large amount of affordable housing in its zoning (see section below, Zoning and Land Use). Regarding the family poverty rate distribution (see Figure 8, Family Poverty Rate), the poverty rate is high in rural areas, though the housing density is low. This is probably because many of those families rely on agriculture for their income (see Table 1 for Location Quotient), or they are living in rural areas in order to take advantage of lower land prices there. 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.

Affordable Housing

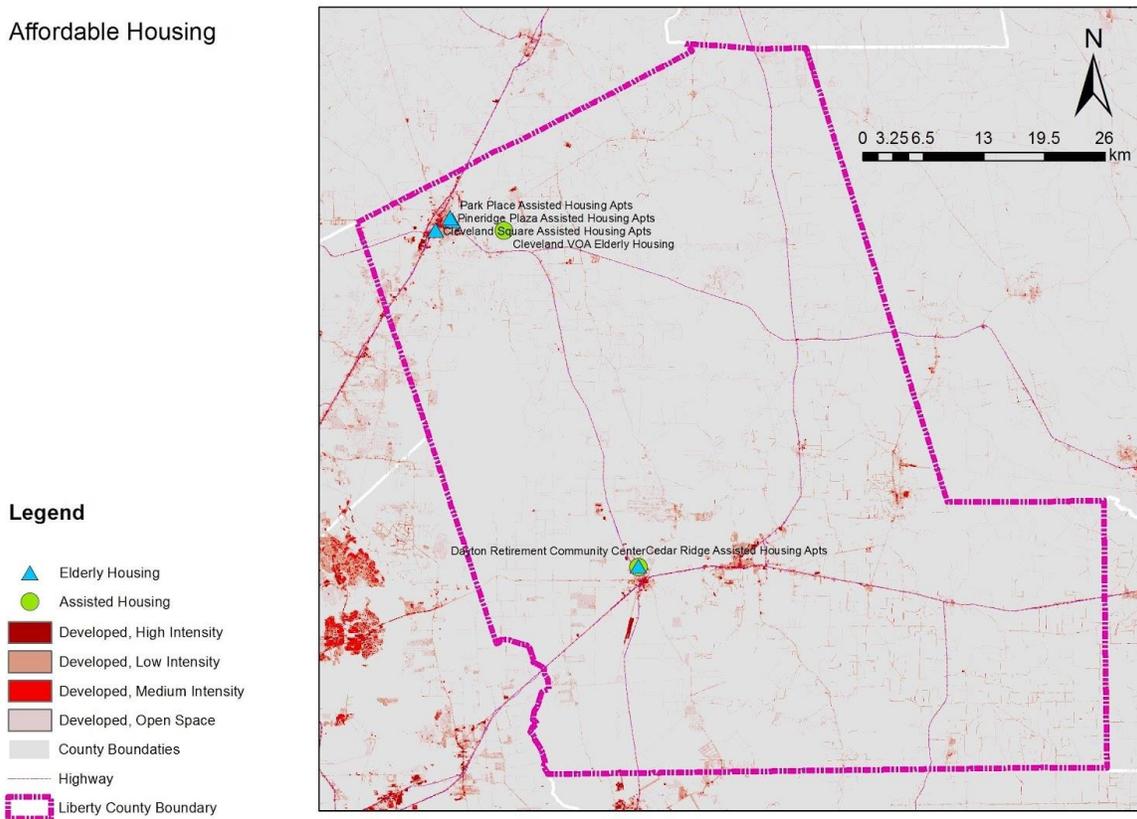


Figure 27: Liberty County, Affordable Housing Map



## Zoning and Land Use Plan Cleveland, TX

As a major town in Liberty County, the City of Cleveland has adopted a zoning plan to regulate its land use development. It includes 6 zoning districts with regulated heights, lot sizes, frontages, and setbacks (see Table 7 in Appendices for further details).

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).

### *Transportation*

The city is located at the intersection of two railway lines. The Union Pacific railroad, running north south, is the main determinant of the physical construction in the town. US 321 horizontally connects Cleveland with other towns that have a greater degree of real estate development. Cleveland's land development mainly centers on the intersection of the railway and US 321.

### *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.

### *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.

### *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.

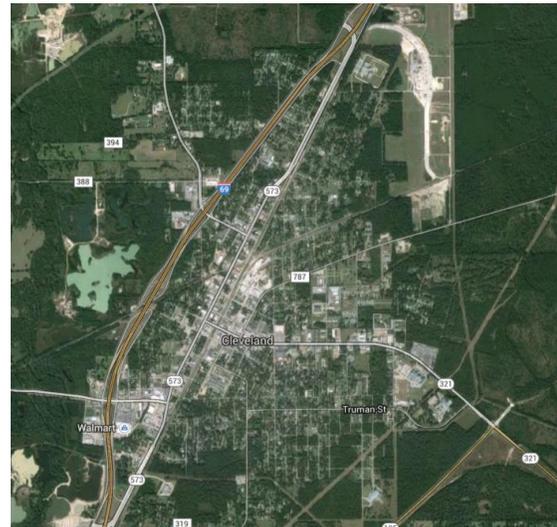


Figure 28: Cleveland Aerial Map



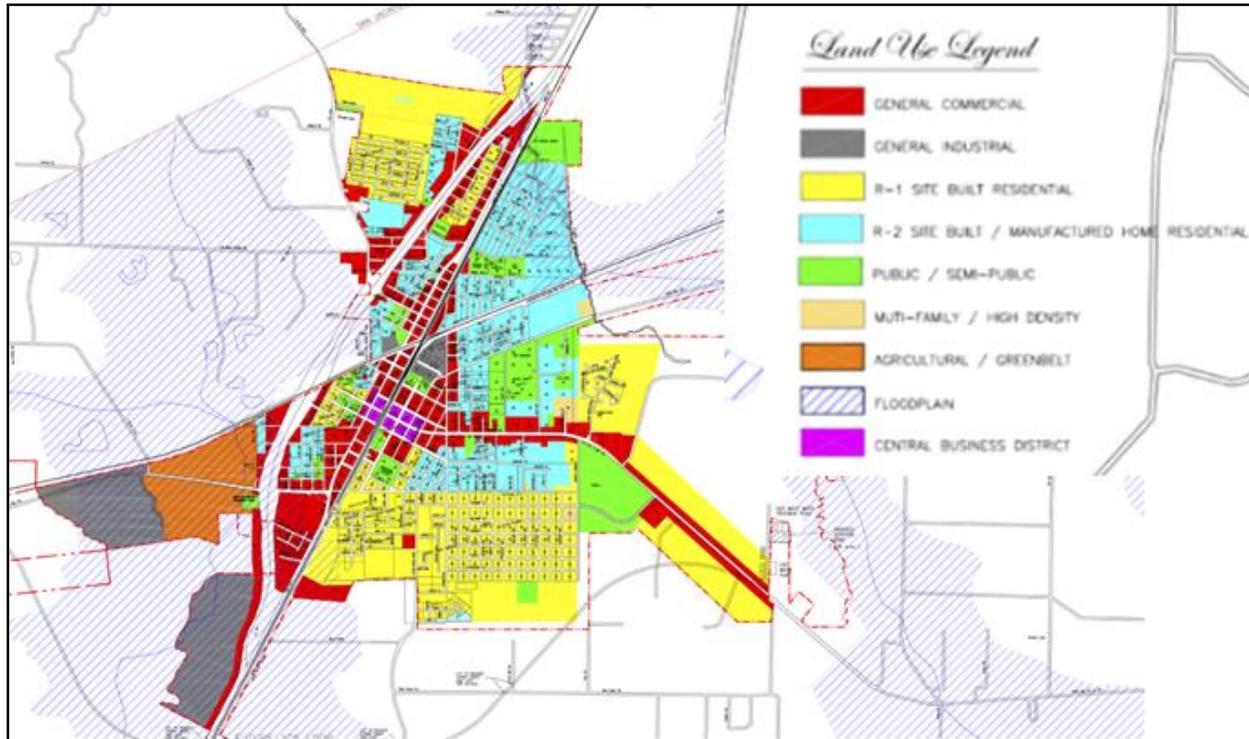


Figure 29: Cleveland City, Zoning Map, Source: City of Cleveland

### *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.

### *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.

## **Liberty and Dayton, TX**

As major towns in Liberty County, both the City of Liberty and the City of Dayton have adopted zoning ordinances, which mainly regulate the construction focusing on the airport area.

However, they do not have specific zoning including zoning maps in their ordinance, which is primarily in written form without any detailed graphical illustrations. The land use restrictions mentioned in the zoning ordinance target the continued safety of air traffic only and omits use restrictions.



# Transportation

## Mode Networks

### Highways

The Liberty County transportation road network comprises interstate highways, freeways, and arterials. Interstate Highway 69 crosses the northwest corner of Liberty County, where US 59 HOV (High Occupancy Vehicle) was designated a high priority corridor by Congress in order to facilitate the development of IH-69 (Liberty, 2009). IH-10 runs east west just south of Liberty County in Chambers County, carrying large volumes of passenger and freight vehicles.

In addition, SH 146 and is the major north-south highway in the center of the county, briefly running parallel with east-west US 90 in the Cities of Liberty and Dayton. SH 105 is another major east-west route, while SH 321 connects Cleveland with Liberty and Dayton.

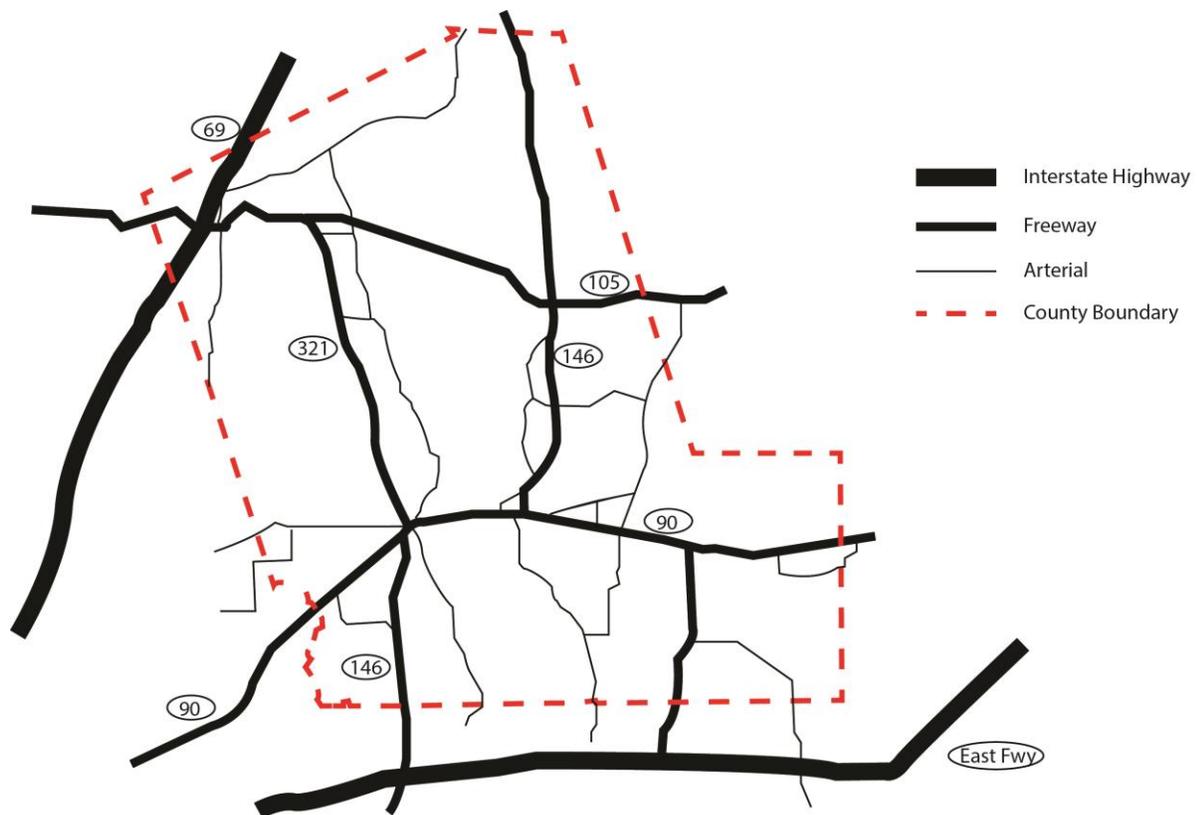


Figure 30: Transportation map (Courtesy of TAMU, 2015)



## 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 31).

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 Cleveland (Morgan, C., Warner, J., and Sperry, B., 2013). 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.

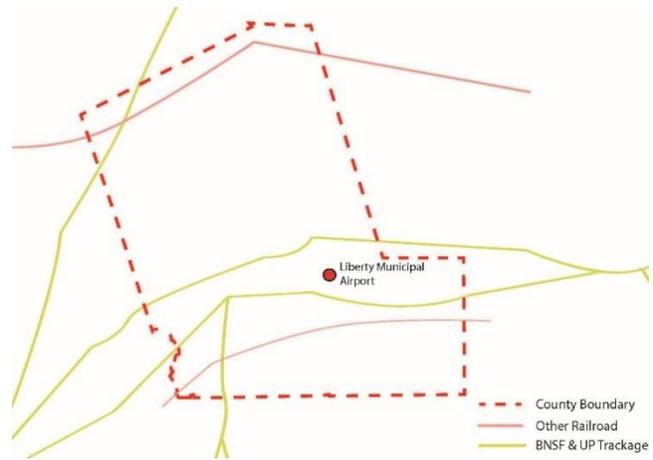


Figure 31: Railroad map, Liberty County  
(Courtesy of TAMU, 2015)

## Airport

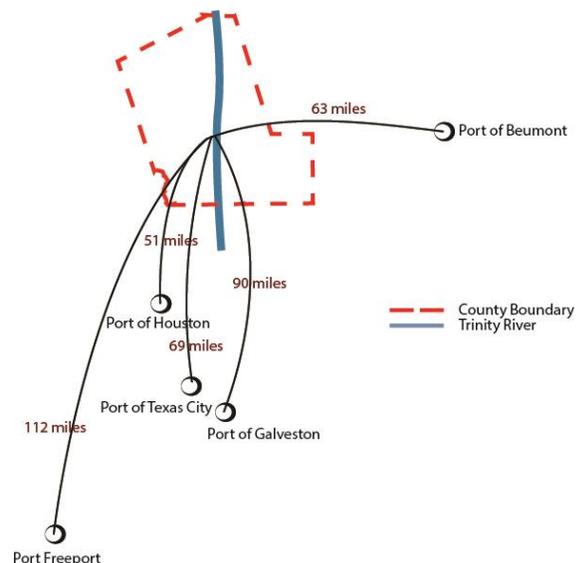
Liberty Municipal Airport is a general aviation airport located 6 miles northeast of downtown Liberty and covers an area of 127 acres. It is also used by Life Flight emergency helicopter services, disaster relief agencies, and private companies. The airport is owned and operated by the City of Liberty. 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-Fi (Liberty, 2009).

## River Freight

Liberty County is located 40 miles 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 Engineers (CLCND, 2011). In addition, the County is located in proximity of two ports, the Port of Houston and the Port of Beaumont.

## Sea Ports

Liberty County is located in the proximity of port of Houston, port of Beaumont, and port of Texas city (refer to the figure to the right). The port of Houston is located within 45 minutes of



Distance from Liberty County to the nearby Sea Ports



Liberty and Dayton. It is ranked first in the US in foreign waterborne tonnage and second in total tonnage (Liberty, 2009).

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 Gulf (Liberty, 2009). It also connects to the inland waterway system serving Minneapolis, Chicago, St. Louis, Kansas City, Louisville, Omaha, among others.

## Public Transit

### Liberty County Transit Plan

The 2009 Liberty County Transit Plan (LCTP, 2009) 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, 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.

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 (see Figure 32).

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 the special needs population 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.

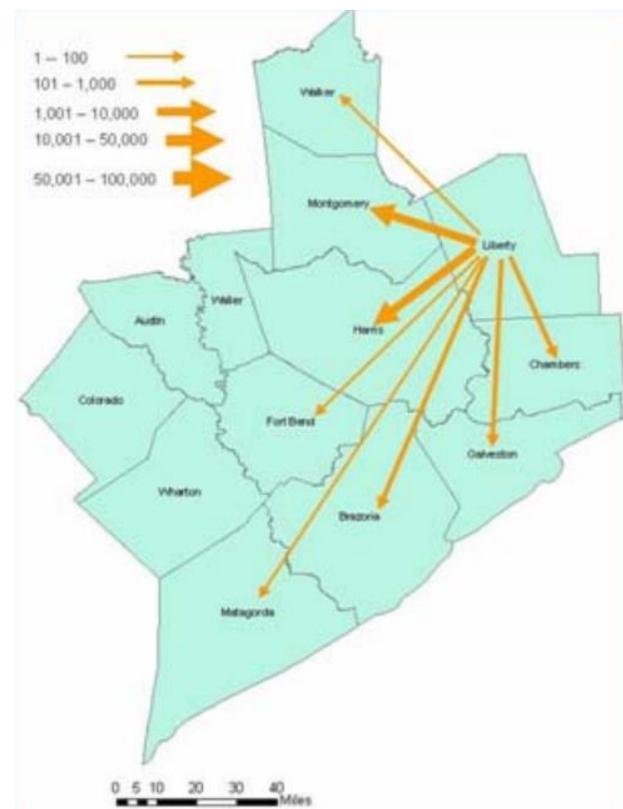


Figure 32: Liberty County: Inter-County Journey-to-work flow (Hackett, 2008)

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 (see Figures 33 and 34)

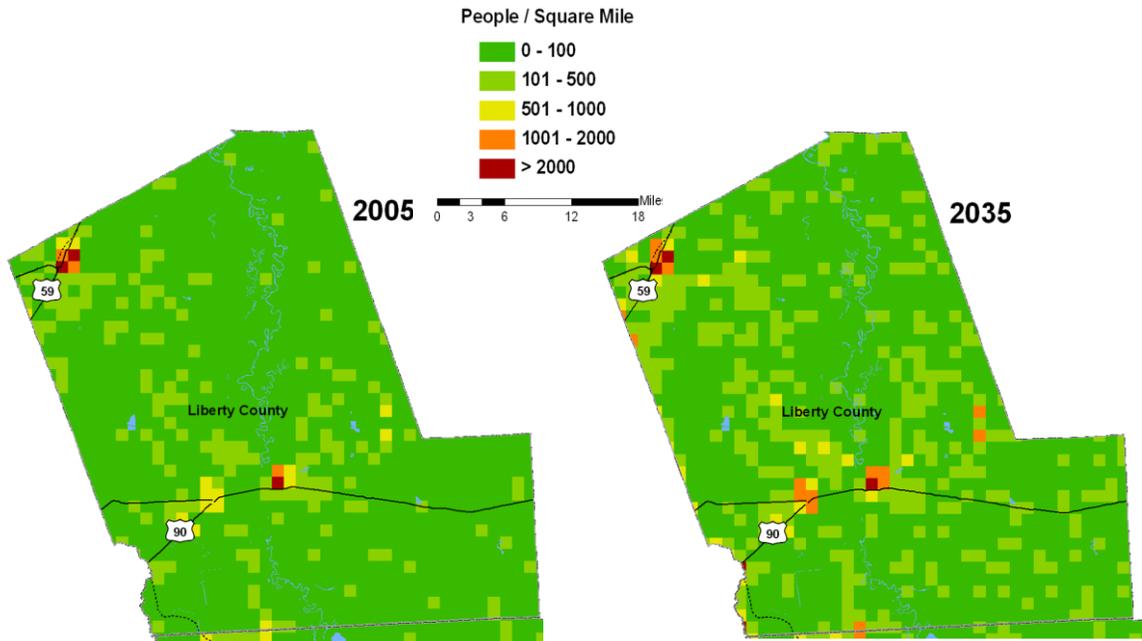


Figure 33: Population Densities in Liberty County for 2005 and 2035 (Projected) (LCTP, 2009)

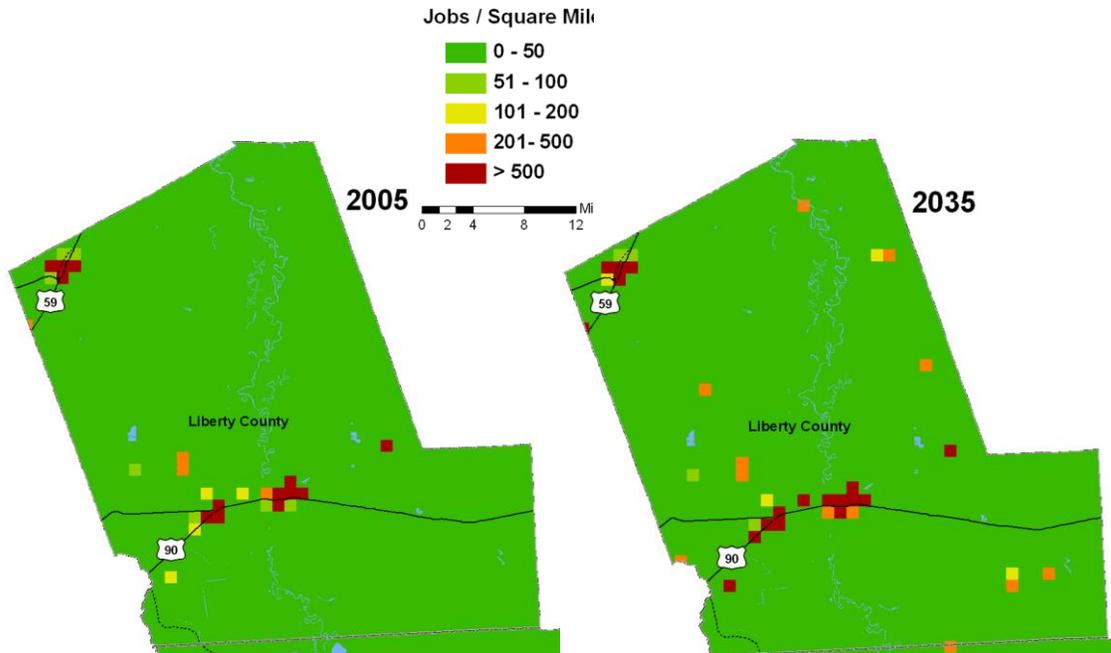


Figure 34: Employment Densities in Liberty County for 2005 and 2035 (Projected) (LCTP, 2009)



Figure 35 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.

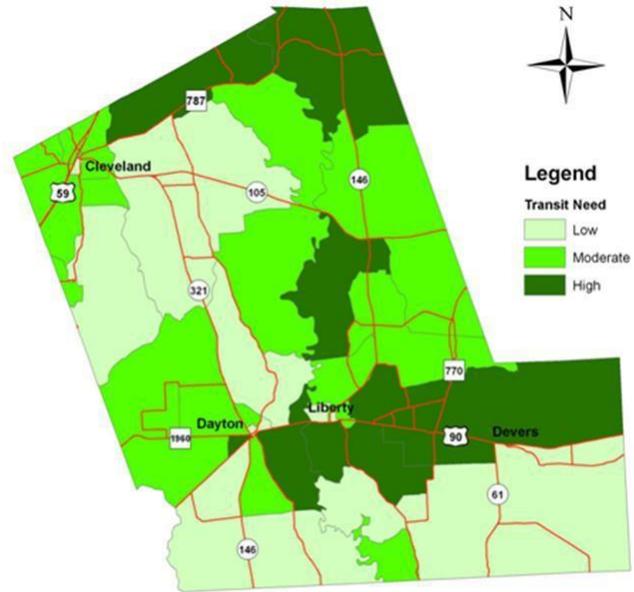


Figure 35: Liberty County Transit Needs Index (LCTP, 2009)

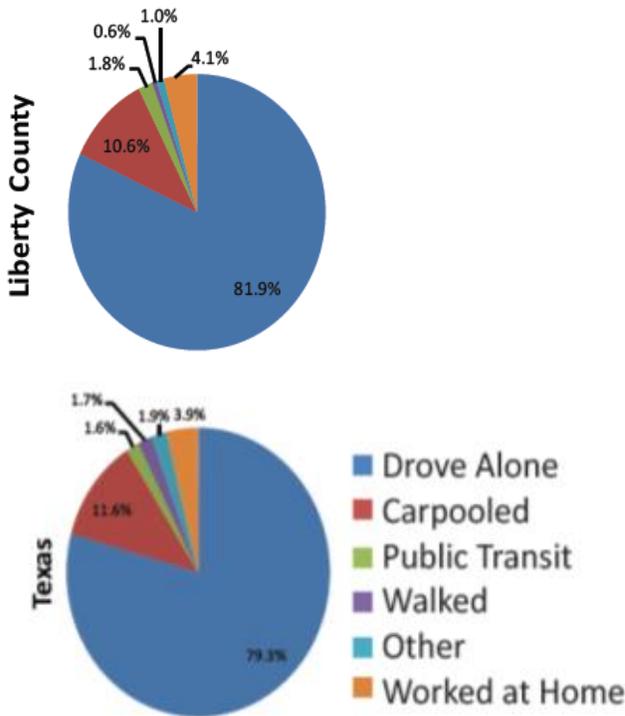


Figure 36: Commute to Work Circular Diagram (HGAC, 2013)

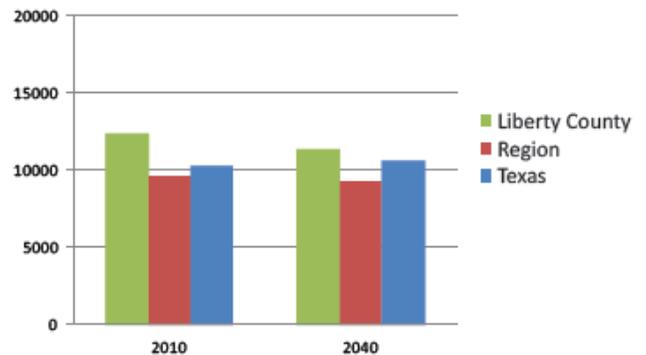


Figure 37: Chart Showing Vehicle Miles Traveled Per Person (HGAC, 2013)

## Brazos Transit District

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 clusters (HGAC, 2009). The fixed routes travel the same path every hour and forty five minutes on the hour beginning and ending at the Transfer Point (BTD, 2012). 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 PM (BTD, 2012). 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.



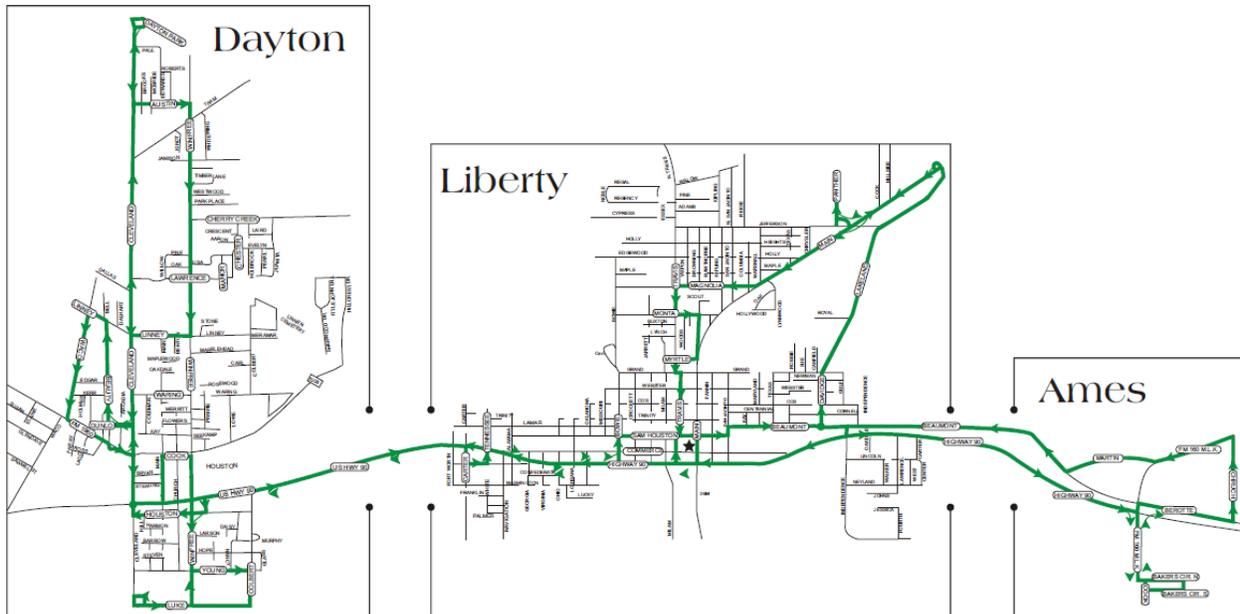


Figure 38: Liberty / Dayton Ground Transportation by Brazos Transit District (BTD, 2012)

## Medical Transportation Program

The Medical Transportation Program is part of the Texas Health and Human Services Commission, and is based on non-emergency Medicaid (MTP, 2014). 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 annually (LCTP, 2009).

## 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 programs (Burt, n.d.). The program's annual trips are a total of 78 urban trips and 139 rural trips (LCTP, 2009).

## Park and Ride Service between Liberty County and Houston CBD

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. The proposed service span and frequency is 3 roundtrips for AM peak, 1 roundtrip for mid-day and 3 roundtrips for PM peak (HGAC, 2009). This service is not yet implemented in Liberty County.



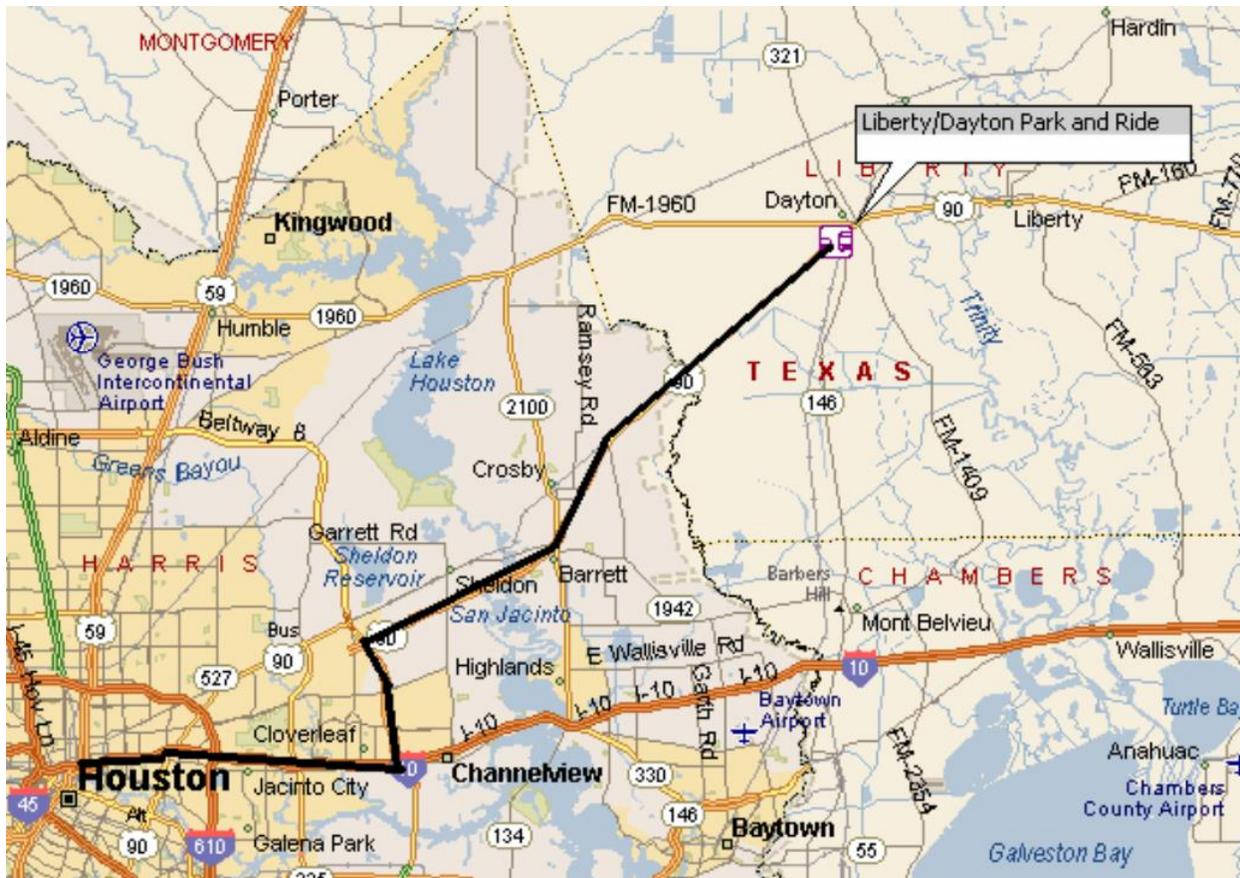


Figure 39: The proposed Park-and-Ride Service by H-GAC (Hackett, 2008)

## Grand Parkway Toll Road

The third loop of Grand Parkway is a proposed 37-mile, four-lane controlled access toll road, with a 400-foot right-of-way width (Segments H & I-1, n.d.). 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 County (Dietrichson, 2013). Segment H is 22.5 miles and segment I-1 is 1.8 miles. The Liberty County Commissioners Court voted on the 18<sup>th</sup> of December, 2012, to relinquish control of the county's portion of the Grand Parkway to the Texas Department of Transportation (Franco, Grand Parkway project moves one step closer for area, 2012). The construction is expected to start after the completion of another portion in the neighboring Montgomery County.

The goal of this project is to improve traffic mobility around Houston and to attract more businesses to Liberty County which will stimulate economic development in the County without negatively impacting the environment. The Segments H and I-1 Final Environmental Impact Statement (FEIS) was signed by the Federal Highway Administration on April 8, 2014 and was published in Federal Register on May 9, 2014.

The design of the segments H and I-1 began in 2015, as did the acquisition of the right-of-way. Construction is scheduled to begin in 2016 and the toll road should open to the public in 2019 (The Grand Parkway Association, 2014).

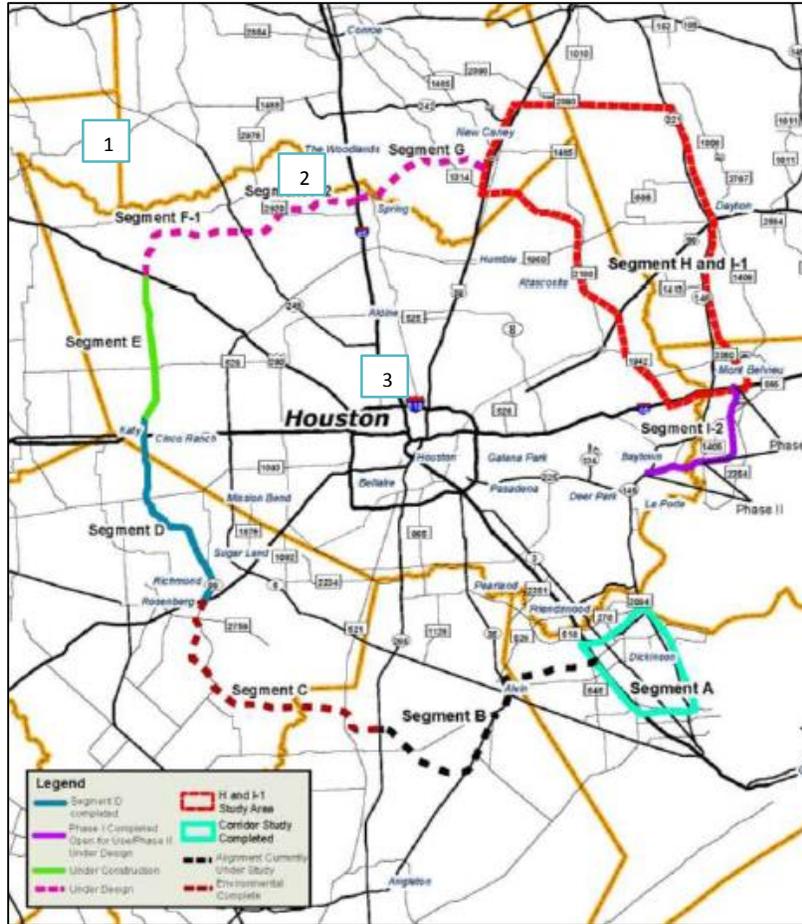


Figure 40: Grand Parkway Road, Segments H and I-1, US 59 (N) to IH 10 (E) (Segments H & I-1, n.d.)

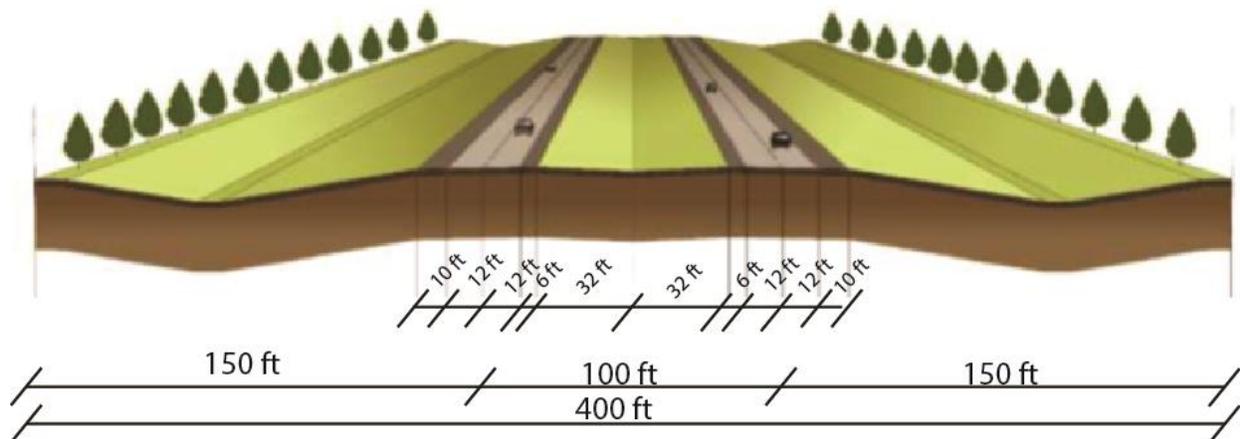


Figure 41: Highway Section for Grand Parkway Road, Segments H and I-1, US 59 (N) to IH 10 (E) (Segments H & I-1, n.d.)



# Public Infrastructure and Livability

## Fire

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. The Fire Departments and fire service areas serving Liberty County are shown in Figure 42. 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.

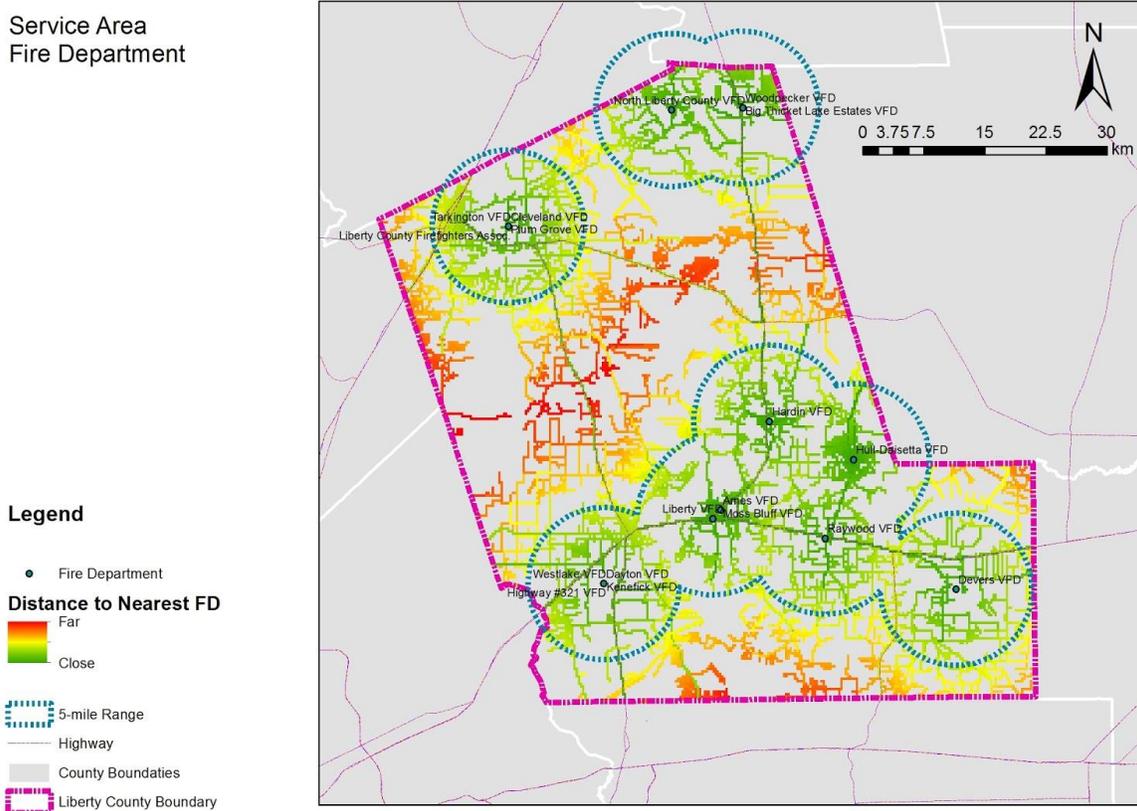


Figure 42: Liberty County, Fire Departments and Fire Service Areas



## Project 2020: Healthy Community Initiative

In 2009, Project 2020 was initiated in Liberty County by the Family & Consumer Sciences (FCS) Advisory Board (Texas A&M Agrilife Extension, 2009). 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.

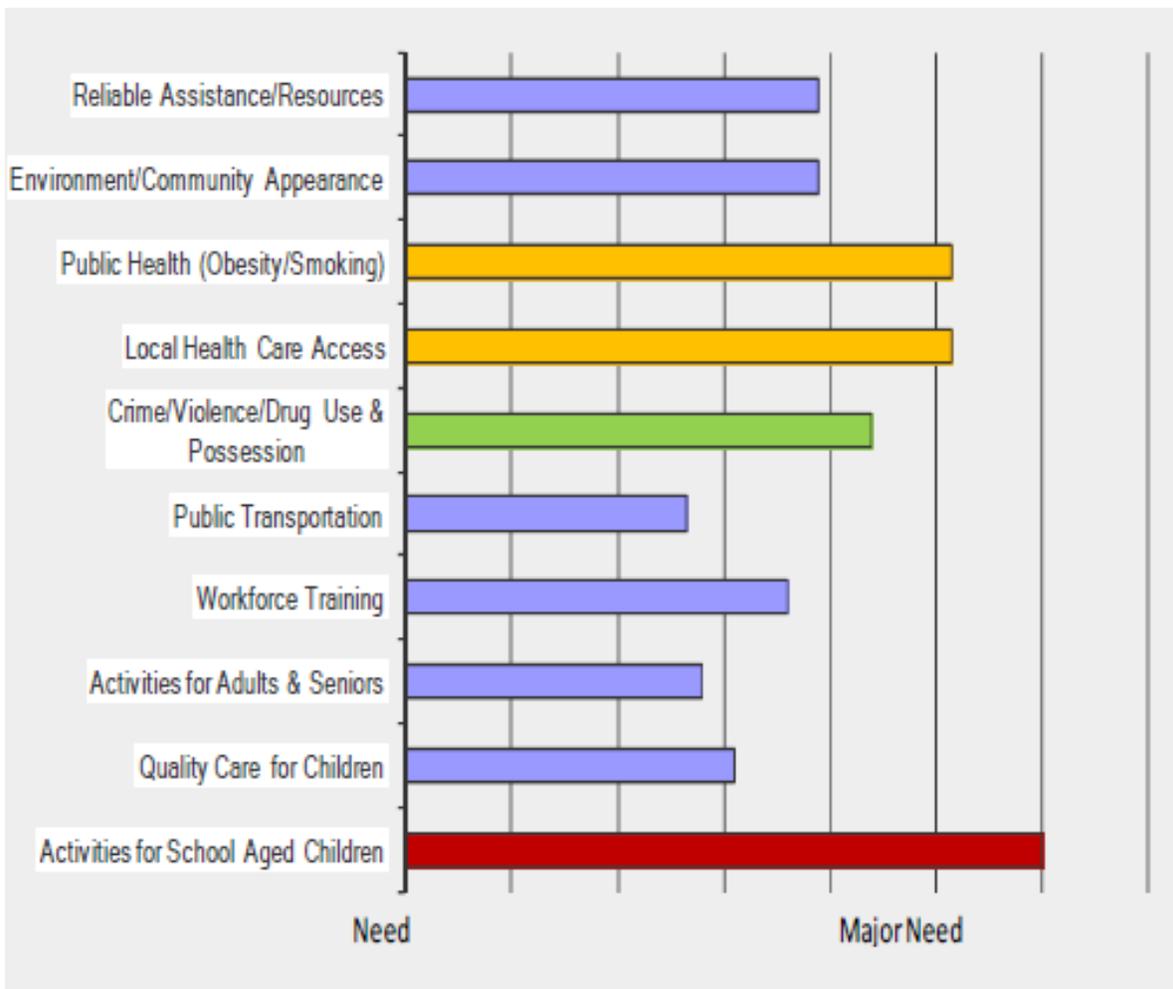


Figure 43: Liberty County Community Needs (Texas A&M Agrilife Extension, 2009)

## Hospitals

The map below (Figure 44) shows the distribution of health care facilities in Liberty County, which are mainly in Cleveland, Dayton, and Liberty. Other expanding area such as Daisetta obviously does not have much health services yet. People who live in rural areas rely heavily on commuting to other cities by highway to receive healthcare. Below is an overview of the important hospitals in the County, including their history and current status.



## 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, 2009 (Horswell, 2009).

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 \$235,000 (Franco, 2010). The hospital property and building are now formally owned by the Liberty County Hospital District #1 (Franco, 2010).

### Health Services

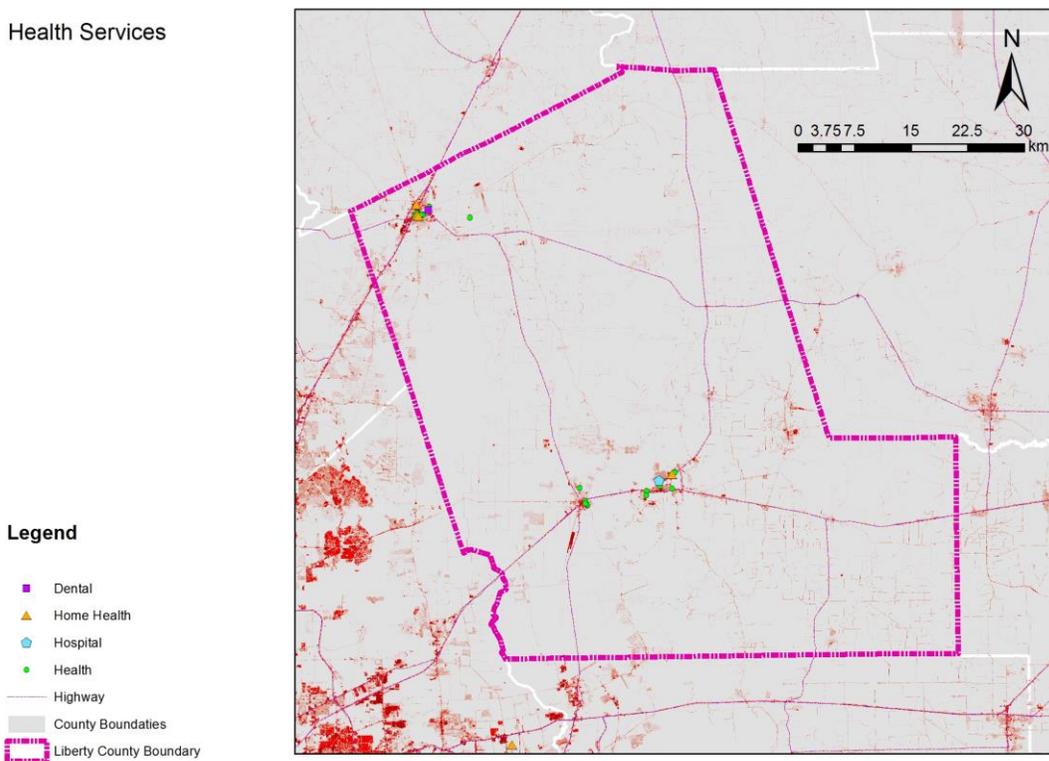


Figure 44: Liberty County, Medical Services and Hospitals Location

## 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 repairs (Caserta, 2014). The hospital was found to have had unsanitary kitchen, which led to decertification and the loss of Medicare eligibility and funding (Jacobson, 2014). The closure of the hospital affected not only the patients, but also the employees.



## 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 services. (Hospital, n.d.).

## Independent School District

As shown in Figure 45, the independent school districts are mainly located in Cleveland, Dayton, Liberty and Daisetta. They are also within the area, which is densely developed, and mostly built along the highways.

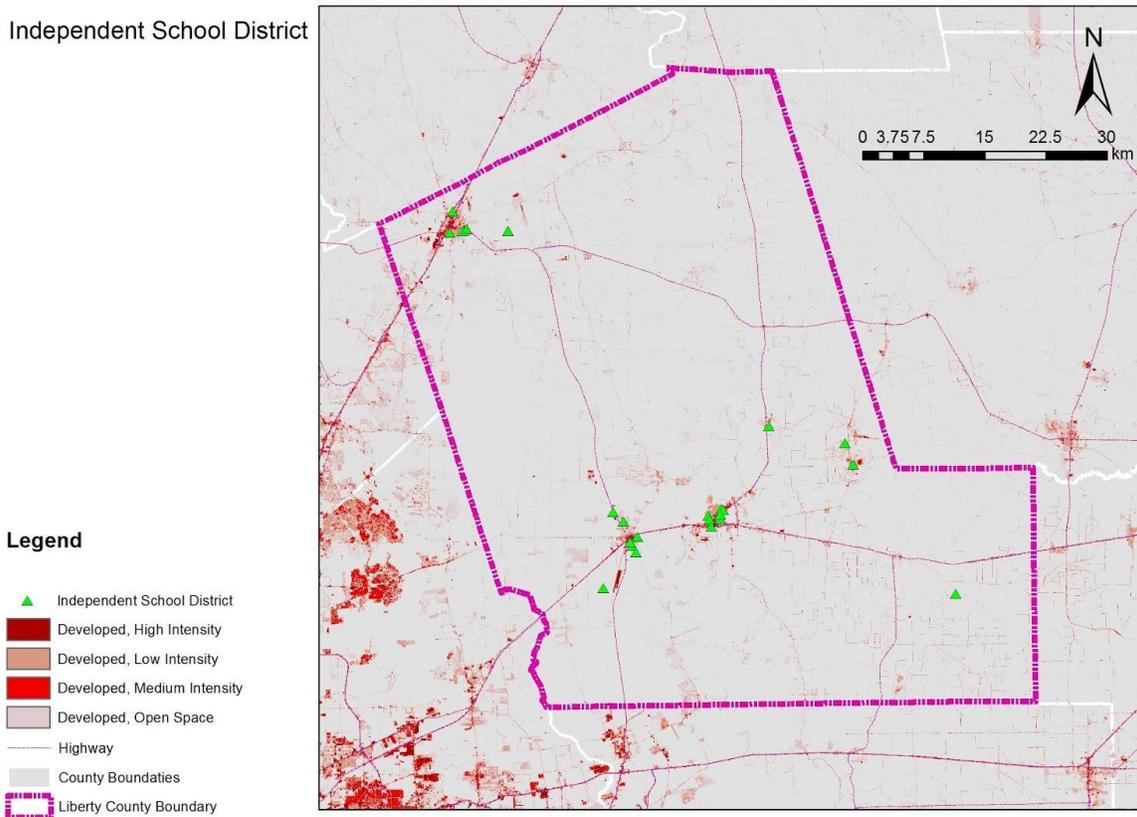


Figure 45: Liberty County, Independent School District



## Hazards Vulnerability

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 watershed (Texas General Land Office and The National Oceanic and Atmospheric Administration, 2011). The fact that Liberty County is coastal makes it more vulnerable to hazards.

### Flood Plains and Building Permits

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. 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 easy access to the Trinity River. Mainly woody wetland now, the floodplain area is not suitable for urban construction, and it can also limit the conversion from wetland to agricultural land.

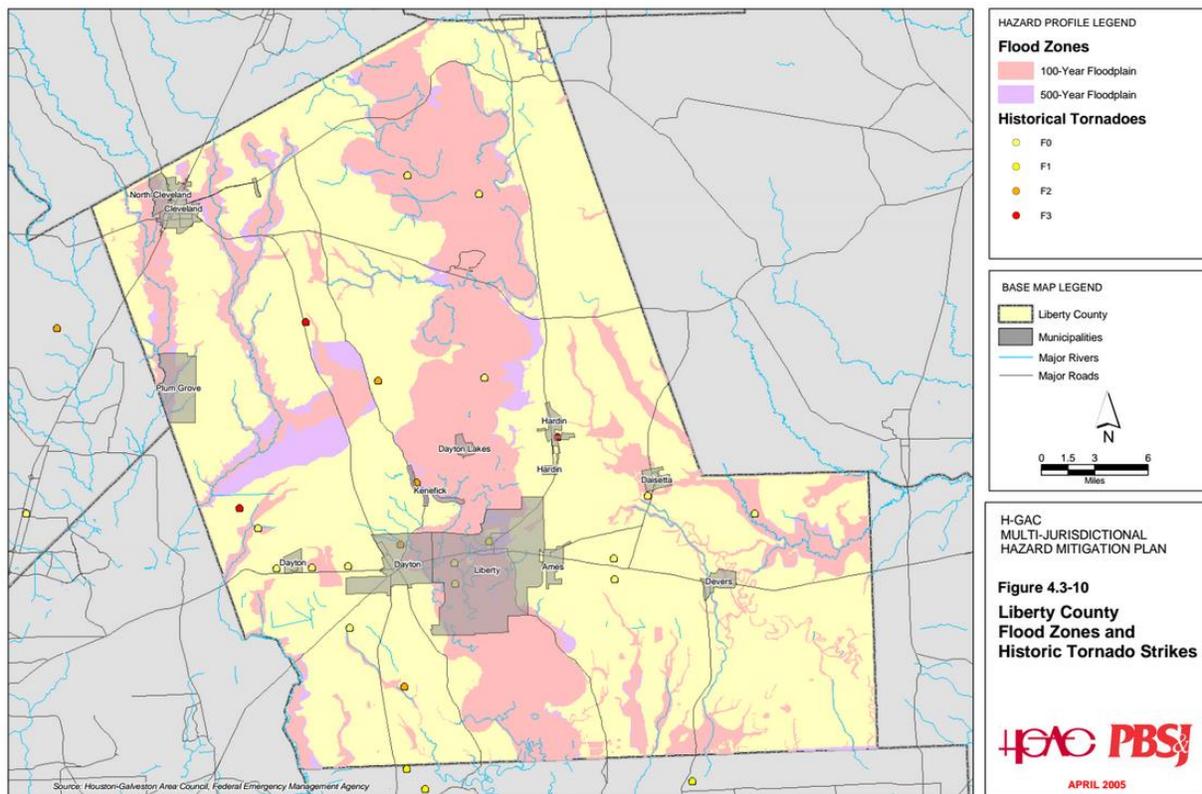


Figure 46: Liberty County, Flood Zones and Historic Tornado Strikes (H-GAC & PBSG, 2005)

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 purchase requirements and floodplain management standards apply” (FEMA, Zone AE and A1-30, 2014). Liberty County allows building in floodplain under specific permits. The building permit fees were set by the Engineering and Permit Department in Liberty County, effective August 1<sup>st</sup>, 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 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 flood event, need for temporary shelter, and job loss (FEMA, Designing for Flood Level Above the BFE: Home Builder's Guide to Coastal Construction, 2010). These certificates must be issued by a registered professional engineer (Louis W. Bergman, n.d.).

## Storm Surge

Most of the lands located in the estuary of Trinity River at Trinity Bay belong to Surge category 3, which is considered as “Extensive” (see Table 6). A number of sites are likely impacted by category 4 and 5 intensity winds. Saffir-Simpson Hurricane Wind Scale provides five categories for wind intensity and storm surge (NOAA, 2013).

Table 4: 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

Figure 47 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.



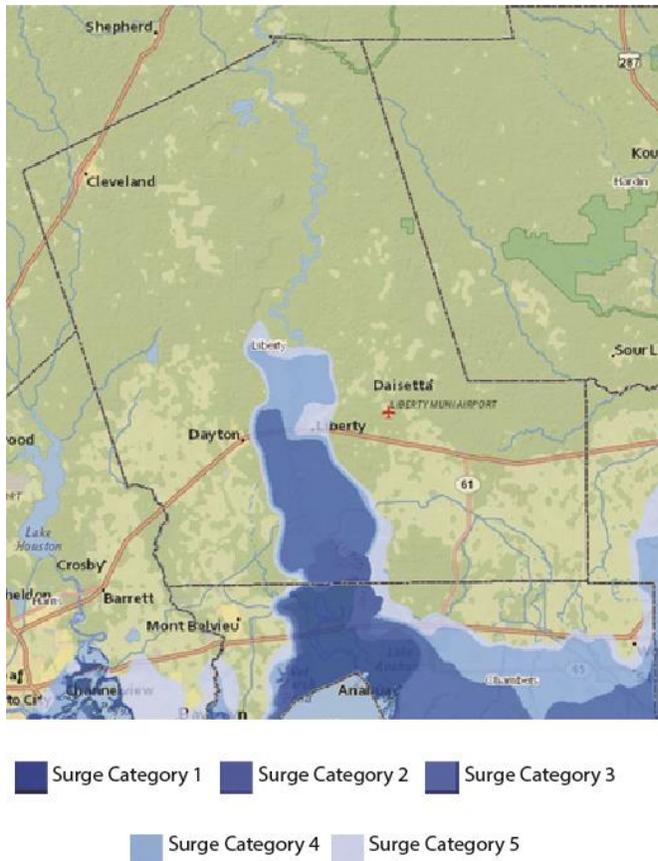


Figure 47: Areas Affected by Storm Surges  
(TAMU, n.d.)

## Hazard Recovery and Mitigation

After Liberty County was hit by Hurricanes Ike and Dolly, Community Development Block Grant (CDBG) disaster recovery program was put in place. After Hurricane Ike, the County lost 25% of intermediate care facility beds, which serve people with intellectual disabilities (Governor's Office of Homeland Security, 2008). This program was funded by the U.S Department of Housing and Urban Development (HUD) and it aims to provide safe and healthy housing in the hurricane impacted areas, especially for the elderly and disabled populations (Texas GLO, Housing Guidelines). In addition, it includes different steps such as impediments analysis, needs assessment, and complete environmental review.

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.

In addition to that, 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 demolished (Regional Flood Management Council, 2009).



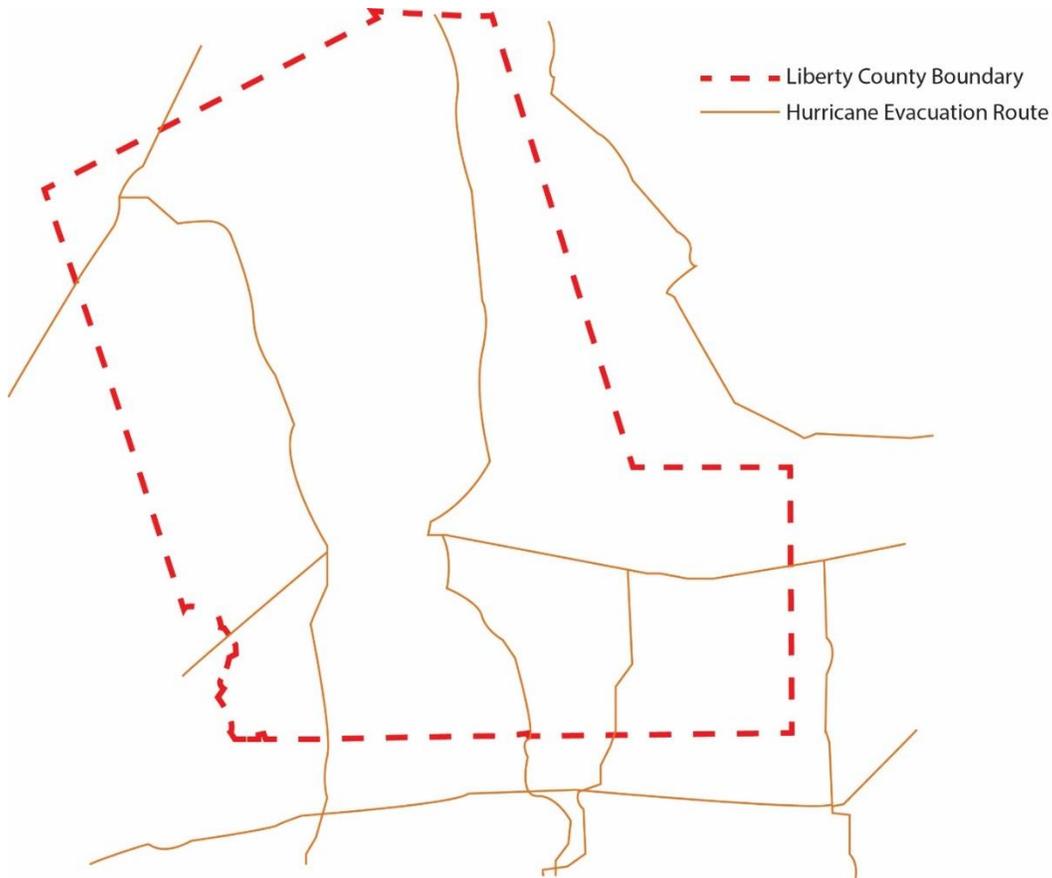


Figure 48: Hurricane Evacuation Routes in Liberty County

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 Figure 48). 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.

# SWOT

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## Strengths

- High economic base multipliers in mining, manufacturing, and retail trade promise economic growth
- Prime agricultural land and forests for lumber production
- Good highway network for intra-county and inter-county passenger and freight transportation
- Railway presence for industrial growth
- Presence of zoning plan in Cleveland to guide the city's mixed-use development
- Adequate fire protection to adapt for hazards
- Full school coverage for county needs

## Weaknesses

- Higher poverty rate, especially in lumber-producing and agricultural areas farther from Houston and lacking in transport
- Inadequate jobs within the county forces residents to commute outside county lines
- Poor employment opportunities for women within the county
- Issuance of building permits in wetland areas endangers critical habitats and prevents the area's capacity to decrease flood risk
- Dredge sites along Trinity River endangers biodiversity along the river
- Population density in surge zone and 100-year floodplain puts lives at risk
- Railway preventing livable/vibrant downtown in Cleveland
- No higher education opportunities within the county
- Inadequate public hospital facilities
- Existing evacuation routes lie within the 100-year floodplain and surge zones and are suitable only for pre-disaster evacuation

## Opportunities

- Projected population growth provides potential for economic boost and expanded opportunities for public services
- Cleveland serves as an example of future-oriented mixed-use for other cities in the county
- Calls to expand public transit with evidence of adequate market demand
- Support for affordable housing initiatives in major towns.
- Potential for commercial/industrial growth in Daisetta/Hardin
- Liberty's network development pattern can support further urban growth and a positive living environment
- Grand Parkway toll road expansion



- Perceived interest in community outreach and civic engagement activities for schoolchildren
- Proposed Park & Ride can reduce metro area vehicle miles traveled and roadway congestion

## Threats

- Population growth combined with high unemployment rate may worsen quality of life
- High desirability of neighboring counties lures residents outside Liberty County
- Trinity River ship transport pollutes the waterway

## Recommendations

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- Promote Mitigation Banking for preventing or minimizing conversion from wetland to agricultural land
- Stop issuing residential building permits in surge zone
- Encourage equitable division of resources on either side of bisecting railroad in Cleveland
- Reach out to county stakeholders to identify opportunities in diversifying economic activity to include sustainable energy generation to supplement fossil fuel extraction
- Develop building standards to elevate buildings and strengthen structures located in the 100-year floodplain zone
- Add fixed-route transit between Cleveland and Dayton-Liberty
- Add Park and Ride for inter-county commuters
- Explore opportunities for public-private partnership for the construction of an intermediate-size county hospital
- Encourage cities to develop comprehensive plans, including land use plans and compact patterns for improved walkability
- Direct more county resources to the northeast
- Establish a Women's Workforce Agency to help women gain skills to improve their employment situation
- Investigate evacuation route option outside the floodplain suitable for evacuation during and after flood events
- Encourage the establishment of a 2-year community college within the county
- Expand sports and cultural activities programs for school-aged children
- Promote the consumption of locally-grown agriculture via farmer's markets and CSA programs



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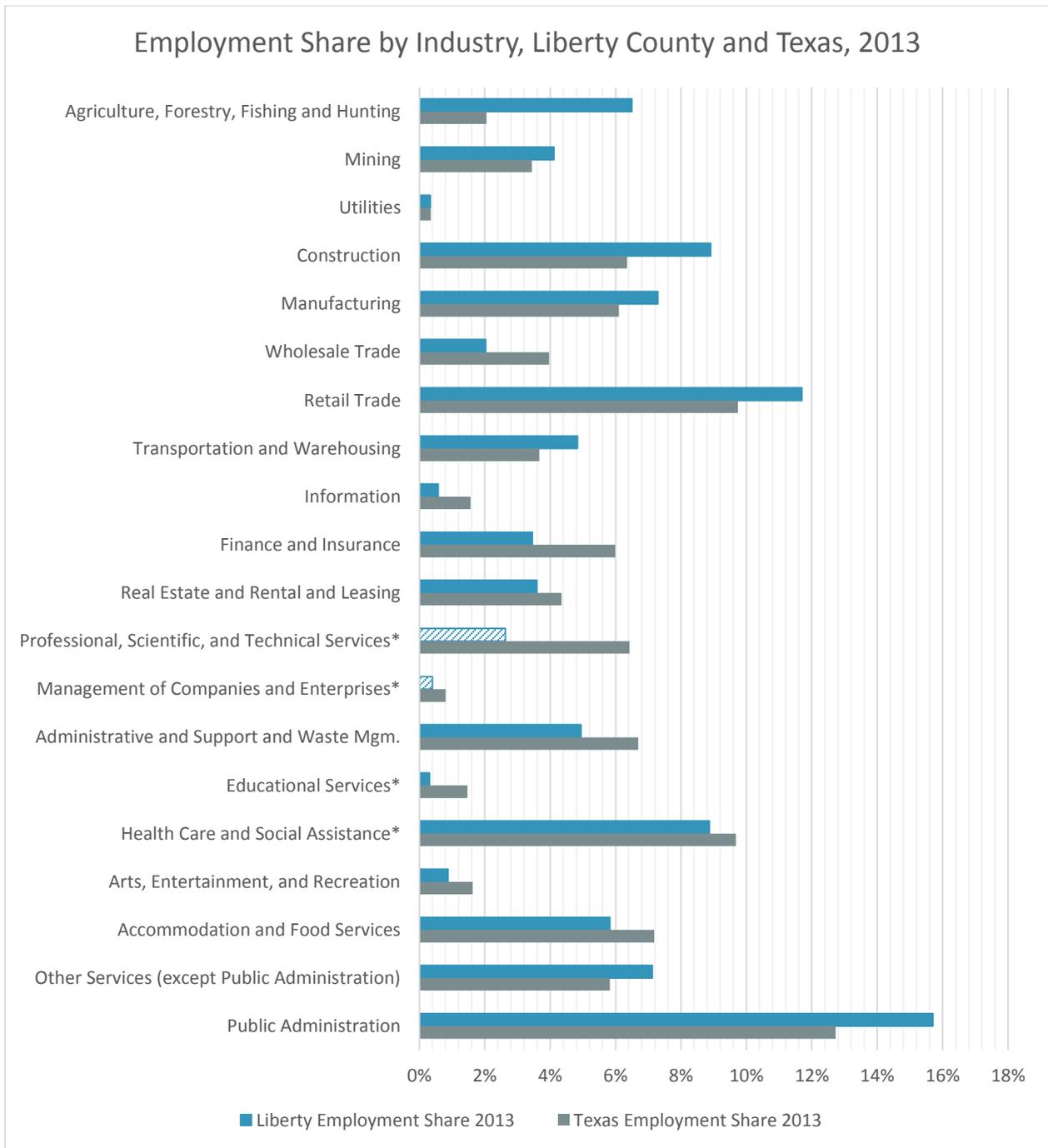
## Appendices

Table 5: Employment Figures (Bureau of Economic Affairs, 2013)

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

\*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.

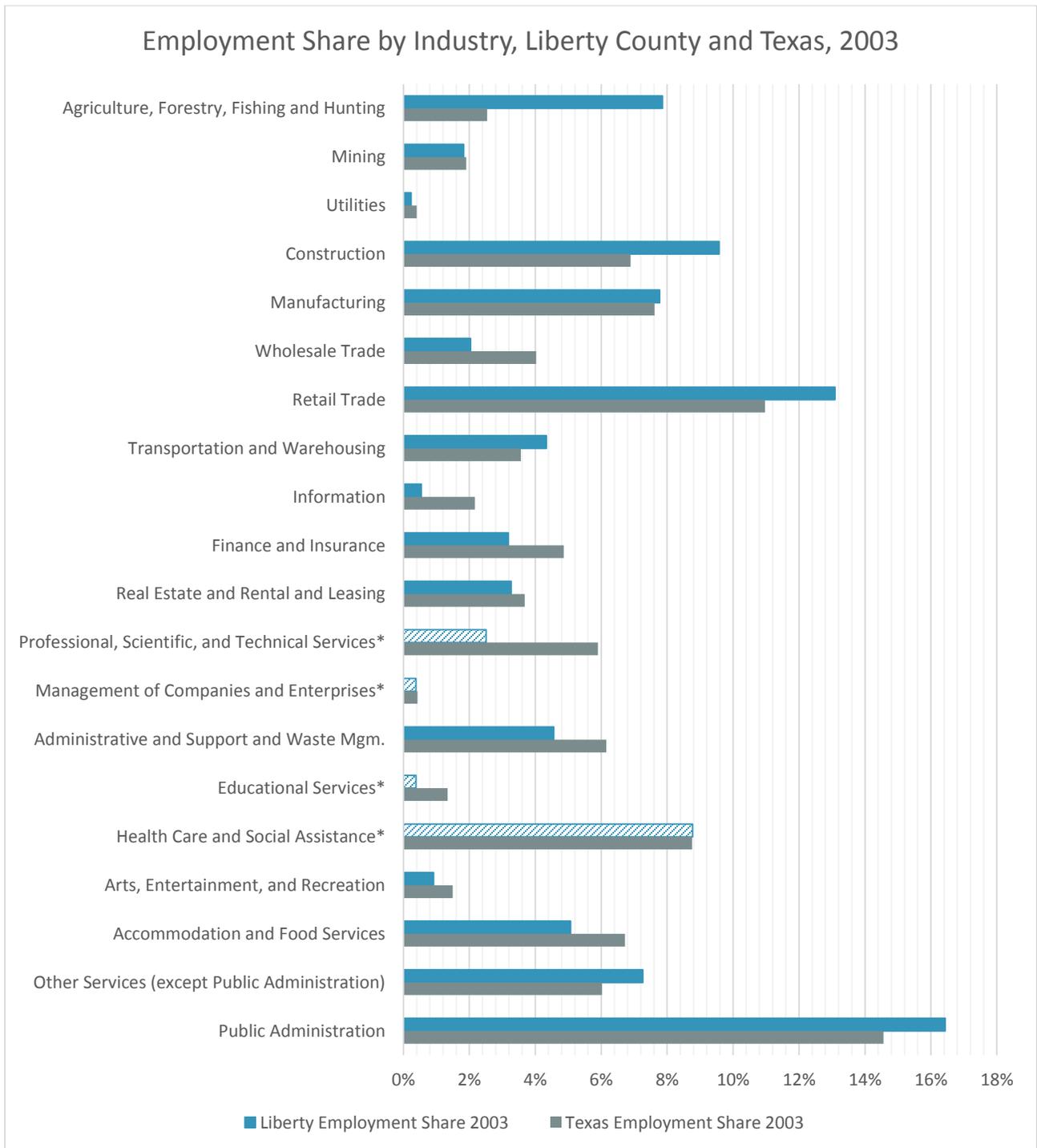
Figure 49: Employment Share by Industry, 2013



*\*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.*



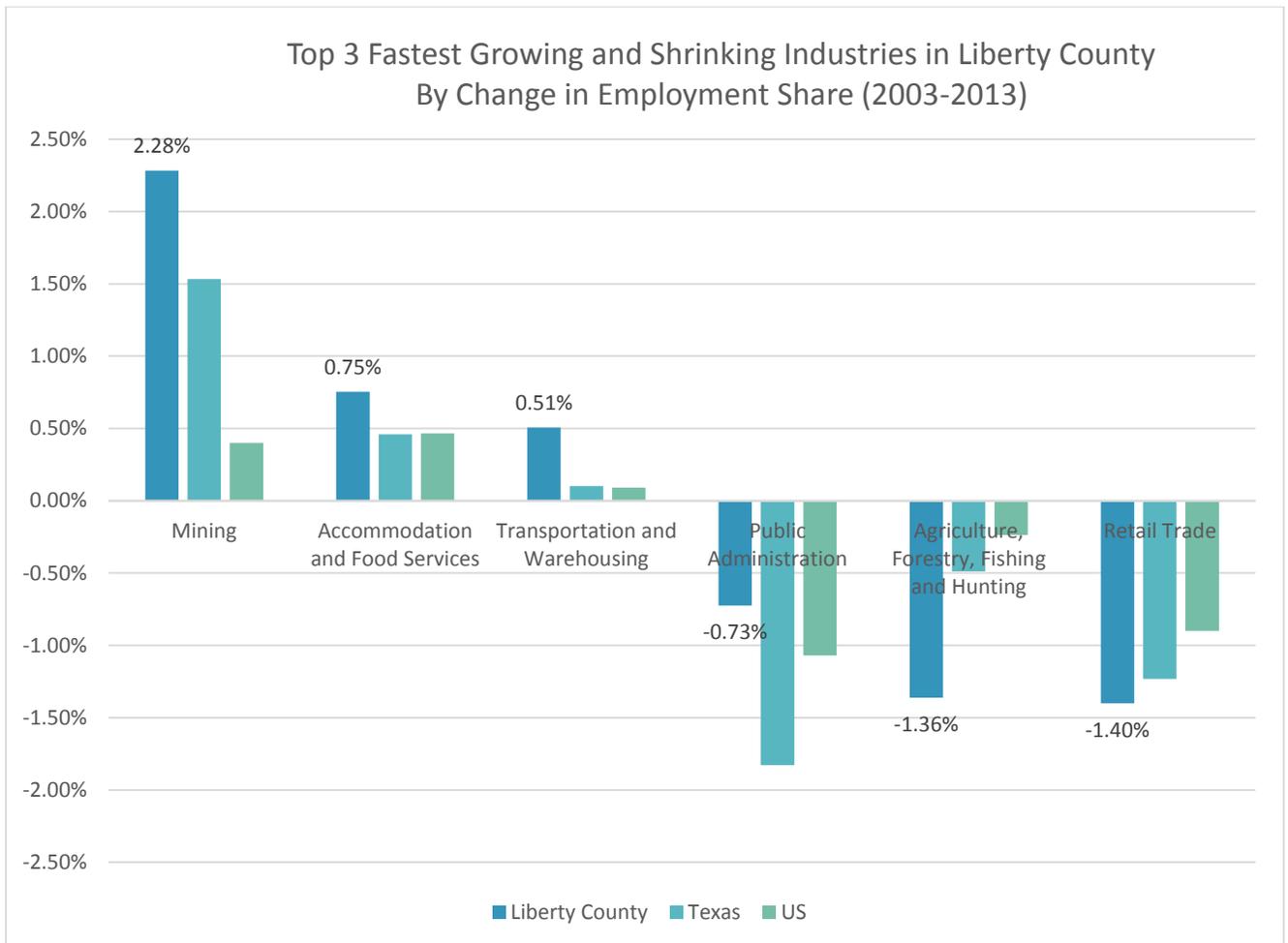
Figure 50: Employment Share by Industry, 2003



*\*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 51: Change in Employment Share (2003-2013)



**Table 6** Sustainability Study Using 14 Indicators for Liberty County

Sustainability Indicators	Unit	Liberty County	Texas
<b>Annual Urban Population Growth (1990-2000) / Total Population</b>	% per year	1.00	6
<b>Infant Mortality under 4 years old</b>	# / 10,000 pop per year	1.00	1
<b>Health Insurance (Medicaid enrollment / Total Population)</b>	%	1.44	10
<b>Total Toxic Waste / Land Area</b>	100 lbs. / sq. mile	0.09	2
<b>Education Level (Above College / Total Population)</b>	%	3.94	20
<b>Unemployment Rate</b>	%	0.70	5
<b>Poverty Level (% Families below Poverty Level)</b>	%	1.10	10
<b>Affordability Owner (Home Health Paying &gt; 25% of Income for Owners)</b>	%	0.91	25
<b>Affordability Renter (Home Health Paying &gt; 25% of Income for Renters)</b>	%	0.46	85
<b>Total Air Pollution (Total Mobile Industrial Air Pollution / Land Area)</b>	Tons / sq. miles	0.33	50
<b>Crime Rate (Total Crime / Total Population)</b>	%	1.26	2.5
<b>Driving Alone workers (Total Workers Driving Alone / Total Driving Workers)</b>	%	1.6	50
<b>Travel Time (Mean Travel Time to Work)</b>	Minute	2.5	15
<b>Per Capita Residential Energy Consumption</b>	Mwh	1.8	3
<b>TOTAL SCORE</b>		18.4 > Threshold (14)	



Table 7 : Height and Area Regulations  
(Cleveland, n.d.)

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

