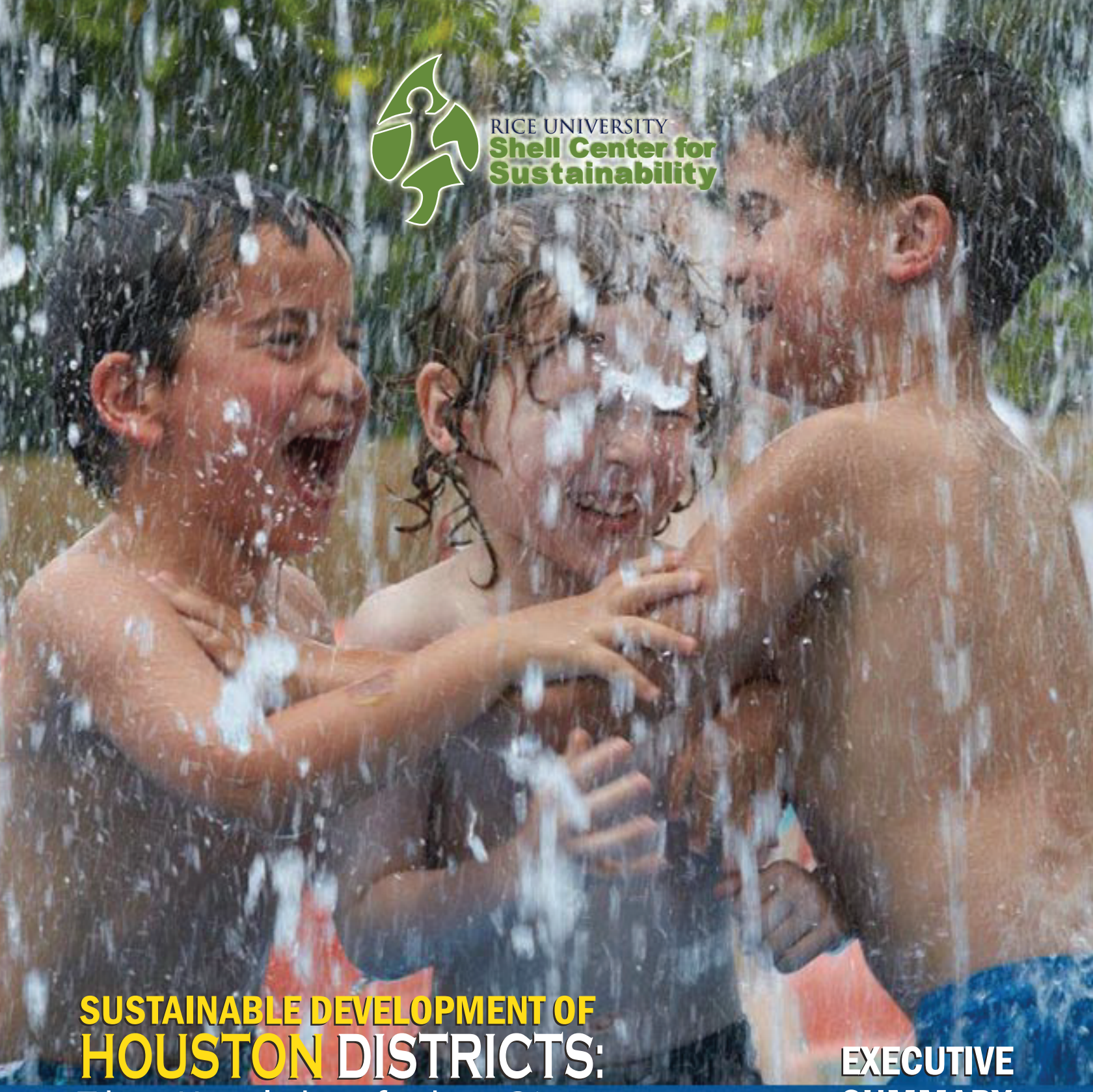

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SUSTAINABLE DEVELOPMENT OF HOUSTON DISTRICTS:

The Health of the City

EXECUTIVE SUMMARY

LESTER KING, PhD.

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Sustainable Development of Houston Districts: The Health of the City

by

Lester King, PhD, AICP, LEED

June 2013

Shell Center for Sustainability
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Acknowledgements

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Executive Summary

In order for citizens, analysts and elected officials to successfully pursue the sustainable development of the City of Houston, a robust set of indicators are needed to identify those issues that are integral to sustainable development and measure progress toward managing those issues. Sustainable development indicators, by definition, are distinct from traditional performance metrics in that they are value laden with sustainability principles and themes and a growing sustainability knowledge base.

Sustainability principles and themes include: ensuring balance among the pillars of sustainability (social, economic and environmental awareness); comprehensiveness; reliability and validity, timeliness and sensitivity. The interconnectedness of the various systems of city development is also an important principle of sustainability. Many city departments today enhanced their erstwhile reporting instruments by including reference to sustainability and focusing on such accomplishments as energy savings. While energy savings is indeed important, it is but one factor in the comprehensive sustainable development of a place where people live and work. In fact, it can be stated that the pursuit of energy savings should be business as usual for efficient company, organization or city management and hence does not validate the need for sustainable development. Further, many companies that pursue energy savings do so for the monetary savings and not the environmental or social impact of energy production and consumption.

This document discusses several of the issues important for the sustainable development of Houston. It is organized by first outlining the big issues and topics relevant to the city by presenting them as Themes and Sub-Themes; then selecting indicators to define those themes; then identifying metrics to measure those indicators, and finally describing the metrics. Policy and programmatic recommendations to improve the indicators of sustainable development in Houston are included after each section. These recommendations are the result of three workshops convened on the campus of Rice University with experts and advocacy groups representing several different fields and agencies in Houston (see Appendix A).

Research here is intended to facilitate discussion and decision making for the sustainable development of the City of Houston. The City of Houston Council Districts were selected as the major units of analysis for this study for two primary reasons. First the Council Districts are the administrative boundaries lead by officials directly elected by the citizens of Houston to lead on the Houston City Council. Secondly the Council Districts represent the primary spatial mechanism, through which capital improvement funds are distributed annually throughout the city. On an annual basis, citizens have the capability to identify issues or projects they would like to have funded in their discreet districts; elected officials have the capability to advocate for projects they would like to have funded in their discreet districts; and city staff have the capability to identify projects that require funding for maintenance and development of the city. These three avenues represent the main forces influencing the sustainable development of the City of Houston. Since this document highlights the sustainable development of each district and compares development among the districts it may be used to demonstrate the degree of diversity among districts

in the City of Houston with regards to Sustainable Development. The reader should also note that within each district there may be several discreet neighborhoods of varied typology. This study will in all cases make reservations for prevailing trends and average patterns within each council district and where possible reference the degree of variability within each district.

This document primarily focuses on development in the year 2010. At that time the city was divided into 9 districts, A – I. Presently, as a result of redistricting 2 other districts were added J and K. Although J and K did not exist in 2010, they are used in this report owing to their extant status. Therefore the city is divided in all indicators according to 11 districts A – K. This was not an appropriate approach for the Capital Improvements Spending indicator, since the data was collected by district.

The study is primarily intended to assist citizens, staff analysts, and decision makers to address the question, ***'How are Houston districts developing with regards to sustainability?'***

This document is a follow up to *Houston Sustainability Indicators: A Comprehensive Development Review for Citizens, Analysts and Decision Makers* (King, 2012). That study was based on: allocation of the sustainability indicators according to the *Theme – Sub-theme* framework; systematic structure of indicators to achieve balance among the three pillars in sustainability; and data collection for 1990, 2000, and 2010. The first document in the series was *Measuring City Sustainability: Project Houston* (Blackburn, 2010). That document, the first in this series published by the Shell Center for Sustainability, was based on a student class review and selection of the most cited indicators of city sustainability in the country in 2010. The next document in this series will be a thematic study of select sustainability indicators in the City of Houston. Expected publication date is Fall 2013.

Table 1: Districts Rank Comparison: Snapshot of districts performance. Green to red indicates whether the high rank is good or poor according to sustainability.

Measure		Min	Houston Average	Max		High Rank					City Average					Low Rank
Social Development																
PopGrowth	%	0.2	1.2	3.3		I	C	H	D	B	A	F	J	K	G	E
Graduation	%	47.4	77.7	95.6		J	I	D	B	K	H	C	A	F	G	E
Voting	%	3.6	7.0	13.3		F	J	A	I	H	B	E	K	D	G	C
Poverty	%	7.1	22.8	31.8		G	E	C	F	K	A	D	I	H	B	J
Pop per Health Center	#	3,966.0	10,497.3	47,017.9		D	B	H	I	J	C	K	A	F	E	G
HousingCost > 30%Income	%	24.1	29.6	33.6		E	C	G	A	I	H	J	D	K	B	F
Pop 1/4 mile to Parks	%	27.5	40.7	58.4		F	G	J	B	A	K	E	D	H	C	I
Pop in Food Deserts	%	12.2	36.0	60.3		G	C	F	I	J	A	H	D	E	K	B
Economic Development																
Unemployment	%	4.6	10.0	12.6		G	C	E	A	K	F	H	J	I	D	B
Primary Jobs	%	11.7	18.8	49.1		I	C	G	B	E	F	A	H	J	K	D
Median Household Income	$	28,735.4	42,355.0	72,421.1		B	J	H	I	D	F	A	K	C	E	G
Housing 1/4 mile to Jobs	%	3.8	26.1	53.5		E	H	K	B	A	F	D	I	J	G	C
* CIP per capita	$	602.0	968.8	1,358.9		A	F	G	E	B	J	K	H	C	I	D
Pop 1/4 mile to Bus Stops	%	10.4	68.5	99.8		E	A	F	K	D	B	G	I	C	H	J
Average TravelTime	#	19.9	25.5	28.7		C	G	D	H	I	E	A	J	K	F	B
Pop using Transit	%	1.7	4.9	8.3		E	G	A	C	F	I	K	B	H	D	J
Environmental Development																
** Air - Max AQI - Ozone	#	106.0	125.0	145.0		D	B	F	K	H	G	C	A	E	J	I
Water-Household (ac ft/y)	#	12,095.0	16,465.0	22,244.0		H	I	J	D	B	K	A	F	E	G	C
Flooding-Pop in FloodZone	#	9,270.0	32,566.0	61,003.0		G	I	H	D	E	K	A	B	C	J	F
Land - Med-Low Devlop	%	27.9	46.0	65.6		E	F	A	B	J	I	D	K	H	G	C
Land Use Mix (index)	#	2,118.1	2,615.0	5,739.0		B	E	A	H	I	D	K	F	C	G	J
Land - Commercial	%	1.9	10.0	41.8		G	E	C	D	K	J	H	A	F	B	I
Land - MultiFamily	%	7.6	41.0	74.9		H	I	B	E	A	D	K	F	C	G	J
Land - SingleFamily	%	6.4	16.0	35.9		J	F	A	B	I	D	C	K	E	G	H

* Districts J and K were assigned the average for the entire city.

** Districts C, G and H assigned city average since no monitor in those areas met federal regs.

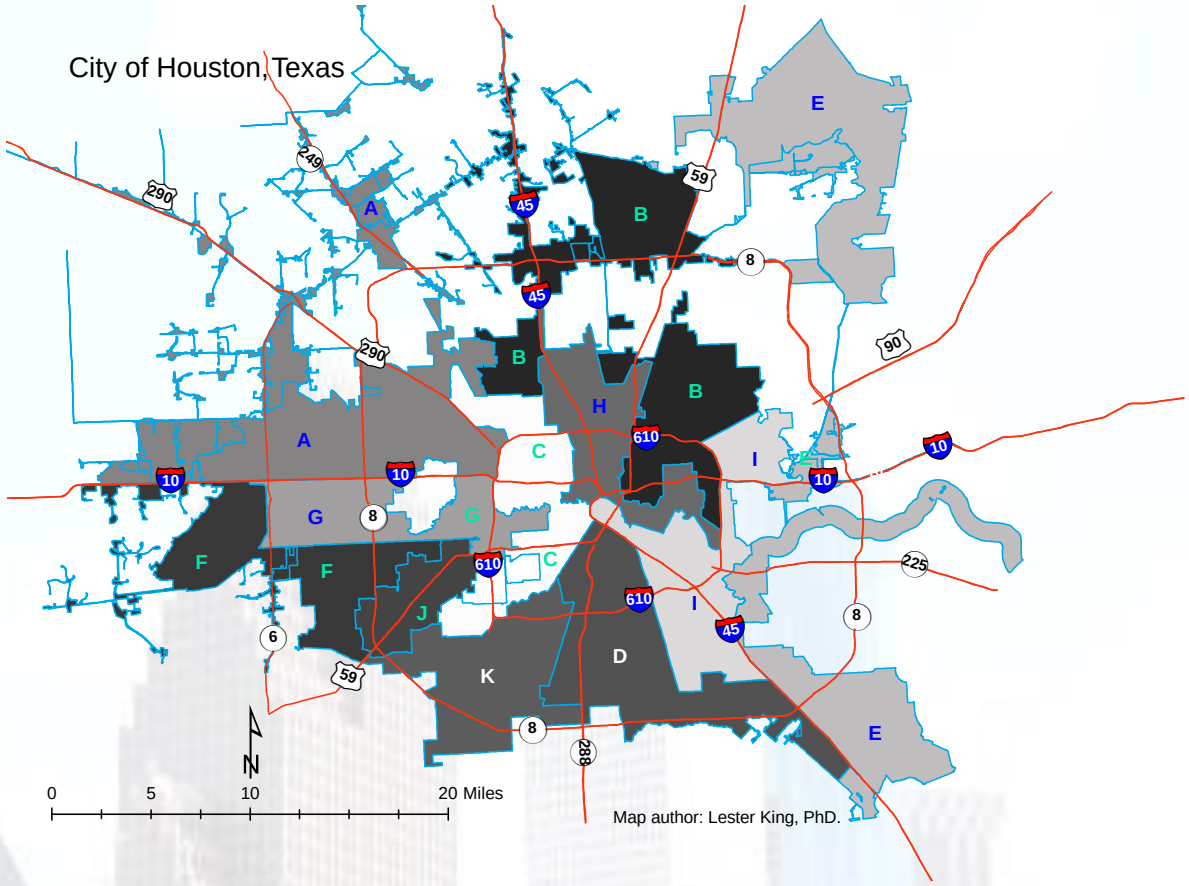

Table 1 shows a comparison of the 11 Districts in the study across the major sustainability indicators chosen for this report. Districts are described first by the numerical values of minimum performance, city average and then maximum performance. Then the districts are rank ordered from left to right according to minimum to maximum performance. In some cases the minimum performance among the districts is actually the better (high) rank according to sustainability and in some cases the minimum performance is the lowest rank. Therefore the color gradation codes of green to yellow to red was meant to illustrate the sustainability performance rank of better ranking to city average to low ranking on the sustainability indicators across the 11 districts. Additionally, for those limited by greyscale printers, the lower ranking districts were depicted in a smaller font complete with white text on the darker red color bands.

Further research is needed to determine whether there is a pattern in any subset of districts, which perform overall either better than other districts or worse than other districts according to sustainability. Research also needs to be conducted on the relative importance of the indicators chosen to determine if the initial question is valid. The reader should note that the sustainability indicators effort is not meant to establish an index and so districts will not be ranked with a single number across all of the indicators. That said, the visual inspection of the ranking (as depicted in Table 1) to determine

whether some districts fall more often than others in either the better or lower ranks according to the indicators, is a valid use of the data presented in this research. Some of those findings are briefly presented below.

District A – Ranked among the average performers in the social development indicators 5 times; ranked among the low performers in the economic development indicators 4 times; and ranked among the average performers in the environmental development indicators 5 times. Overall District A performed at an average level on 13 of the 24 indicators when compared to other districts in the city and performed at a high level on 4 of the 24 indicators. District A has the most manufacturing jobs in the city.

District B – Ranked among the low performers in the social development indicators 5 times; ranked among the low performers in the economic development indicators 5 times; and ranked among the better and average performers in the environmental development indicators 3 times. Overall District B performed at a low level on 12 of the 24 indicators when compared to other districts in the city and performed at a high level on 5 of the 24 indicators. Almost 1 in 3 persons in District B live in poverty (31%).

District C – Ranked among the high performers in the social development indicators 5 times; ranked among the high performers in the economic development indicators 5 times; and ranked among the low performers in the environmental development indicators 6 times. Overall District C performed at a high level on 11 of the 24 indicators when compared to other districts in the city but performed at a low level on 9 of the 24 indicators. District C is strong on the socio-economic indicators in this report.

District D – Ranked among the low performers in the social development indicators 5 times; ranked among the high performers in the economic development indicators 5 times; and ranked among the high and average performers in the environmental development indicators 3 times respectively. Overall District D performed at a low level on 10 of the 24 indicators when compared to other districts in the city. District D performed at a high level on 9 of the 24 indicators. The district contains many persons in poverty with unemployment above the city average. It also contains many jobs, but its inhabitants are not obtaining the education and training needed to fill these jobs.

District E – Ranked among the high performers in the social development indicators 4 times; ranked among the low performers in the economic development indicators 5 times; and ranked among the low performers in the environmental development indicators 5 times. Overall District E performed at a low level on 12 of the 24 indicators when compared to other districts in the city and performed at a high level on 8 of the 24 indicators. District E has poor access to public transportation.

District F – Ranked among the low performers in the social development indicators 4 times; ranked among the low performers in the economic development indicators 6 times; and ranked among the high and average performers in the environmental development indicators 3 times respectively. Overall District F performed at a low level on 12 of the 24 indicators when compared to other districts in the city but performed at a high level on 6 of the 24 indicators. One in three households in District F have housing affordability problems.

District G – Ranked among the high performers in the social development indicators 6 times; ranked among the high performers in the economic development indicators 4 times; and ranked among the low performers in the environmental development indicators 5 times. Overall District G performed at a high level on 12 of the 24 indicators when compared to other districts in the city but performed at a low level on 10 of the 24 indicators. This is the most affluent district in the city.

District H – Ranked among the average performers in the social development indicators 5 times; ranked among the high and average performers in the economic development indicators 3 times respectively; and ranked among the low performers in the environmental development indicators 4 times. Overall District H performed at an average level on 9 of the 24 indicators when compared to other districts in the city but performed at a high level on 7 of the 24 indicators. District H is 70% Hispanic.

District I – Ranked among the low performers in the social development indicators 4 times; ranked among the average performers in the economic development indicators 4 times; and ranked among the high and low performers in the environmental development indicators 3 times. Overall District I performed at a low level on 9 of the 24 indicators when compared to other districts in the city but performed at a high level on 8 of the 24 indicators. District I has the highest percentage of Hispanic persons with 80%.

District J – Ranked among the low performers in the social development indicators 5 times; ranked among the average performers in the economic development indicators 4 times; and ranked among the low performers in the environmental development indicators 4 times. Overall District J performed at a low level on 11 of the 24 indicators when compared to other districts in the city but performed at a high level on 6 of the 24 indicators. Critical indicators such as high poverty and low incomes affect this district.

District K – Ranked among the low performers in the social development indicators 5 times; ranked among the average performers in the economic development indicators 4 times; and ranked among the average and low performers in the environmental development indicators 4 times. Overall District K performed at a low level on 11 of the 24 indicators when compared to other districts in the city but performed at a high level on 4 of the 24 indicators. District K has the lowest number of jobs in the city. As a result of residents having to travel to other districts for work, a lot of traffic and associated emissions are generated by residents from this district.

Details for each sustainability indicator and district are presented in the report, which is concluded by a section presenting further overall findings.


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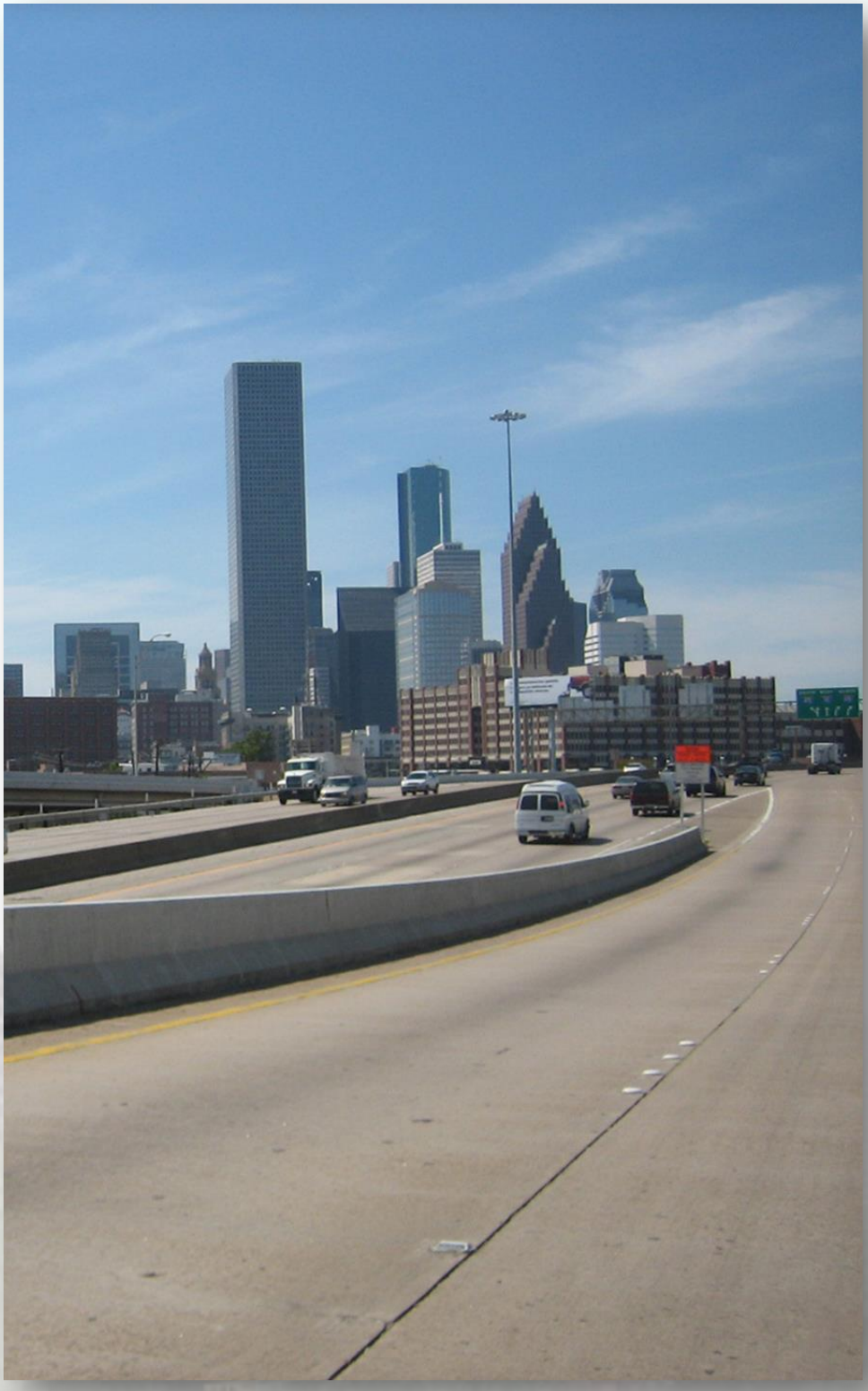

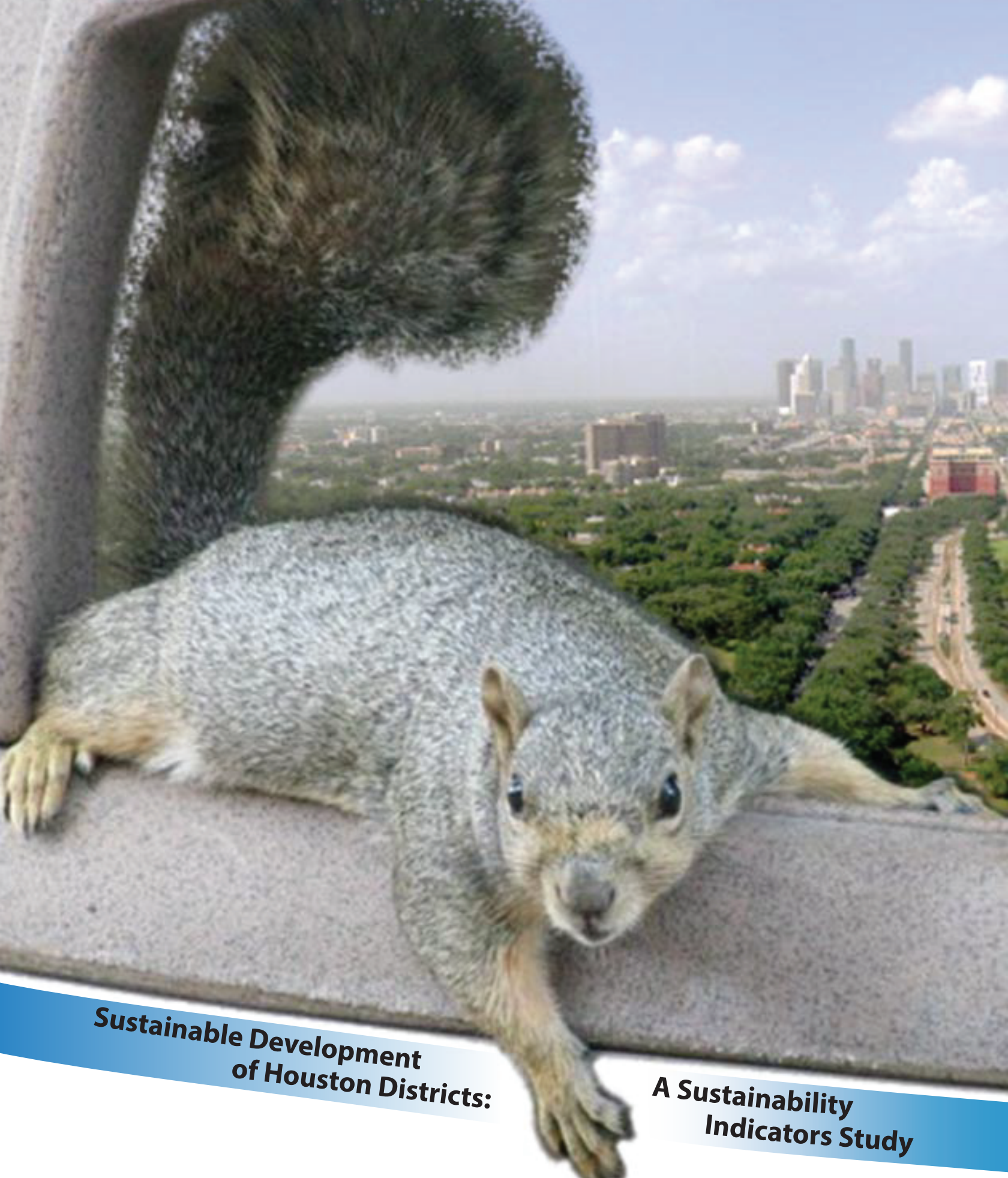

Sustainable Development of Houston Districts:

A Sustainability Indicators Study

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SUSTAINABLE DEVELOPMENT OF HOUSTON DISTRICTS: SOCIAL DEVELOPMENT

The Health of the City

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Social Development Pillar of Sustainability

Theme - Social Demography
Sub Theme - Population Growth

Indicator - Population Growth

Population Growth is one of the indicators of urban successes in the United States (Linneman & Saiz, 2005). Municipalities compete for population growth in different ways: ensuring adequate housing supply; quality schools; or funding beautification projects for an enhanced quality of life (Hill & Brennan, 2012). Some suggest that Houston's population growth is based on its ability to provide an affordable lifestyle for middle-class people, primarily due to low cost housing (Glaeser, 2011). Population growth has an essential impact on sustainability in that the per capita demand on non-renewable resources should be monitored to ensure supplies are available for present and future generations.

Sustainability Benefit: Houston is the 4th largest city in terms of both population and land area and the 25th most densely populated among the 63 largest cities in the country (U.S. Census Bureau, 2011). The city is attracting new residents, which suggests that these new residents perceive living in Houston as advantageous over other places to live.

Sustainability Issue: More residents require more resources. Sustainable management of natural resources in Houston is critical to ensure that the supplies are sufficient to accommodate the needs of increasing population levels. Additionally, Anglos are the only racial/ethnic group that has declined in absolute numbers since 1980, dropping 36 percent (300,000 persons) between 1980 and 2010.

The following figures and tables represent different metrics to measure the indicator *Population Growth*:

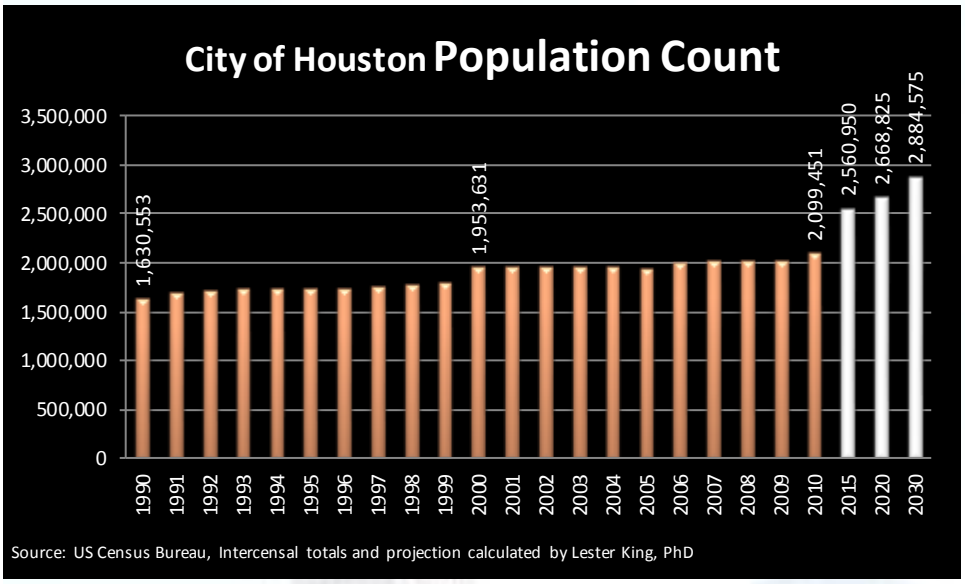


Figure 1: City of Houston Population Growth

- In 2010 Houston was the fourth largest city in the United States with 2,099,451 people (Census 2010). Based on the population growth trend between 1990 and 2010, the City of Houston will gain over 500,000 persons by 2020. The 2030 population is projected to be 2,884,575 persons within the city limits (Figure 1). The City of Houston average annual growth rate projection for each year between 2010 and 2020 is 1.42%.

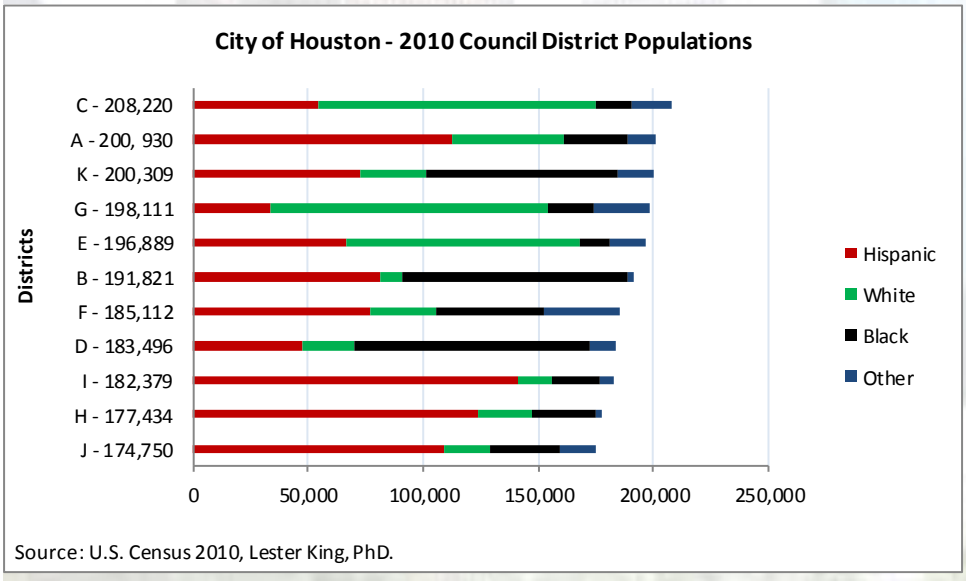


Figure 2: Council District Populations

- In 2010 Houston Council District populations ranged from District J with 174,750 persons to District C with 208,220 persons.

- Each district is represented by an elected official who serves on the Houston City Council. Therefore, the average City Councilman in Houston represents the needs, aspirations and goals of approximately 191,000 citizens.

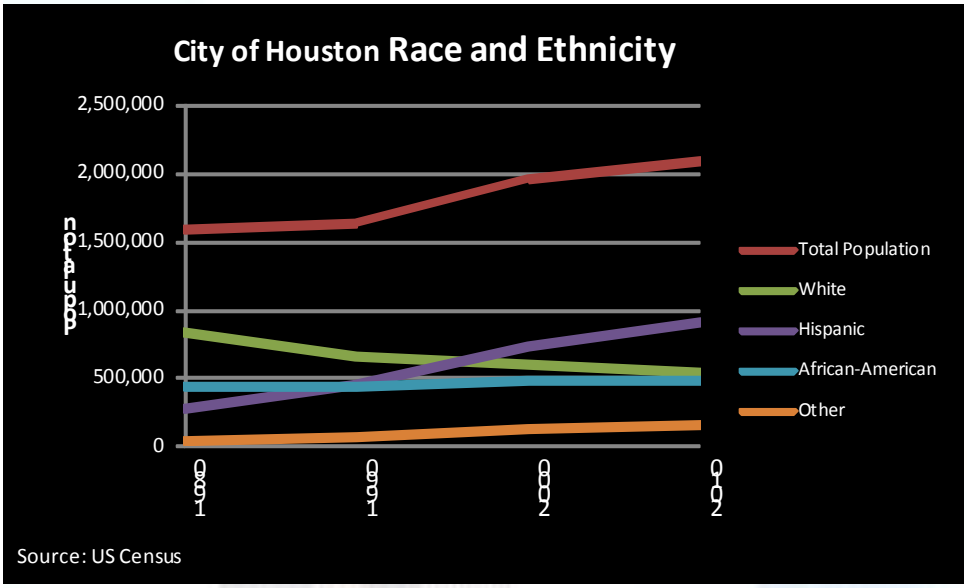


Figure 3: City of Houston Race and Ethnicity

- The race and ethnicity composition of the city is as follows: Hispanic 43.8%, White 25.6%, Black 23.1%, All others 7.4%. In 1980 there were at least 500,000 more Whites than Hispanics in the City of Houston. The exact counts were 834,061 White and 281,331 Hispanics. The population counts for Whites and Hispanics were approximately the same around 1996.
- The latest decennial census results show that there are almost 400,000 more Hispanics in the City of Houston than Whites. Exact counts are 537,901 Whites and 919,668 Hispanics.
- In 1980, the African American population was almost half that of the White population. In the 2010 census the African American population was estimated at just over 50,000 persons less than the White population.
- The City of Houston is losing population among the White cohort.
- Most of the growth in the City of Houston can be attributed to the Hispanic population. A look at figure 3 shows that the trend for the Hispanic population almost exactly matches the trend for the city as a whole after the 1990 census.

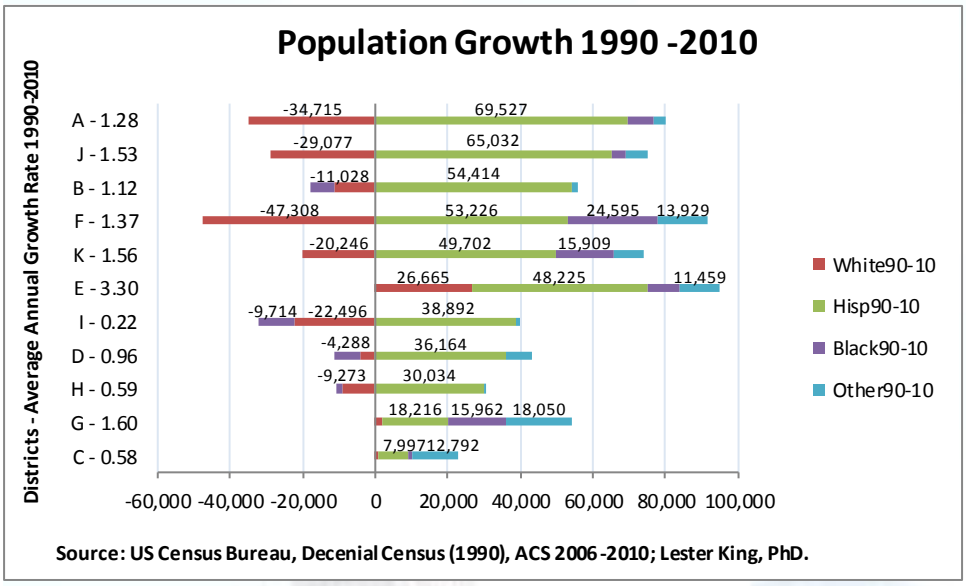


Figure 4: Population Growth 1990 – 2010

- The above chart shows the average annual growth rate based on 1990 – 2010 population growth for each district (Next to district label on left of figure). It also shows the total growth for each racial/ethnic group by district.
- The average annual growth rate, based on the 20 year period between 1990 – 2010, ranged from 0.22 (District I) to 3.30 (District E).
- Most districts lost considerable population among the White cohort between 1990 and 2010 (Districts A, J, B, F, K, I, D, H). The largest lost was District F with 47, 308 persons. Districts E, G and C did not lose population among the White cohort during this period.
- All Districts gained population from the Hispanic cohort between 1990 and 2010.
- Four districts lost population from the African American cohort (Districts D, H, I and B). The largest lost was in District I with 9,714 African American persons.

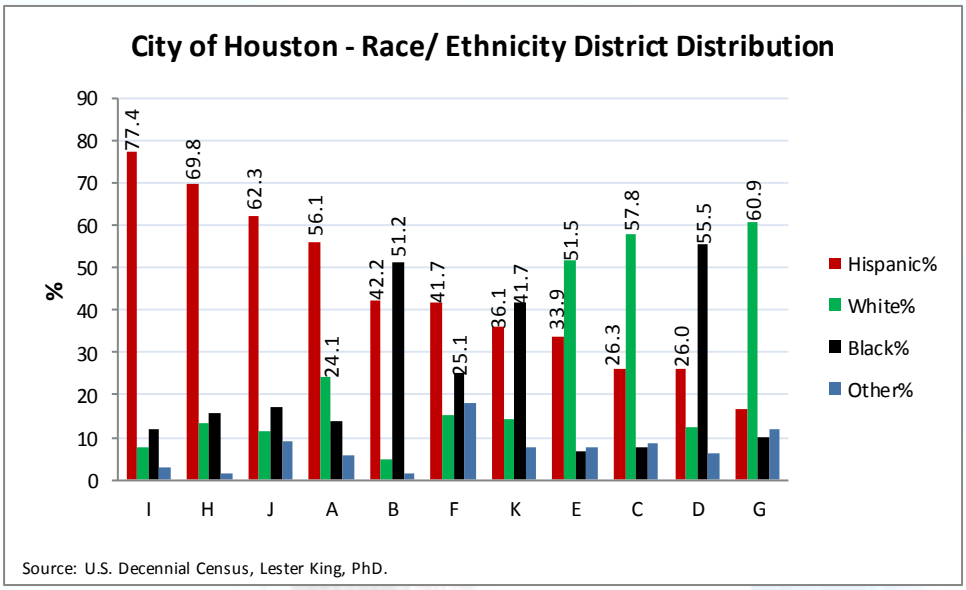


Figure 5: District Race and Ethnicity

- The above figure shows the racial and ethnic distribution of districts across the city in 2010.
- Of the 11 districts in the analysis, the data shows that, with the exception of Councils B, and K, the districts in Houston are not evenly distributed with regards to race and ethnicity.
- Five of the districts are primarily Hispanic (I, H, J, A, F). All districts have at least 25% Hispanic with the exception of District G.
- Three of the districts are primarily White (E, C, G). Only these three districts have more than 25% White cohorts.
- Three are primarily Black (B, K, D). These three plus district F, constitute the only districts with more than 25% of the population of the Black cohort.
- Councils B and K are relatively evenly distributed between Black and Hispanic cohorts.

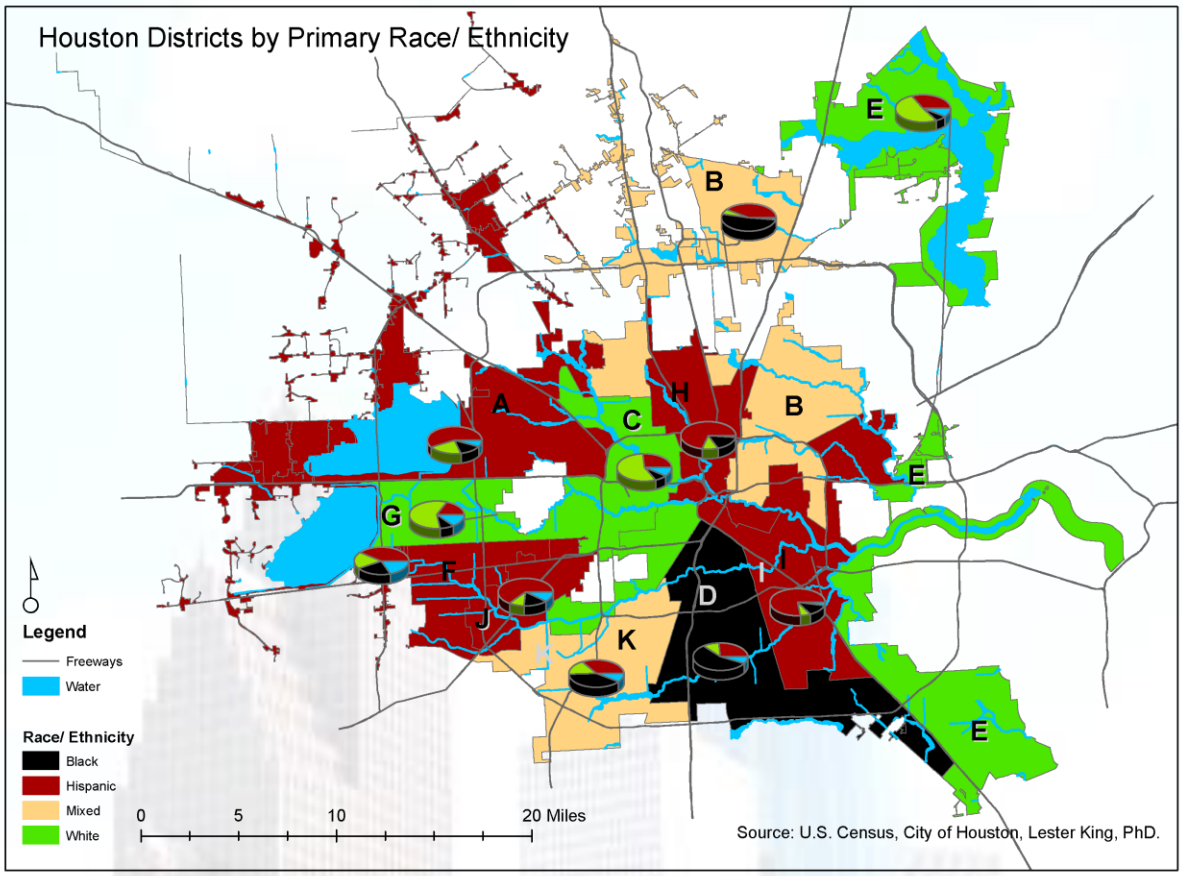


Figure 6: Map of Districts by Primary Race/ Ethnicity

- The above map shows the distribution of race/ ethnic demographic groups across the city in 2010. See Figure 4 for actual percentages of concentrations larger than 25%.
- Hispanic concentrations are to the east, near-north, southeast, northeast and southwest of the city.
- White concentrations are to the near-west, far-northeast, and far-southeast of the city.
- Black concentrations are to the south of the city.
- The southwest and north of the city are the only districts that are mixed.

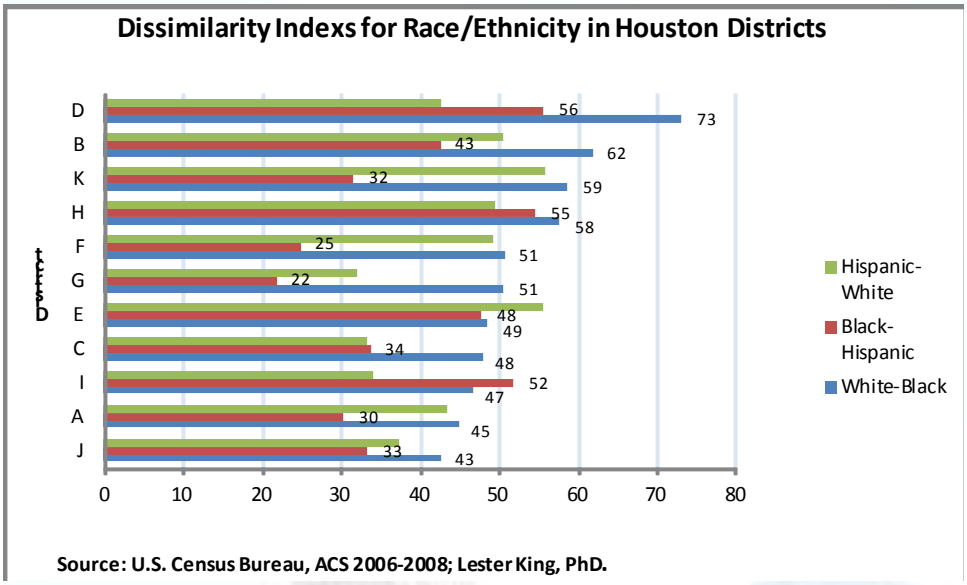


Figure 7: Dissimilarity Indexes for Districts

- The above figure shows indexes for dissimilarity for each district. Dissimilarity is basically a measure of the degree to which the selected racial/ethnic groups are separated from each other. A high value indicates that the two groups tend to live in different tracts. The dissimilarity index ranges from 0 to 100. A value of 60 (or above) is considered very high. It means that 60% (or more) of the members of one group would need to move to a different tract in order for the two groups to be equally distributed. Values of 40 or 50 are usually considered a moderate level of segregation, and values of 30 or below are considered to be fairly low.
- The Hispanic, White, and Black groups are shown exclusively since these three groups make up 97% of the population in Houston in 2010 (U.S. Census Bureau, 2011).
- Districts D,B,K,H,F,E and I all have dissimilarity indexes above 50 for at least one of the combinations of racial/ethnic groups analyzed.
- District D has the highest index value for Black – White segregation in Houston with an index value of 73.
- District D also has the highest index value for Black – Hispanic segregation in Houston with an index value of 56. District H also shows an index separation value of 55 between these two groups.
- Districts K and E are tied for the highest index value for Hispanic – White segregation in Houston with an index values of 56.

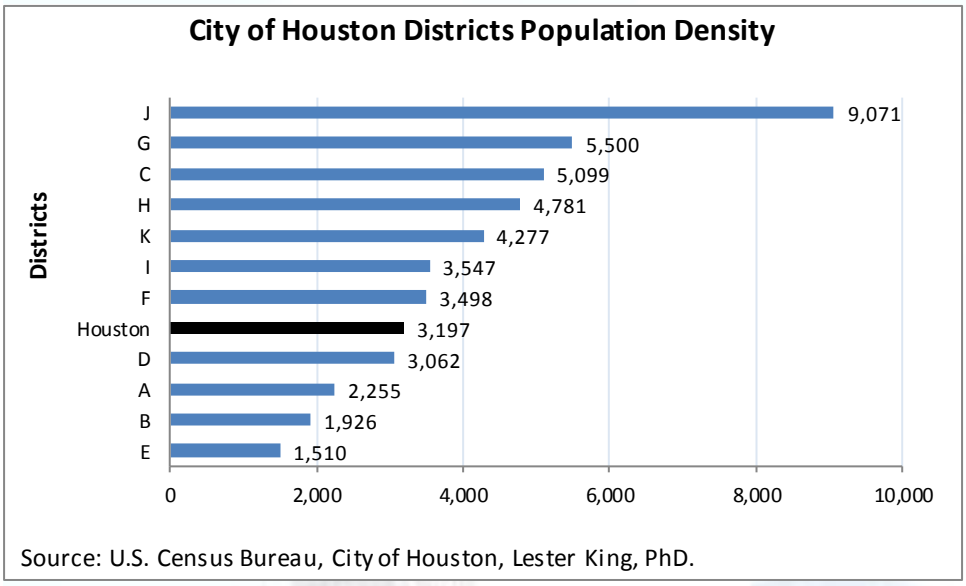


Figure 8: Districts Population Density

- In 2010, the City of Houston population was 2,099,451 and the area of the city was 657 square miles. The population density estimate was 3,197 persons per square mile.
- An analysis of varying size districts and varying populations in those districts presents a very diverse picture of population densities across the city.
- District J had the highest density with 9,071 persons per square mile and District E had the lowest density with 1,510 persons per square mile. Seven Districts had above average population densities (J, G, C, H, K, F, I). These seven districts account for 63% of the population in Houston and 43% of the total land area.

Theme - Social Demography

Sub Theme - Education

Indicator - Education Attainment

Critical to economic, civil, and personal health viability is **Education Attainment** (CFH, 2012). Higher levels of education directly produce healthier behaviors such as more exercise and enhanced nutrition; better jobs and income and higher quality neighborhoods; and more resources for healthcare (Sanborn, 2012). According to the 2010 decennial census, 38.7% of persons without a high school diploma were unemployed. In comparison to the city median unemployment rate of 10%, this suggests that a person without a high school diploma is almost four times as likely to be unemployed. Of the 61.3% of persons without a diploma that were employed, the median earnings were $17,338 in 2010. The median earnings in the City of Houston were $30,241 and the median earnings of persons with a college or associate's degree was $30,313 (US Bureau of Census 2010). This suggests that the average Houstonian has some college or an Associate Degree. It also shows that attainment of the high school diploma is not the final accomplishment for securing wages commensurate with the average Houstonian. However, the high school diploma is still the fundamental threshold for the achievement of enhanced quality of life, since it is not possible to matriculate through other degrees without it. Education is the number one indicator among sustainability indicator studies across the country (Blackburn, 2011).

Sustainability Benefit: The graduation rate for High School is increasing.

Sustainability Issue: There exists a gap between the graduation rates of the White student population and all other groups. Districts in Houston vary tremendously based on the percentage of persons with university degrees, which suggests very separated neighborhoods in Houston.

The following metrics are used to measure the indicator *Education Attainment*.

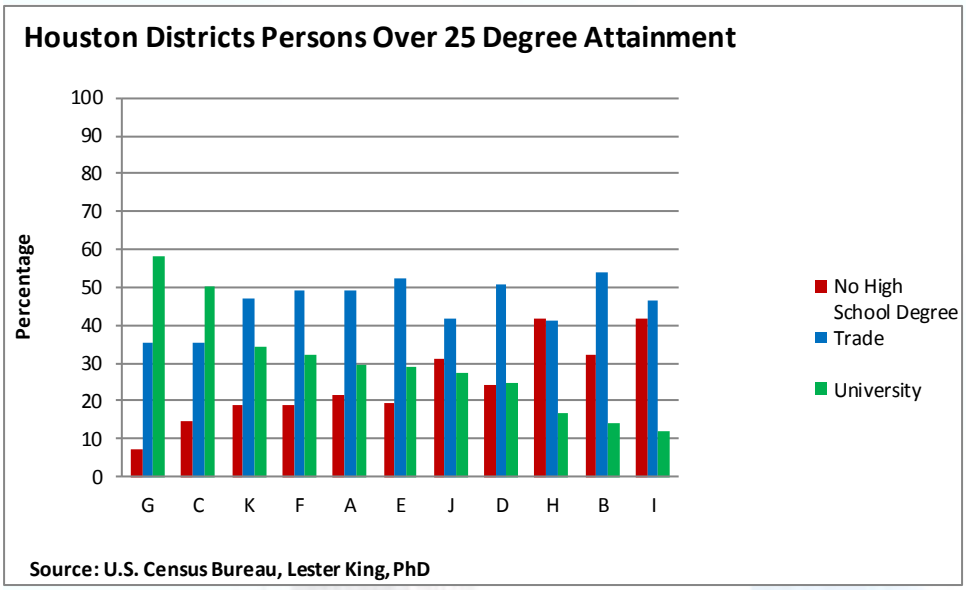


Figure 9: Education Attainment by District

- Two districts have over 50% of persons over 25 years of age reporting university degrees. Those districts are G and C. District G has the highest percentage with 58% of persons.
- Six districts have over 20% of persons reporting no high school degree. Those districts are A, J, D, H, B, I. Districts I and H both have 42% of persons over 25 years of age, without at least a High School degree. These districts represent the highest percentage in the city for this metric.
- In most districts in the City of Houston, residents with high school diplomas who do not have university degrees make up the highest percentage of citizens.

Houston k-12 Schools				
	Elementary	**Middle**	**High**	**Total**
Public Schools	351	116	118	585
Private Schools	14	52	41	107
Total	365	168	159	692

Note: Schools are classified based on highest grade available, therefore schools that serve k-12 grades will be classified as High Schools.
Source: Texas Education Agency; Texas Private School Accreditation Commission; Lester King, PhD.

Table 2: K-12 Schools in the City of Houston

- The City of Houston has approximately 692 public and private K-12 schools. Of this number, 585 are public schools and about 15 percent or just over 100 are private schools.

- There are approximately 26 separate independent school districts that overlap the administrative boundary of the City of Houston. These independent school districts all have their own Boards of Directors and are separately administered outside of the City of Houston jurisdiction.
- The Houston Independent School District is the 7th largest in the country with a budget of approximately $2 Billion. The district serves 200,000 students and employs over 22, 300 people (Texas Education Agency, 2011). The budget for the City of Houston is $4 Billion (City of Houston, 2011).

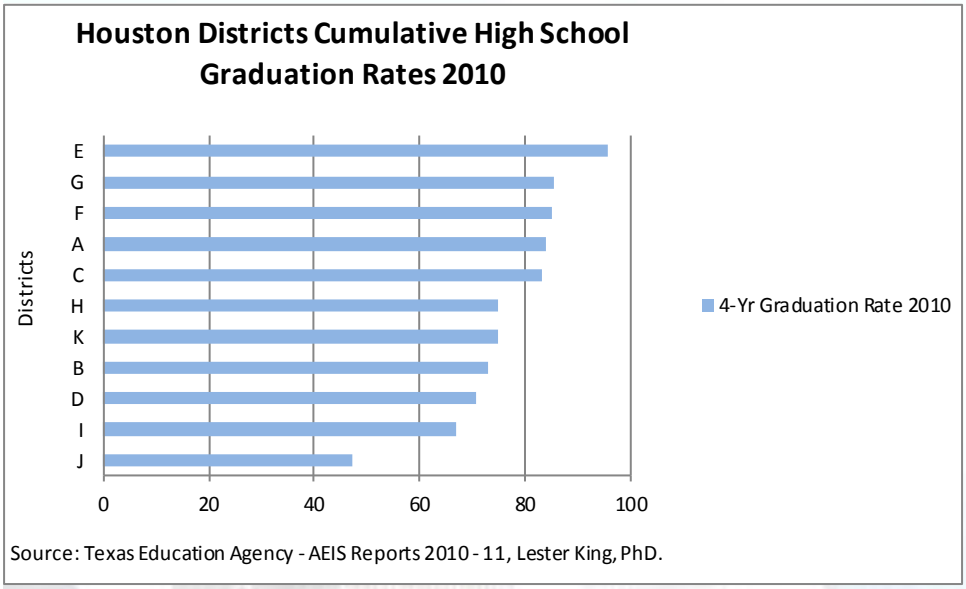


Figure 10: High School Graduation Rates

- The 4-Year Graduation rate tracks the cohort of students who enter school between 9th and 12th grade as the student group qualified to graduate. It is calculated as the number of graduates divided by the sum of the graduates plus continuers plus GED recipients plus continuers.
- Districts J has the poorest performance across Houston with only 47% of students graduating. District E has the highest number of graduates with 96% graduating.

Theme - Social Demography
Sub Theme - Community Involvement

Indicator - Voter Participation

Voter participation is a sign that citizens are involved in their community. Participation leads to a sense of community (Julian, Reischl, Carrick, & Katrenich, 1997). Societies which have higher voter participation also tend to have enhanced livability and high social capital since residents are more involved in the management of their neighborhoods and communities. The State of Texas has empowered local neighborhoods with enforcement capabilities called 'Deed Restrictions', to allow citizens to develop and enforce their own neighborhood building and design standards. This is an excellent model for the empowerment of citizens and their sense of local neighborhood (Julian, Reischl, Carrick, & Katrenich, 1997). As a result, arguably, residents have focused their limited time and attention on the administration of neighborhood needs and devolved management of the city commons, outside of neighborhoods, to elected officials. An increase in voter participation is a good indicator of the degree of public interest with the comprehensive management of the City of Houston.

Sustainability Benefit: Voting in Houston is conducted in a democratic format.

Sustainability Issue: Very few people vote in the local elections.

The following metrics are used to measure the indicator *Voter Participation.*

Figure 11: Voter Participation in Houston
Figure 12: Voting by District

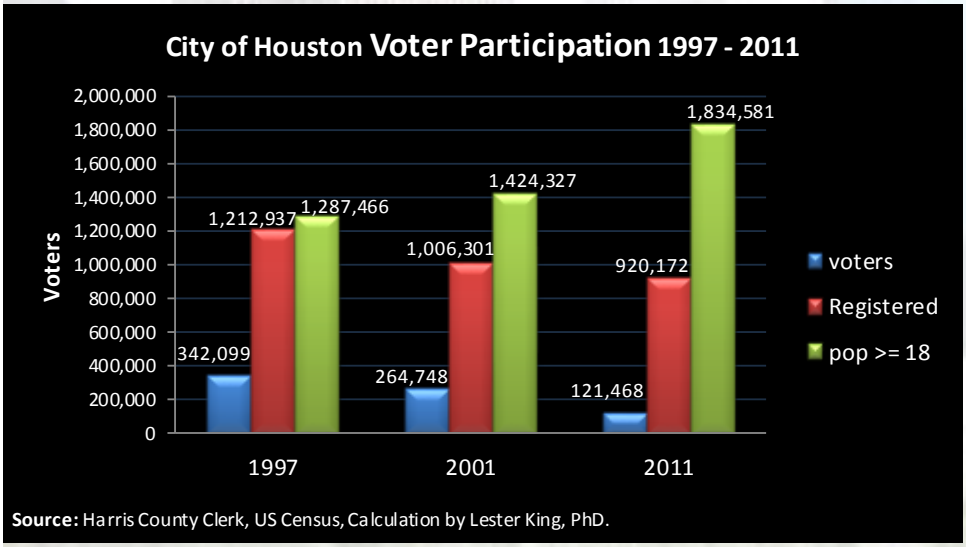


Figure 11: Voter Participation in Houston

- In this analysis we look at voting participation as a percentage of persons of eligible age, and as a percentage of registered voters.
- Only 7% of the Houston voting age population voted in the local election of 2011. This was the lowest voter participation rate in comparison to 1997 and 2001. The number of people who voted also constituted 13% of the registered voters.
- The figure shows that over the last 14 years, as the population in Houston increased. Fewer persons registered to vote and fewer persons actually voted, which indicates a decrease in social capital.

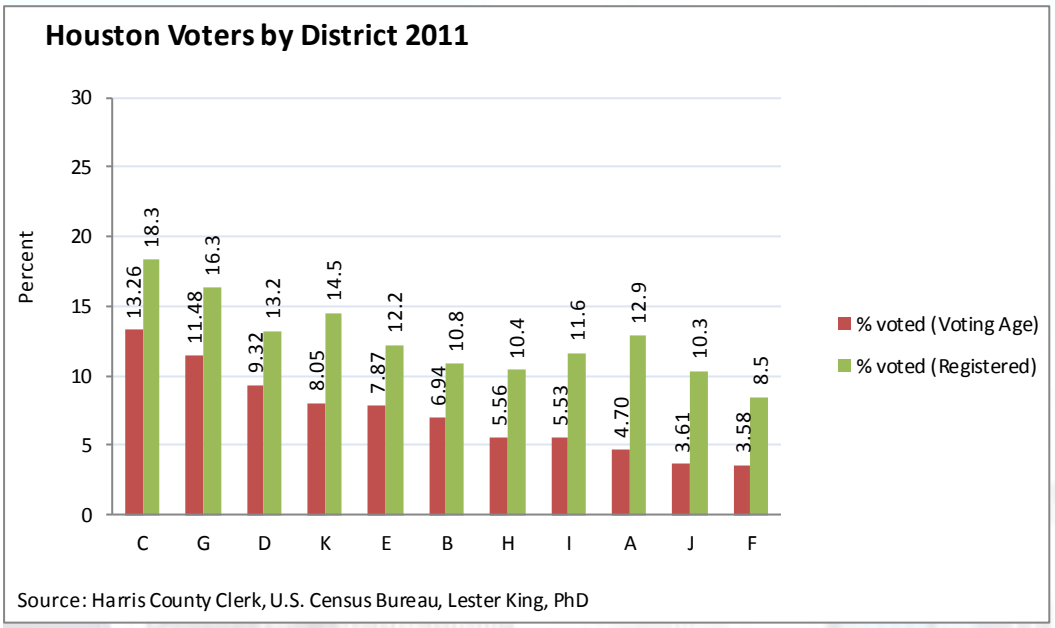


Figure 12: Voting by District

- The above figure shows comparative voter participation among the Districts. Less than 20% voter participation occurred throughout all the districts in the City of Houston.
- District C had the highest participation rate among voters of 13.26%. District F had the lowest voter participation rate of 3.58%.
- The difference between the participation rate for registered voters and for the voting age population suggests that those persons who registered to vote were more inclined to actually vote. This may explain discrepancies between participation rates in Districts K, I, A, and J.

Theme - Poverty

Sub Theme - Inequality

Indicator – Income Inequality

Income inequality has an effect in the broad social capital of a city since it gives rise to separate cultures of poverty. Persons in poverty are unable to prioritize spending on maintenance of physical living spaces, which leads to blighted neighborhoods. They are unable to contribute properly to the tax base, which makes it more difficult for public agencies to supply public services. Income disparities are greater today than at any other time since the 1920s in Harris County and greater in America than in any other country (Klineberg, 2005)

Sustainability Benefit: Median household income earnings in Houston have increased over time.

Sustainability Issue: The top 20 percent of earners report fluctuating incomes.

The following metrics are used to measure the indicator *Income Inequality*.
Figure 13: Household Income by District
Figure 14: Ratio of Share in Income

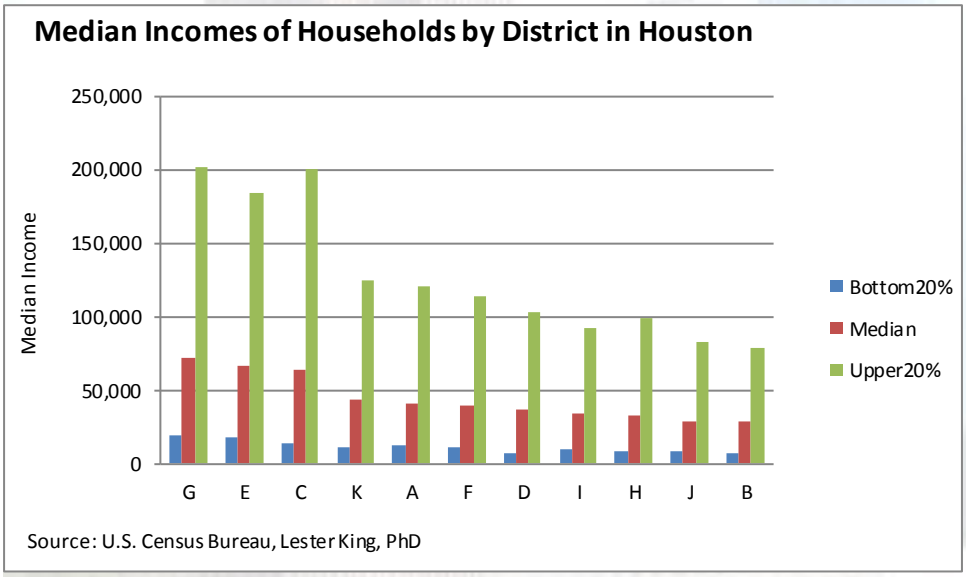


Figure 13: Household Income by District

- The median household income in the City of Houston in 2010 was $42,962.
- The above figure shows that only three districts have median household incomes over $50,000 in the City of Houston. Those districts are G - $72,421, E - $66,924, and C - $63,586. These districts are also the only ones with median income of the upper 20% of wage earners over

$150,000. These 3 districts G, E, and C can be considered the most prosperous in Houston, at least in terms of median household incomes.

- All districts except I, J and B have median incomes of the top 20% of wage earners over $100,000. These three districts can be considered the least prosperous in Houston in terms of median household incomes.

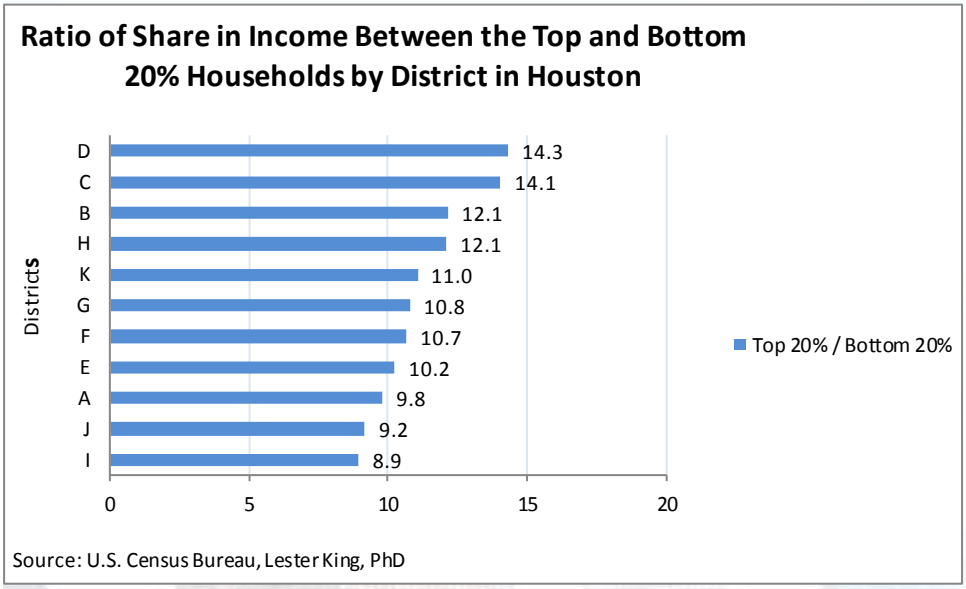


Figure 14: Ratio of Share in Income

- In 2010 the income disparity in the City of Houston, measured by the ratio of the top 20% divided by the bottom 20% median household incomes, was 13.51.
- Districts D and C had the highest ratio share in incomes with 14.3 and 14.1 respectively. These ratios were the only two above the average for the city of Houston, which suggests that the greatest disparity in incomes between the top earners and bottom earners, occurs in these two districts.
- District I had the lowest disparity between top and bottom earners with a ratio of 8.9.

Theme - Poverty
Sub Theme - Poverty Level

Indicator – Poverty Rate

High **Poverty rates** lead to development of social cultures, which by necessity favor private survival needs over involvement in public affairs. This suggests that public facilities, such as schools, parks, sidewalks, streets and neighborhood businesses will suffer from neglect due to pervasive poverty. Reduction in poverty rates is important because it helps households become self-sufficient. Access to good jobs, good schools, and shopping does not occur in poor neighborhoods (McClure, 2008).

Sustainability Benefit: The drop in poverty rates between 1990 and 2000 compared to the sharp increase in income between 1990 and 2000 shows that the local economy is capable of lifting persons out of poverty.

Sustainability Issue: The poverty rate in 2010 was higher than it was in 1990 and 2000.

The following metric, Percent Below Poverty by District, is used to measure the indicator *Poverty Rate*.

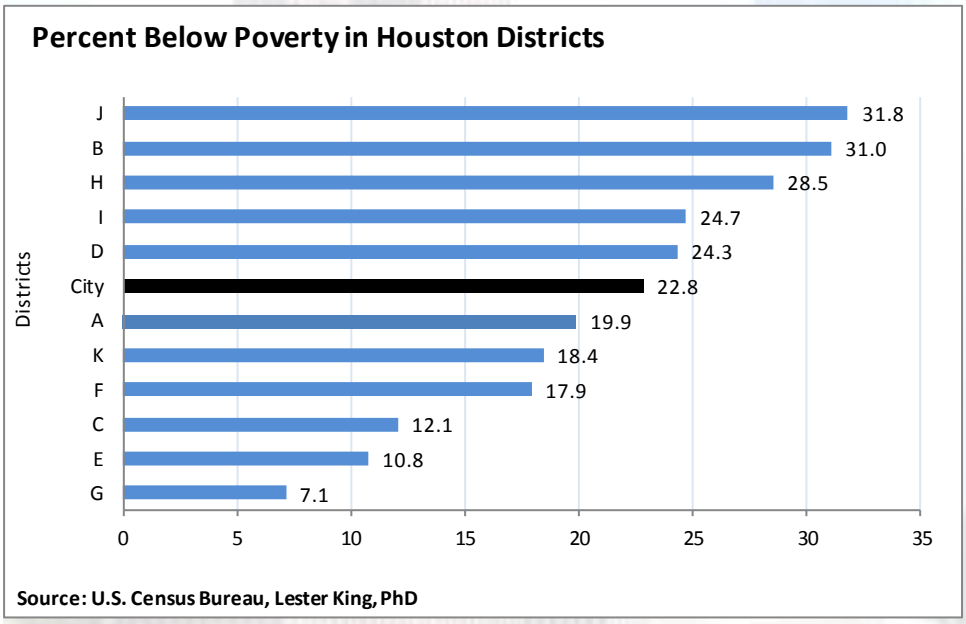


Figure 15: Percent Below Poverty by District

- The percentage of persons below the poverty line was higher in Houston (23%) than it was in Harris County and Texas (16.8% for both). The percent of people below the poverty line in the United States was 13.8% (US Census Bureau, 2010).
- Five districts have higher percentages of the population below poverty than the average for the City. Those districts are J, B, H, I and D.

- Districts A, K, F, C, E, and G all have less than the City average for persons below poverty. District G has the lowest percentage of persons below the poverty line with 7.1 percent.

Theme - Poverty

Sub Theme - Healthcare Delivery

Indicator – Health Coverage

Health coverage is essential in this country to access quality care. In measuring access to healthcare, one can measure the physical access such as the distance and difficulty to get from home or work to a healthcare institution. However, in the U.S., there is a major barrier to access, which is the need to have healthcare insurance before adequate care can be offered. The provision of healthcare is normally offered by employers to employees in the U.S. and as a result persons without jobs are vulnerable to not having access to healthcare. In 2010, the Affordable Care Act was signed into law to improve the delivery of affordable health care services (Office of the Legislative Counsel, 2010).

Sustainability Benefit: The Texas Medical Center in Houston is the largest medical center in the world. This suggests that the availability of doctors per capita should be higher than other comparable places.

Sustainability Issue: The percentage of persons without health insurance has increased in Harris County.

The following metric, Population per Health Center by District, is used to measure the indicator *Health Coverage*.

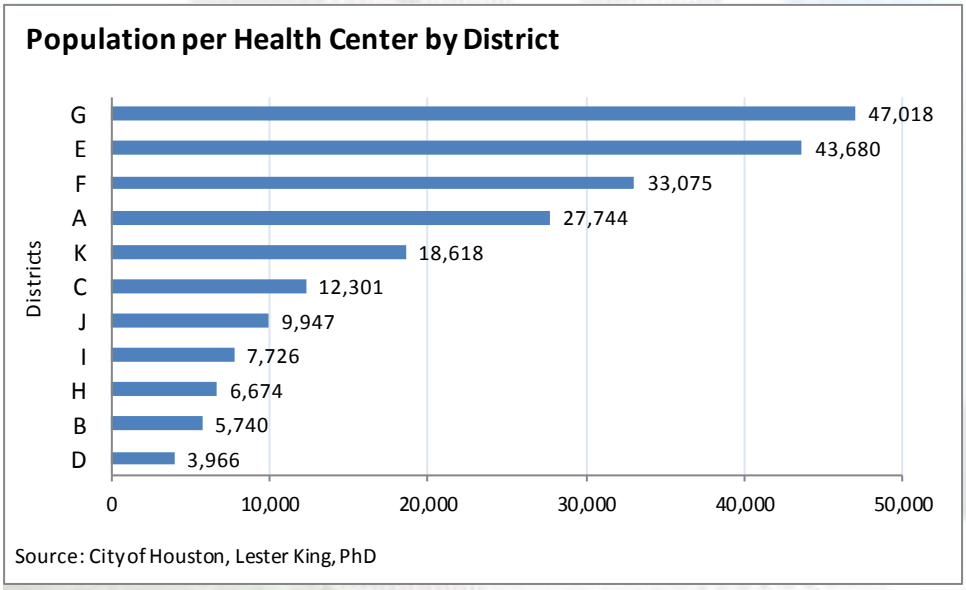


Figure 16: Population per Health Center by District

- The percentage of uninsured persons in the City of Houston (30.9%) was higher than in Harris County (27.9%) in 2010.
- The number of Health Facilities in the City varies greatly by district. District D has the highest number of 48, while District G has the lowest number of 4.

- Districts G, E, F, A, K all have very low numbers of health centers relative to the population. These five districts have a population ratio to health center of over 15,000 persons per Health Center.
- The Affordable Care Act has made provisions for the Community Health Center Fund that provides $11 billion over a 5 year period for the operation, expansion, and construction of health centers throughout the nation. This effort is expected to improve the performance of this indictor in Houston, and this indicator can be used to support decision making as to where centers should be located (U. S. Department of Health and Human Services, 2011).

Theme - Livability
Sub Theme - Cost of Living

Indicator - Affordability

Housing is a basic need. Ensuring that housing is affordable may correlate strongly with home ownership but neither of these are in absolute terms a basic necessity. The basic necessity is met with the supply of homes not with the cost. That said, it is a good policy for local governments to supply affordable homes. This helps to enhance the quality of life of citizens and to bolster their economic well-being, which ensures a more sustainable financial future (Blackburn, 2011). Housing affordability can be defined as relative, subjective, a product of family budget, a ratio, or residual. This would explain the gamut of definitions of housing affordability, but spending less than 30% of income on housing (Ratio standard) has taken the fore as the definition of affordability in the U.S. (Stone, 2006).

The relationship between the Cost of Gasoline and Housing Costs is also used to measure Affordability in this study. These two price indicators are selected based on the theory that travel costs (including time) and affordability of housing are two of the primary factors which influence where people live in urban areas. In the study of Urban Economics, households will maximize their bid-rent capability by locating close to the jobs commensurate to their ability to afford housing in the area (Stegman, 1969). Housing will probably always be more affordable the farther one travels from the central city, but gasoline prices influence the affordability to travel increasingly longer distances from the city. When comparing cities in the country with more than 250,000 people, Houston ranks 26th for affordability, with 46% of income going to housing and transportation costs. Philadelphia was first with 33%; New York was 4th with 37%; Chicago was 14th with 42%; and Los Angeles was 51st with 52% of income going to housing and transportation cost (Center for Neighborhood Technology, 2010).

Sustainability Benefit: On average, Houston is not affected by housing value decreases at the same rate as the rest of the country. Real estate prices are relatively stable.

Sustainability Issue: More people are spending more than 30% of their income on housing.

The following metrics are used to measure the indicator *Affordability*:
Figure 17: Housing Affordability
Figure 18: Housing Affordability by Cost Quintiles

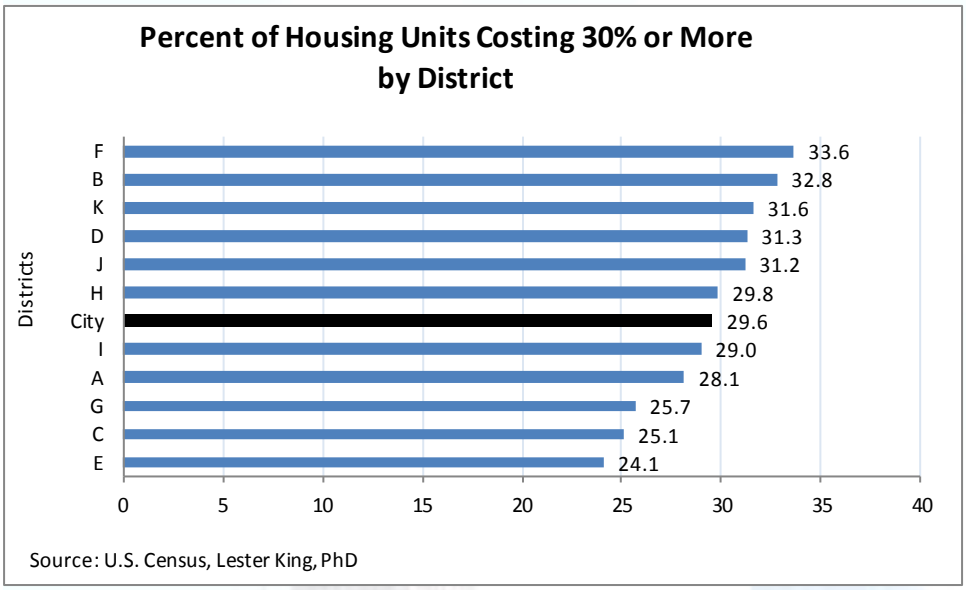


Figure 17: Housing Affordability

- The percentage of housing units in Houston where tenants spent more than 30% of their incomes on housing costs increased almost 50% in 2010 from 1990 and 2000 levels, which were relatively similar in percentage. In 2010, 30% or 104,140 housing units cost tenants more than 30 percent of their incomes.
- Within each district in Houston, at least 24% of housing units spend more than 30% of their incomes on housing costs.
- The highest percentage of units are in District F – 33.6% and the lowest percentage is in District E – 24.1%.

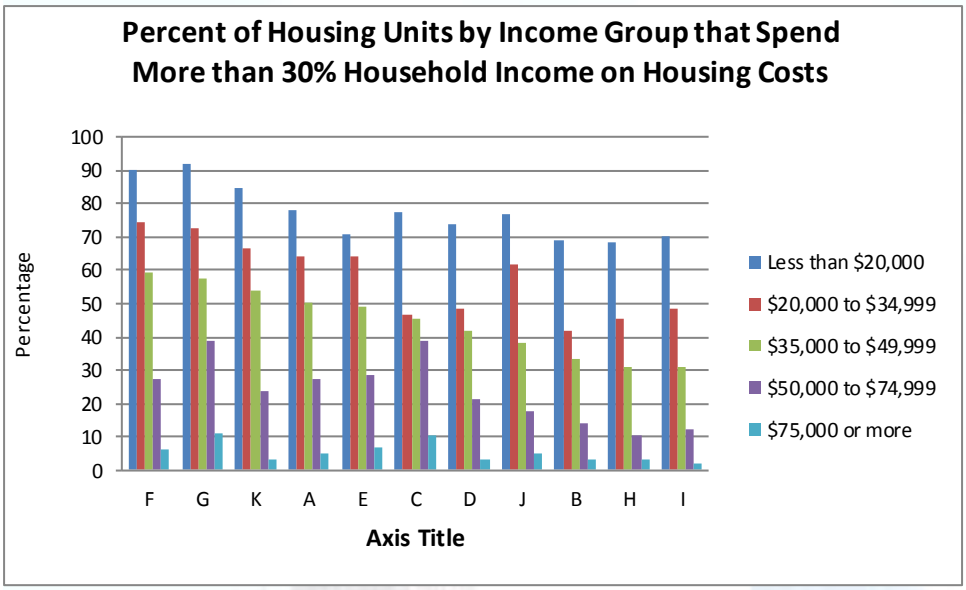


Figure 18: Housing Affordability by Cost Quintiles

The above figure shows that among people in Houston, who earn in the median income bracket ($35,000-$49,999), the range among districts for those who have to spend more than 30% of their incomes on housing costs is from 60% in District F to 31% in District I.

Theme - Livability

Sub Theme - Quality of Life

Indicator - Accessibility of Public Spaces

Quality of Life is difficult to measure since the City of Houston has a diverse number of cultures and persons with individual differences within those cultures. However access to nature and open space has been proven effective in combating health and behavioral problems (Mitchell & Popham, 2008). Accessibility of public spaces enhances quality of life by offering a physical space for the interaction of people to form community and neighborhood networks (Alexander, Ishikawa, & Silverstein, 1977). Places where we want to encourage a high level of accessibility, and hence frequency of use such as commercial centers, transit lines, and community facilities such as parks should be no more than ¼ mile walking distance from population residences (Ewing, 1999). Houston ranked 32nd among the 63 largest cities in the country for pedestrian activity and incentives to walking (Walkscore, 2012). According to the Trust for Public Land (TPL), Houston ranked 21st among the 63 largest cities in the country, in terms of percentage of area devoted to parks with 13% (The Trust for Public Land, 2011).

Sustainability Benefit: Small public parks are relatively well dispersed across the city.

Sustainability Issue: Half the population does not have a public park within walking distance and few new parks are being developed.

The following metrics are used to measure the indicator *Accessibility of Public Spaces*:

Figure 19: City of Houston Access to Parks 2000 – 2010

Figure 20: Access to Parks by District

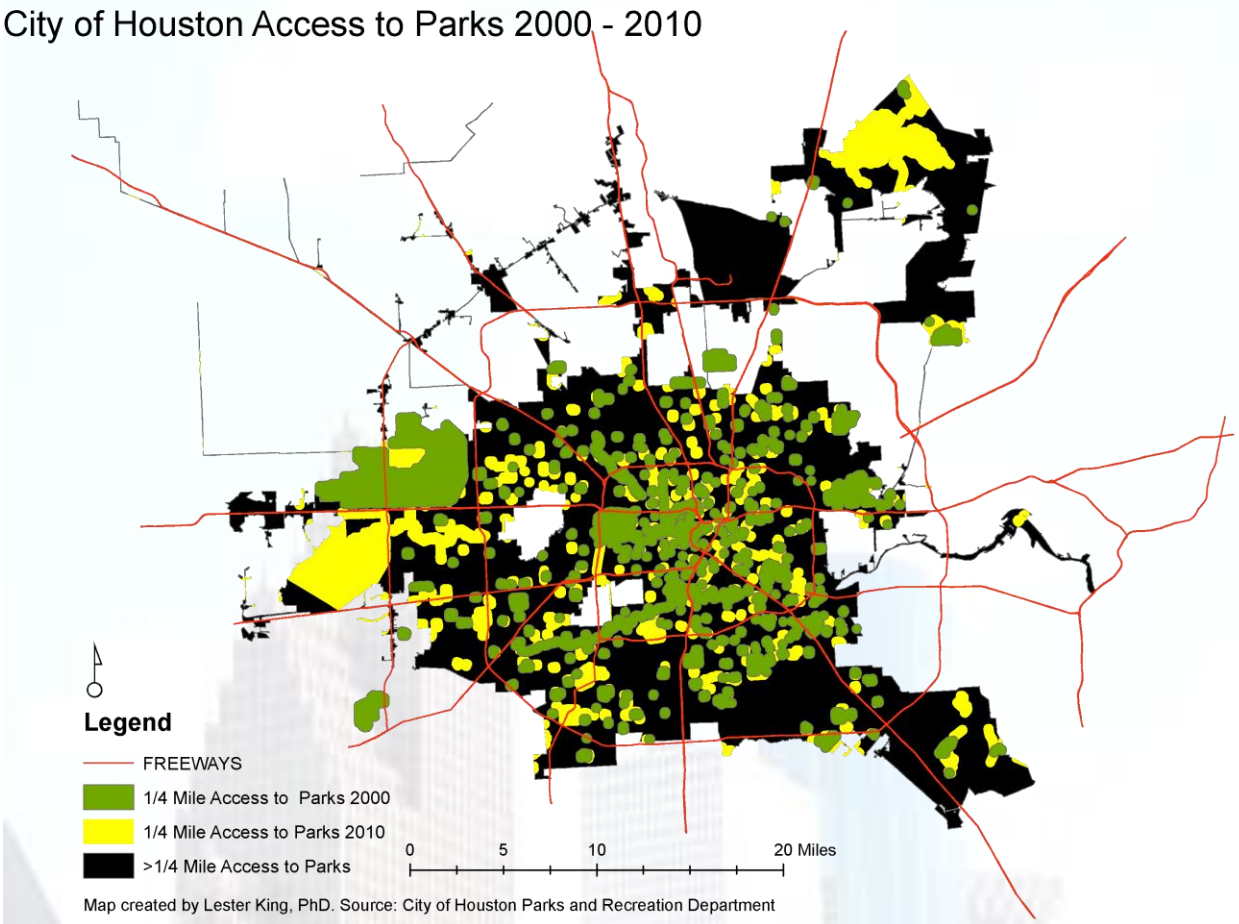


Figure 19: City of Houston Access to Parks 2000 – 2010

- A map of existing parks in 2000 superimposed on a map of existing parks in 2010, shows the new areas classified as parks in 2010. These areas include pedestrian and bike trails, school parks shared by neighboring communities, and county parks.
- In 2010, there were 918,882 persons living within a quarter mile of parks in Houston.
- That figure represents 44% of the population living within walking distance of a park.
- Demographic analysis of access to parks in 2010 shows the following figures by race and ethnicity. White cohort 48%; Black cohort 41%; Hispanic cohort 44% living within ¼ mile to a park or open space.

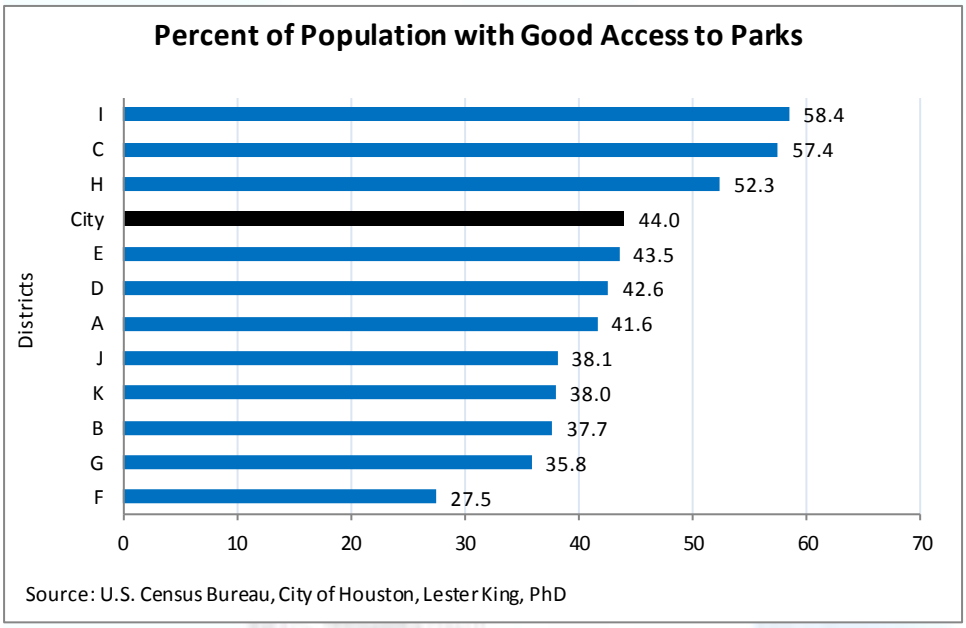


Figure 20: Access to Parks by District

- Good access to park spaces within districts in Houston ranges from 58.4% of the population to 27.5% of the population.
- Three districts have greater than average access to parks. Those are I – 58.4%, C – 57.4%, H – 52.3%. All other districts have below average access to parks according to the Houston average, which is 44% of the population.


POST OAK BOULEVARD

Theme - Livability
Sub Theme - Health & Nutrition

Indicator - Food Deserts

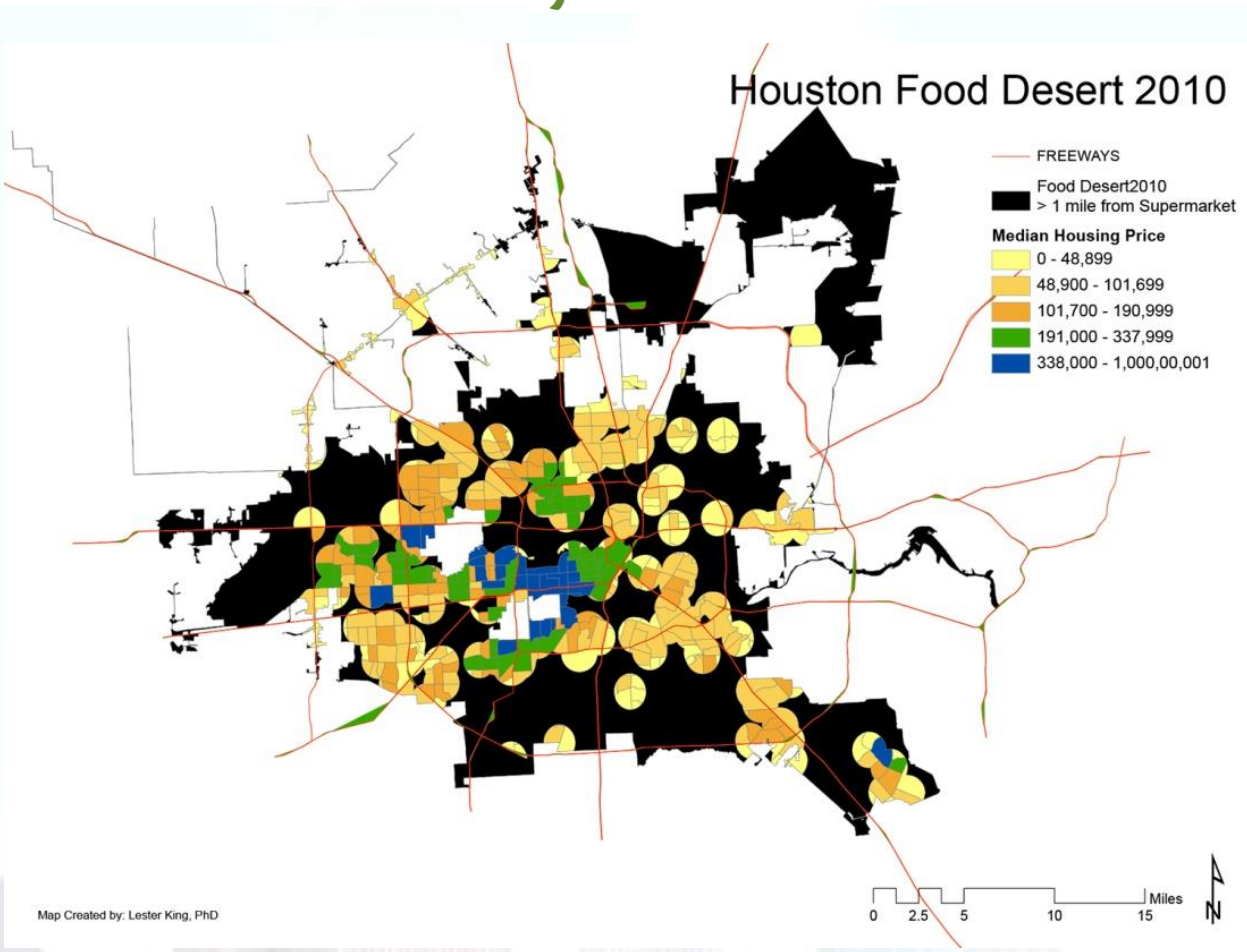
Food deserts are correlated with low-income neighborhoods, health and nutrition deficiencies, and fast food restaurants. According to the Centers for Disease Control and Prevention (CDC), food deserts are defined as 'areas that lack access to affordable fruits, vegetables, whole grains, lowfat milk, and other foods that make up the full range of a healthy diet' (Centers for Disease Control and Prevention, 2012). The CDC also states that there is no standard definition of food desert, however the US Department of Agriculture (USDA) defines a food desert as a census tract more than 1 mile from a supermarket with at least $2 million in annual sales (urban definition), and that at least 20% of the people living there are poor (US Department of Agriculture, 2012). This report uses the definition of any area more than 1 mile from a grocery store selling fresh fruits and produce as being in a food desert. The reason is because some small stores also sell produce that meet the CDC's definition and also some areas that are not necessarily poor, but are not within a mile to supermarkets will not be covered by the USDA definition.

Texas has the lowest number of supermarkets per capita in comparison to other states in the country (Manon, Giang, & Treering, 2010). The economic model that finds it strategic to locate a fast food store in a food desert is clearly different from the model that is used to locate grocery stores. Low income persons have to shop more frequently for retail items since they do not have enough stored wealth or storage space to stock up on consumer goods. Recently there has been an emergence of several Farmer's Markets across the city (Turner, 2012). The increase of Farmer's Markets suggests that there is a local demand, which traditional grocery stores are not meeting. There are also reportedly more than 125 community and school gardens across the city (Blackburn, 2011).

Sustainability Benefit: The Food Desert in Houston is getting smaller.

Sustainability Issue: More than 700,000 people in Houston do not live within a mile of a grocery store selling fresh fruits and vegetables.

The following metrics are used to measure the indicator *Food Deserts*:
Figure 21: Houston Food Desert 2010
Figure 22: Food Deserts by District



Source: Highways, City outline by City of Houston. Address locations of supermarkets by InfoUsa. Calculation of Food Desert by author.

Figure 21: Houston Food Desert 2010

- In 2010 there were about 750,000 persons living in a food desert accounting for 36% of the population. This is a big decrease in the number of food deserts compared to previous years.
- In the south central portion of the city, between Highway 288 and Interstate 45-South, the food desert continues to exist when comparing data from 1990 to 2010. This area is known as the Greater Third Ward neighborhood and is home to University of Houston and Texas Southern University.
- Some of the 1-mile regions around supermarkets show that the median housing value is under $50,000, therefore the food desserts in Houston cannot be explained by lower income levels alone.

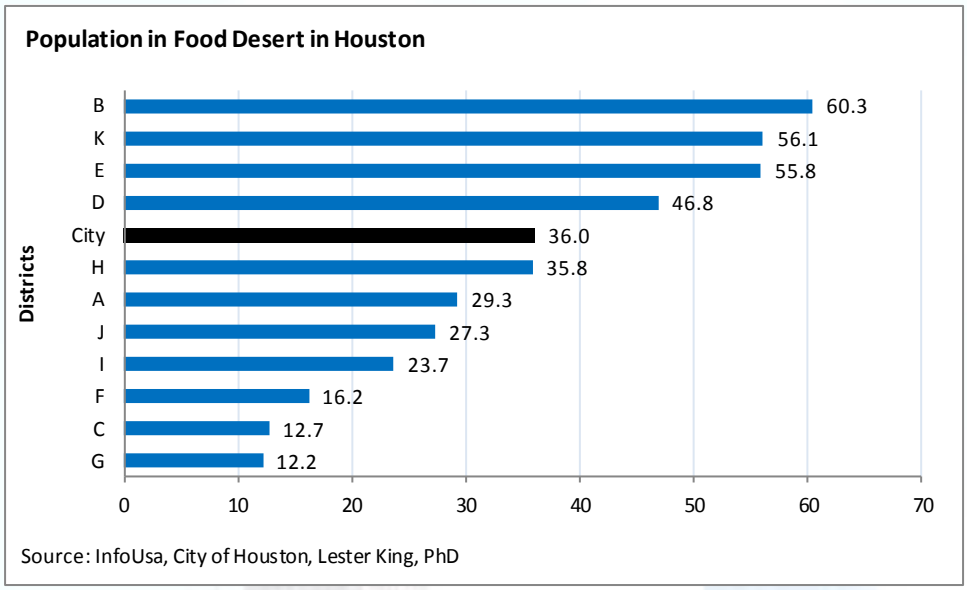


Figure 22: Food Deserts by District

- The figure above shows that four districts have above average food deserts in terms of population affected. Districts B, K, E and D all have above the Houston average of 36% of the population.
- Districts G, C and F all have below 20% of their populations affected by food deserts.


ALPHA
REALTORS
FOR
SALE
281

Theme - Livability

Sub Theme – Environmental Justice

Indicator - Waste Exposure

In the United States, there were 250 million tons of municipal solid waste generated in 2010. Paper and paperboard constituted 28.5% of this total and another 28% was organic wastes such as food scraps, and yard trimmings (US Environmental Protection Agency, 2010). The data presented here covers waste generation. However, the other sustainability component of waste is the environmental justice issue of where landfills are located. There has historically been a higher rate of poorer communities located close to landfills (Bullard, 2000).

Sustainability Benefit: Municipal Solid Waste disposal numbers are decreasing in the 13 county region.

Sustainability Issue: Private waste haulers account for a large portion of the market and do not have to report tonnage by generating sources to the state (King, 2012). As a result, public agencies do not have a good understanding of the types and amounts of waste generated by various sectors.

The metric Population Close to Waste Sites is used to measure the indicator *Waste Exposure:*

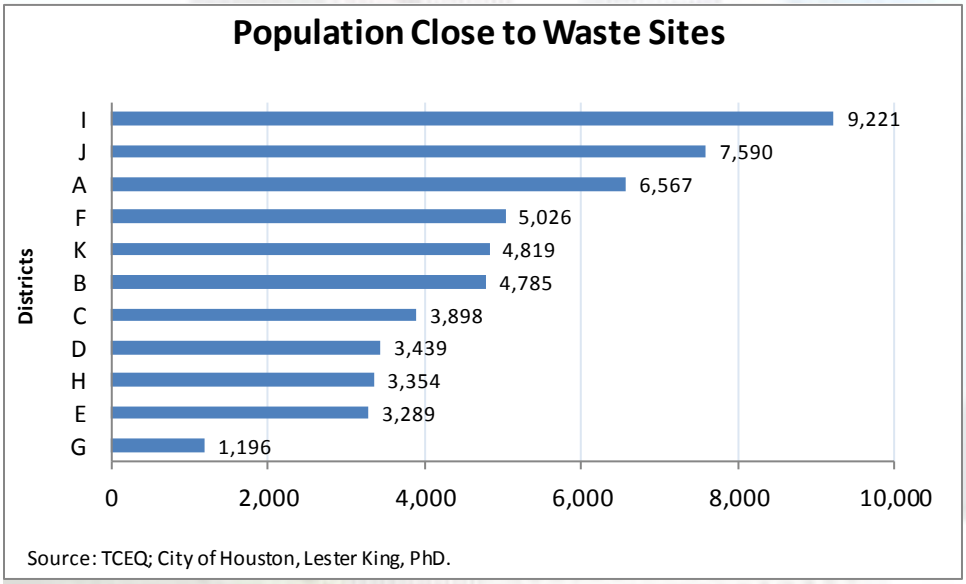


Figure 23: Population Within a Quarter Mile to Waste Sites

- The above figure shows the population living within a quarter mile of municipal solid waste sites and permitted hazardous waste sites.
- District I has the highest number of persons living in close proximity to waste sites with 9.221 people.

- District G has the lowest number of persons living in close proximity to solid waste sites with 1,196 persons.

Social Development Policy Recommendations

THEME – Social Demography

Sub Theme – Population Growth: Indicator – Population Growth

- We need to encourage more **population growth within the City** through incentives to develop in the city as opposed to the suburbs.
- Population forecasts for the City of Houston should be based on the City of Houston boundaries and not the region.
    - Citizens can do the following:
        - Contact elected officials.
        - Organize in community groups.
        - Participate in the electoral process.
    - Local government can do the following:
        - Retrofit infrastructure including Complete Streets model for street design.
        - Provide incentives to market for diverse housing choices.
        - Provide more resources to improve schools.
        - Create areas for mixed-use development and reduce permit processing time.
        - Improve community facilities.
        - Long range planning.
    - Businesses can do the following:
        - Supply quality and diversity in housing choices.
    - Non-profit groups can do the following:
        - Advocate and educate for improved quality of life.

Sub Theme – Education: Indicator – Education Attainment

- Major actions and interventions are needed to **reduce the education gap** among students of color and whites.
- Structure K-12 to **develop vocational tech training** that provides blue collar jobs.
    - Citizens can do the following:
        - Provide better at home education.
        - Demand accountability.
    - Local government including school districts can do the following:
        - Adjust school hours around work hours and provide public daycare options.
        - Universal pre-school and Montessori options.
        - Raising teacher performance.
        - Reduce separation of kids by achievement level and integrate active learning.
        - Reduce charter school starts.
        - Improve quality of learning environment.
    - Non-profit groups can do the following:

- More extra curricular activities.
- Educate citizens on home education responsibilities.
- More cultural enrichment opportunities.

Sub Theme – Community Involvement: Indicator – Voter Participation

- We need to strive to **increase voting** since it is a major cornerstone to any democracy.
- Elected officials need to find ways to **demonstrate accountability to citizens**, **adoption of a comprehensive sustainability indicators program** will aid this goal.
  - Citizens can do the following:
    - Vote
  - Local government can do the following:
    - Implement Saturday voting.
    - Offer incentives to vote.
    - Reduce language barriers.
    - Offer on-going government classes.
  - Non-Profit groups can do the following
    - Educate community in culture of civic participation.
    - Increase voter registration activity.

THEME – Poverty

Sub Theme – Inequality: Indicator – Income Inequality

- **Improved skills and training** needs to be developed to reduce income inequality.
- A **local or state taxing structure to reduce income inequality** would allow for systematic approach to this issue.
  - Local government and school districts can do the following:
    - Integrate more vocational training in middle and high school levels.
    - Bridge gap between market demand and concentrations at colleges.
    - Integrate businesses in curriculum development.
    - Tax incentives for businesses to offer internships and apprenticeships.
  - Businesses can do the following:
    - Offer internships and spprenticeships.

Sub Theme – Poverty Level: Indicator – Poverty Rate

- Need to **establish a commission on the root causes of poverty** which often link back to underperforming schools, and inadequate job skills.
  - This is an effort, which should be led by the local government with opportunities t participate by citizens, businesses and non-profit groups.

Sub Theme – Healthcare Delivery: Indicator – Health Coverage

- Need to **attract more jobs that offer healthcare and livable wages**.
  - Local government can do the following:
    - Establish more wellness programs.
    - Develop more healthy infrastructure such as trails, parks and sidewalks.
    - Work with businesses to increase participation in wellness programs.
    - Education for wellness in schools.

- Citizens and Non-profits should advocate for more wellness programs.

THEME – Livability

Sub Theme – Cost of Living: Indicator – Affordability

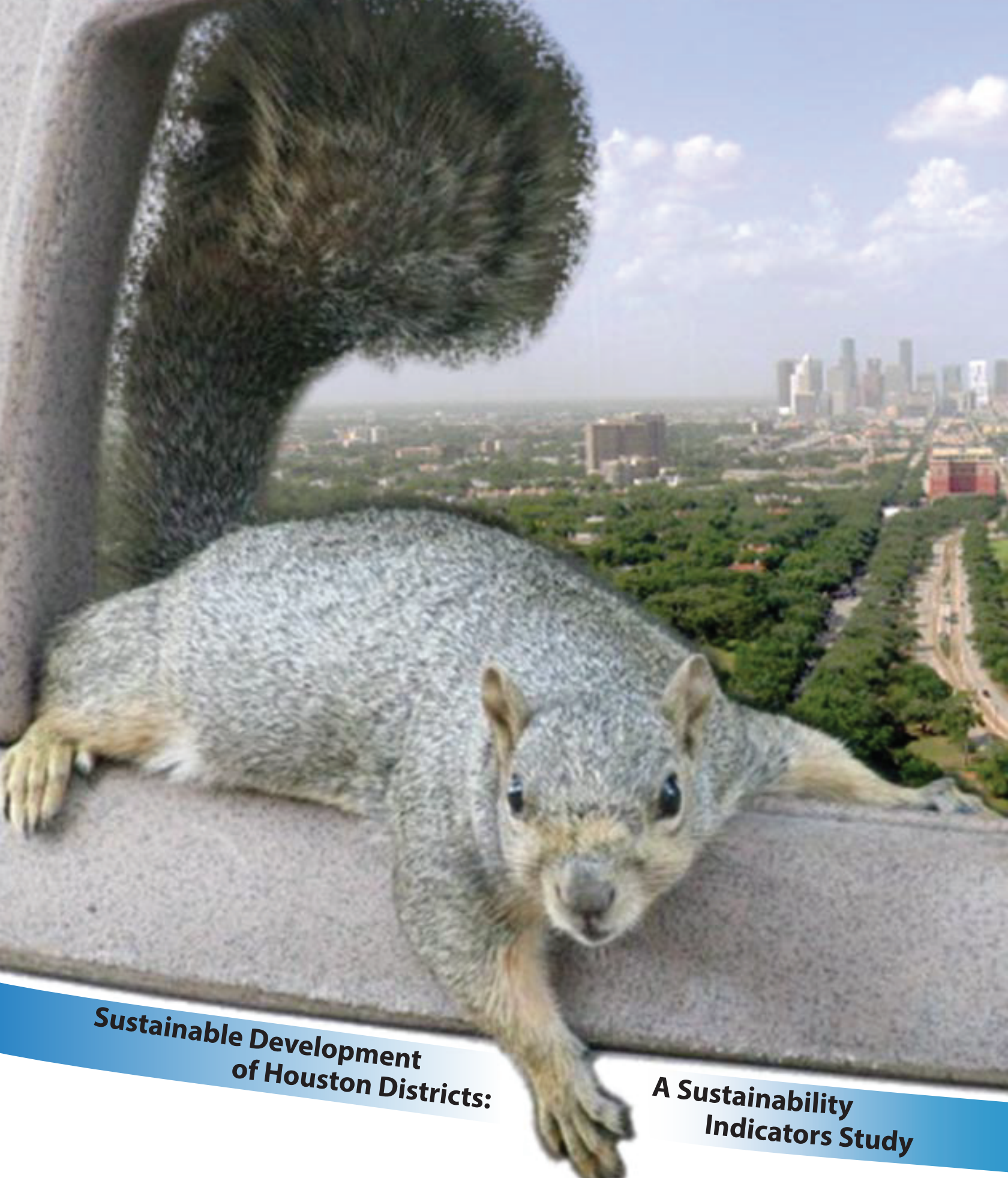
- Citizens in Houston pay more for transportation as a percentage of income than other cities of comparable size. **Improving transit options** would help to alleviate this burden.
  - Citizens can do the following:
    - Use public transit where possible.
    - Advocate for more funding.
    - Form conservancies to advocate for parks.
  - Local government can do the following
    - Funding infrastructure for multimodal travel options.
    - Incentivize mixed-Use development.
    - Incentivize the use of jitney services for flexible destinations.
  - Businesses can do the following
    - Provide facilities to encourage biking/ walking.
    - Educate employees on the benefits of alternative travel.
    - Offer flex-time and other alternative options to 9 – 5 workday.

Sub Theme – Quality of Life: Indicator – Accessibility of Public Spaces

- Houston needs to **aggressively develop more parks and green space**.
  - Citizens can do the following:
    - Form conservancies to advocate for parks.
  - Local government can do the following
    - Develop interlocal co-op agreements.
    - Educate developers on incentives to build parks.
    - Reduce development in flood prone areas and convert land to parks.
    - Long range planning for parkland acquisition.
    - Establish Transfer-of-Development Rights program.
  - Non-Profit groups can do the following
    - Advocate for more parks

Sub Theme – Health & Nutrition: Indicator – Food Deserts

- City of Houston needs to actively **attract more grocery stores selling fresh fruits and vegetables in food deserts** across the city.
  - Citizens can do the following:
    - Send letters to local elected officials.
    - Establish co-op enterprises
  - Local government can do the following
    - Reduce parking requirements for supermarkets.
    - Tax incentives for more supermarkets.
    - Incentivize co-op options.
    - Market analysis showing alternative resources to businesses.



Sustainable Development of Houston Districts:

A Sustainability Indicators Study

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SUSTAINABLE DEVELOPMENT OF HOUSTON DISTRICTS:

The Health of the City

ECONOMIC DEVELOPMENT

LESTER KING, PhD.

RICE


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Unconventional Wisdom

Sustainable Development of Houston Districts:

The Health of the City

by

Lester King, PhD, AICP, LEED

Economic Development Pillar of Sustainability


WILLIAMS

Theme - Economic Development
Sub Theme - Employment

Indicator - Employment Status

In a 2010 survey of area residents, 38% of respondents stated that the biggest problem facing Houston was unemployment, poverty and the cost of loving (Klineberg, 2010). Employment is essential to gain access to health care, quality shelter, good communities, and quality of life among others (King, 2012). In comparison to the 63 largest cities in the country, Houston had the 18th highest unemployment rate in 2010 (U.S. Census Bureau, 2011). Houston is projected to add 404,007 jobs between 2010 and 2015 based on the projected performance trend developed over the 20-year period between 1990 and 2010 (King, 2012). It is hoped that this increase in job numbers will significantly reduce the unemployment rate despite the premise that many of the new jobs advertised will be filled by new people moving into the city. Educational training to meet the specialized need for Houston based job mix is essential to reducing the unemployment rate in the city (King, 2012). The Houston Metropolitan Region had the largest increase in jobs in the country between the last quarter of 2011 and the first quarter of 2013 (The Economist, 2013).

Sustainability Benefit: The unemployment rate for Hispanics, which are the fastest growing segment of the population, has not increased significantly between 1990 and 2010.

Sustainability Issue: African-Americans in Houston have a disproportionally high unemployment rate.

The following metrics are used to measure the indicator *Employment Status.*

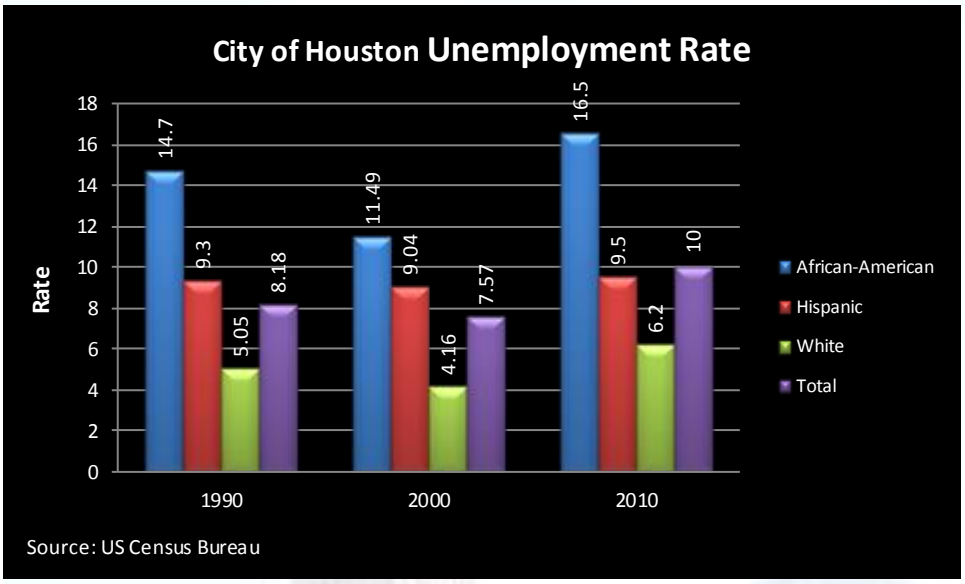


Figure 24: Unemployment Rate

- African Americans had a 16.5% unemployment rate in 2010. This is the highest rate of any racial or ethnic group and hence it demonstrates that African Americans are at a disadvantage when it comes to employment and job security in Houston.
- The unemployment rate among Hispanics remained stable at around 9.5%. This suggests the majority of jobs occupied by Hispanics are in sectors, which are less volatile to the type of economic downturn we experienced.
- All groups show a reduction in unemployment percentage in 2000 and then an increase in unemployment in 2010. African Americans are the most adversely affected group in terms of unemployment.

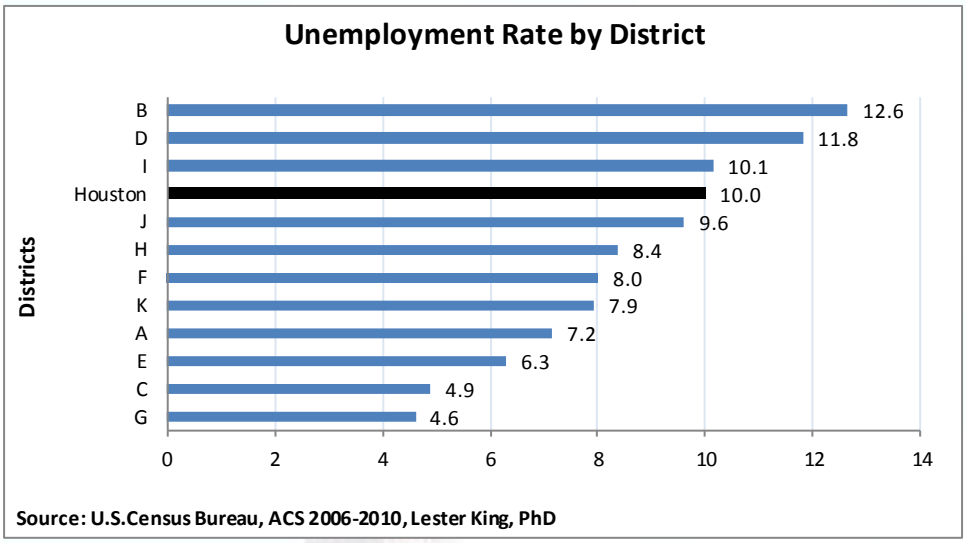


Figure 25: Districts Unemployment Rate

- The Unemployment Rate in Districts B, D and I were above the city average.
- Council Districts J, H, F, A, E, C and G were below the city average.
- Districts B and G had the highest and lowest unemployment rates respectively.
- These results show very large variance in unemployment rates between districts in the city.

Theme - Economic Development
Sub Theme - Macroeconomic Performance

Indicator - Primary Jobs

Traditionally **primary jobs** (manufacturing) were considered the anchors of local economies and essential for reporting economic success (King, 2012). The city of Houston ranked 23rd among the largest 63 cities in the country in terms of the percentage of manufacturing jobs (U.S. Census Bureau, 2011). For this indicator primary jobs are defined as manufacturing jobs plus health sector jobs, since the health sector in Houston attracts patients nationally and internationally.

Sustainability Benefit: Decentralization of the core business areas in Houston means that jobs are spread out across the city. Research shows that there are 17 qualified business centers including the central business district in the City of Houston (King, 2012).

Sustainability Issue: Even with gains in medical jobs, medical added to manufacturing jobs, constitute less than one quarter of all jobs.

The following metrics are used to measure the indicator *Primary Jobs*:

Figure 26: Primary Jobs by District
Figure 27: Jobs by Monthly Salary by District
Figure 28: Percentages of jobs by race and ethnicity

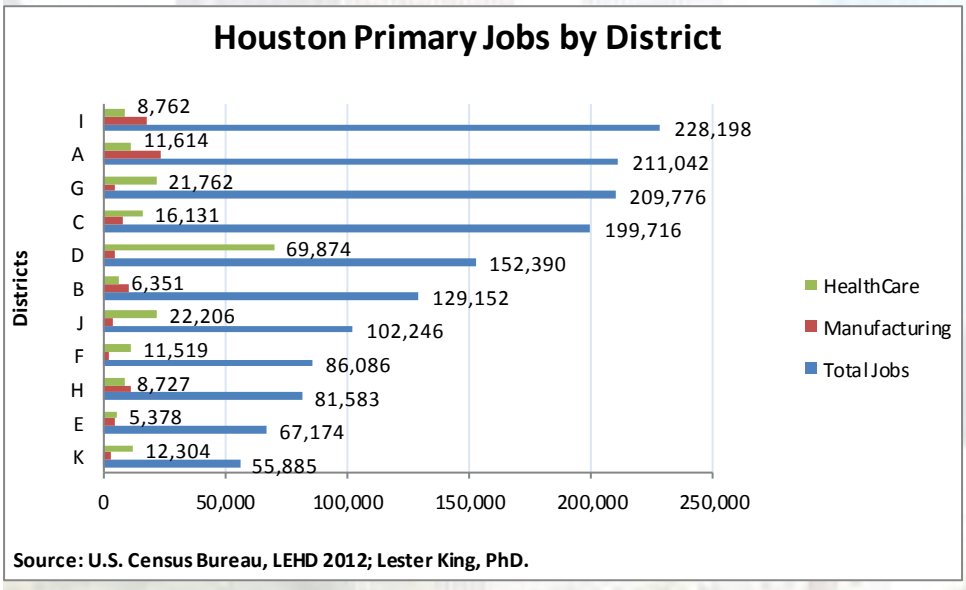


Figure 26: Primary Jobs by District

- The range of job numbers by District stretches from 55,885 jobs in District K to 228,198 jobs in District I.

- Manufacturing jobs and Health Care jobs are the primary jobs in Houston and still constitute a very small percentage of all jobs.
- District D has the highest percentage of Health Care jobs relative to Total jobs with 46%. District D is home of the Texas Medical Center.

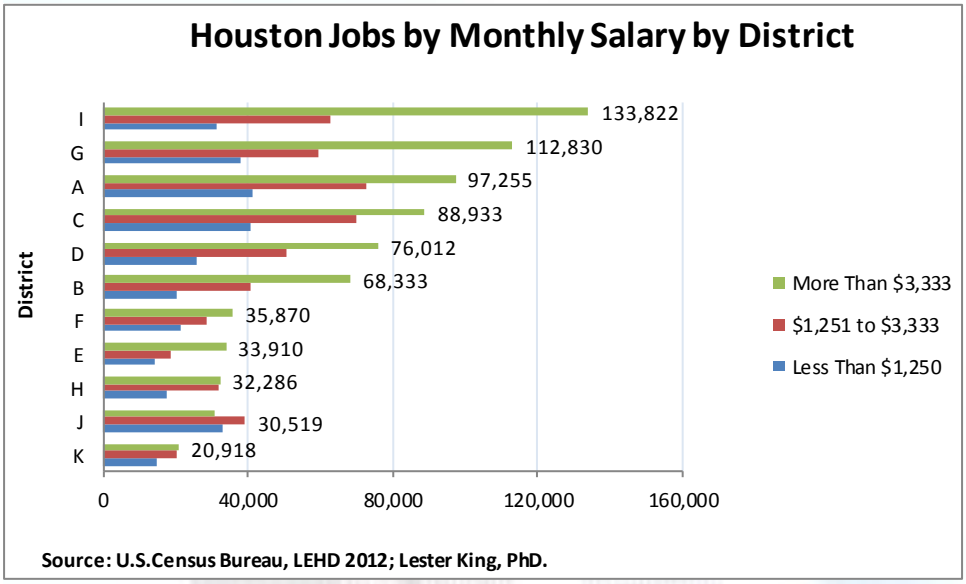


Figure 27: Jobs by Monthly Salary by District

- The figure above shows numbers of jobs in each district divided into three monthly income categories: Jobs that pay under $1,250 per month; Jobs that pay between $1,251 and $3,333 per month and Jobs that pay over $3,333 per month.
- District I has the highest number of jobs which pay over $3,333 per month.
- District K had the lowest numbers of jobs which pay over $3,333 per month.
- Districts A and C had the highest number of low paying jobs, with over 40,000 such jobs each.

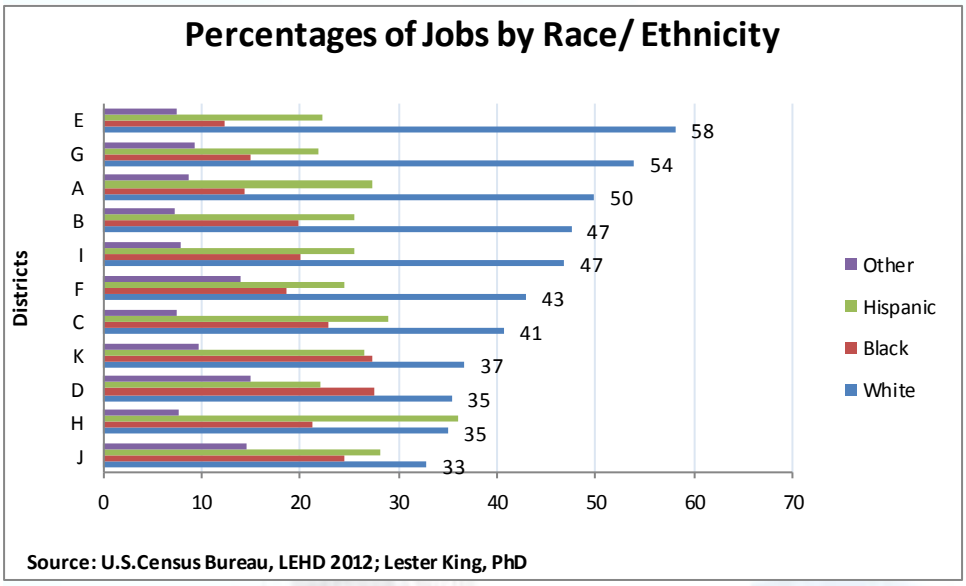


Figure 28: Percentages of jobs by race and ethnicity

- The above figure shows the percentage of jobs in each district held by various race/ ethnic groups.
- The 'Other' cohort, which constitutes 7% of the total population, is well represented in jobs across all of the districts commensurate with the proportion of the population (U.S. Census Bureau, 2011). Eight districts have persons from the 'Other' cohort occupying 7-10% of the jobs. The 'Other' cohort is over-sampled in Districts F,D and J with close to 15% of the jobs in each of those districts. District D is the Texas Medical Center, which employs many diverse persons. Districts F and J are in the West and Southwest areas of the city. These districts have high numbers of persons from other races living and working in these areas such as in Chinatown.
- The Hispanic cohort constitutes 44% of the population, but does not occupy similar percentages of jobs (U.S. Census Bureau, 2011). District H has the highest percentage of jobs occupied by the Hispanic cohort with 35% of Jobs. The Hispanic cohort occupy between 20% and 30% of all jobs in all other districts.
- The Black cohort constitutes 23% of the population in Houston (U.S. Census Bureau, 2011). This group is represented in similar proportions of around 23% in the jobs in Districts C,K,D,H and J. All other districts have an under-representation of the Black cohort in the workforce commensurate with the city level percentage. District E has the lowest proportion with 12% of jobs occupied by the Black Cohort.
- The White cohort constitutes 26% of the Houston population but is represented by a range of 33% to 58% of all jobs in all districts across the city.
- The District with the lowest percentage of jobs in the White cohort is District J. District E has the highest percentage of persons in the workforce from the White cohort.


UPTOWN
PARK

Theme - Economic Development

Sub Theme - Earnings

Indicator – Income

Growth in income is an important summary indicator that shows the rate at which private gains increase over time. This is especially important in an environment where municipalities compete for population and economic growth, as well as more basic things such as keeping up with the rate of inflation. The City of Houston ranked 45th out of the largest 63 cities in the country in terms of median household income in 2010. The median household income in Houston was $42,962 in 2010. New York City ranked 16th highest in terms of median household income and California had 9 cities in the top 20 highest household income ranking, with San Jose City as the highest in the country with a median household income of $79, 405 (U.S. Census Bureau, 2011).

Sustainability Benefit: The Houston region grew to surpass the Boston, Philadelphia, and San Francisco regions by 2006 and has maintained those gains. The Houston region is now the sixth largest metro region in the country in terms of Personal Income.

Sustainability Issue: The 2008 economic crises affected Houston MSA more adversely than the Dallas MSA. By 2010, the Dallas MSA reported the highest total personal income in Texas.

The metric Median Household Income 2010 is used to measure the indicator *Income*:

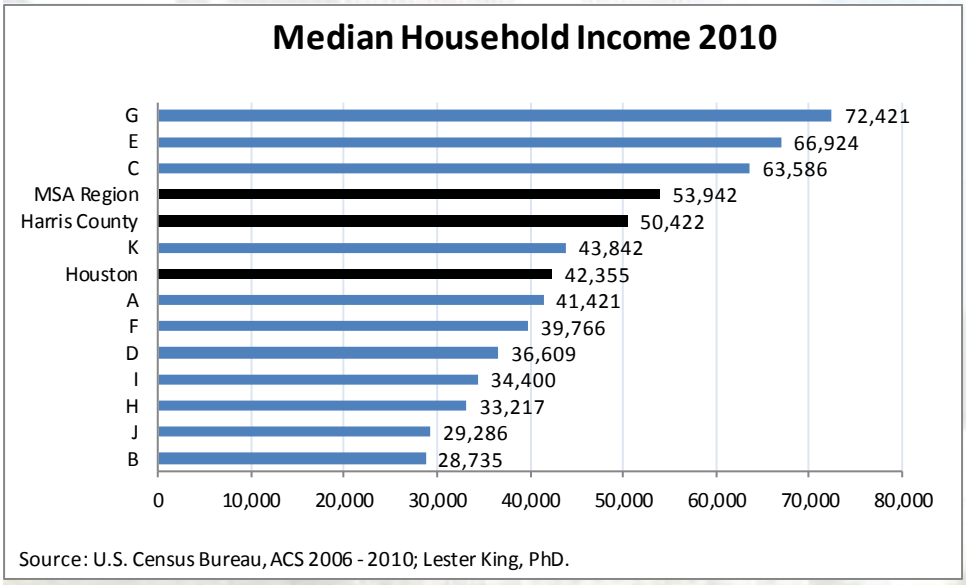
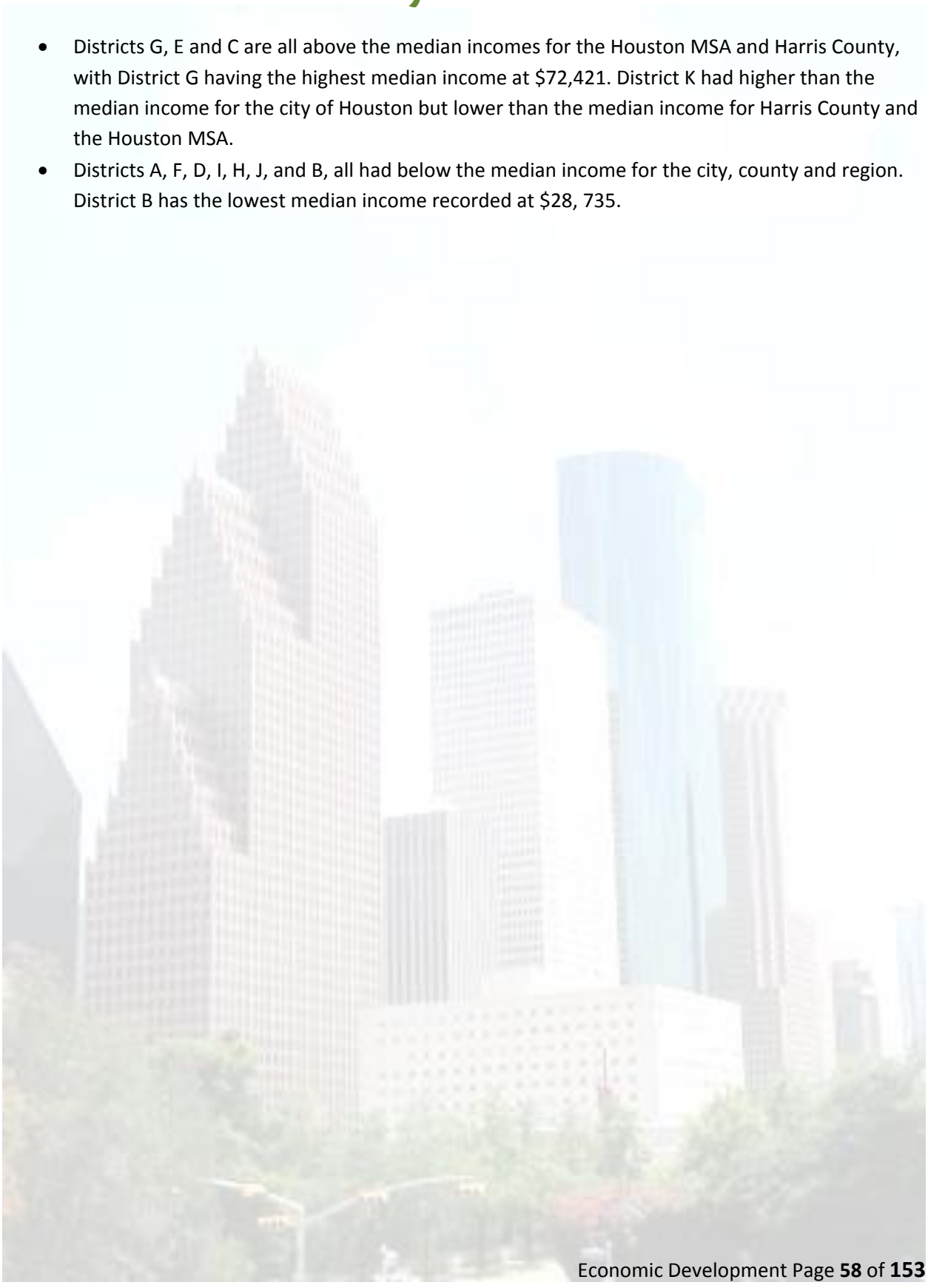


Figure 29: Median Household Income

- The median household income in Houston of $42,355 is below that for Harris County, which is $50,422 and the MSA Region ($53,942) (U.S. Census Bureau, 2011).

- Districts G, E and C are all above the median incomes for the Houston MSA and Harris County, with District G having the highest median income at $72,421. District K had higher than the median income for the city of Houston but lower than the median income for Harris County and the Houston MSA.
- Districts A, F, D, I, H, J, and B, all had below the median income for the city, county and region. District B has the lowest median income recorded at $28, 735.



Theme – Economic Development
Sub Theme – Business Location

Indicator - Jobs/ Housing Balance

Sprawl can be described as the separated spread-out development practice that has dominated suburban development over the last 60 years. The **Jobs/ Housing balance** is a focus on the supply of housing in proximity to jobs. The ideal Jobs/Housing balance is one that offers access to many and various types of housing such as single family, duplexes, and multifamily housing within walking distance to jobs. The Jobs/Housing balance alludes to the importance of mixed-use developments where pedestrian access to schools, services, entertainment, jobs and housing is made possible (Burchell, Downs, McCann, & Mukherji, 2005). For sustainable development, should local governments actively encourage companies to locate in existing business centers or should we let the market decide? In a survey of Harris County residents in 2010, 80% called for redevelopment of older urban areas for mixed use development (Klineberg, 2010). However, in a 2005 survey, Anglos preferred neighborhoods that do not have high percentages of African American or Hispanic people (Klineberg, 2005). This cultural practice, complicates the rational location choice theory of maximizing income to find housing close to jobs. It also explains why some inner city neighborhoods, such as the Houston Third Ward and parts of the Fifth Ward, have large supplies of vacant and underused property, despite their close proximity to the central business district.

Sustainability Benefit: Houston has a very efficient freeway system which connects most areas of the city to employment centers very efficiently.

Sustainability Issue: Less than 25% of Houstonians live within a quarter mile of high density business centers.

The following metrics were used to measure *Job / Housing Balance:*

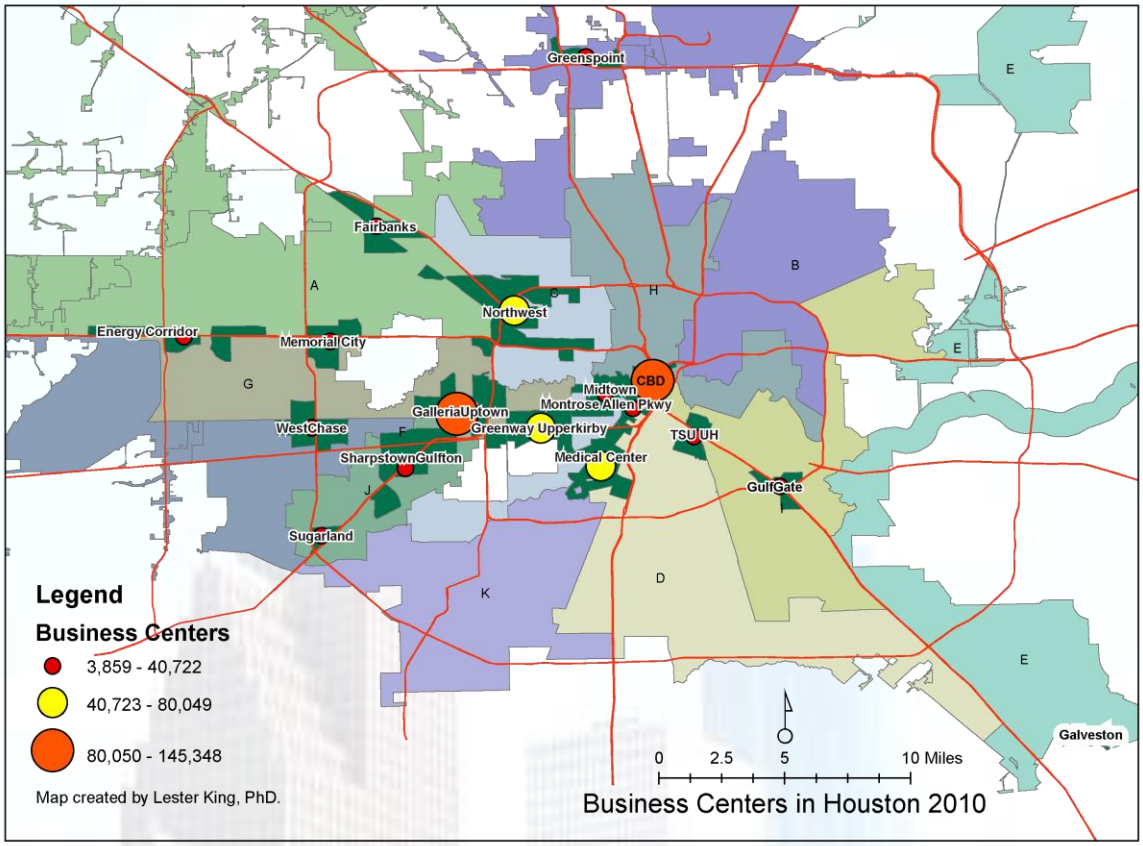


Figure 30: Houston Business Centers

- This map shows the location of business centers in Houston in 2010. These business centers are defined primarily as places with a high density of jobs (greater than 10 per acre within transit analysis zones or TAZs and clusters of such high density TAZs with more than 10,000 jobs).
- In 2010 there were 17 business centers in the City of Houston.
- Downtown, the Galleria, and the Medical Center show the highest concentration of jobs in the City of Houston with more than 75,000 jobs each.
- Although less than 25% of Houstonians on average live within a quarter mile of business centers, about a third of the White cohort live within a quarter mile of the business centers (31.33%). The comparable figures for other races/ ethnicities are: Black – 13%, Hispanic 20%, other races 27%. This suggests that in comparison to other races and ethnicities in Houston, the White cohort prefers and can afford to live close to business centers.

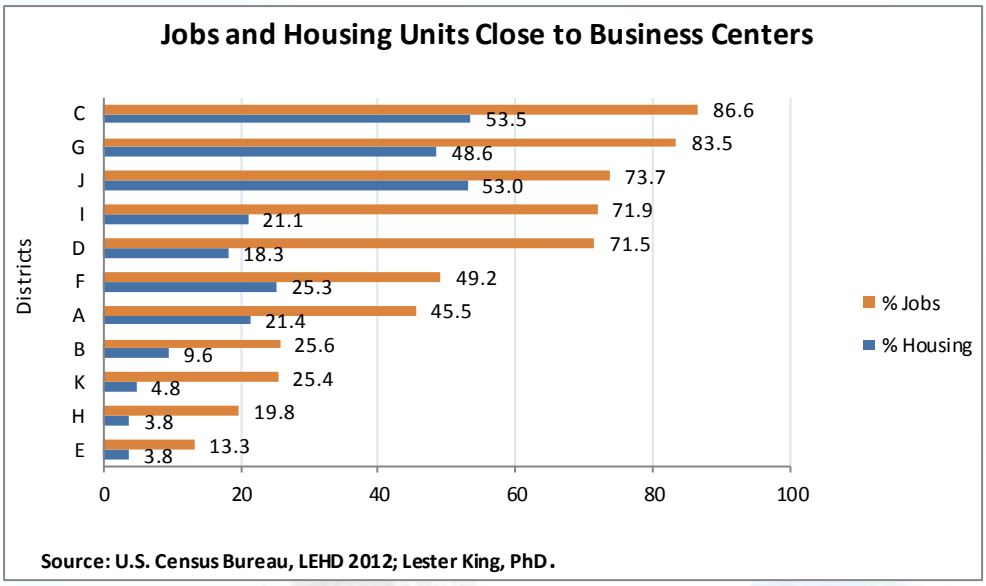


Figure 31: Jobs and housing units close to business centers

- The above figure shows the percentage of jobs and housing units within a quarter of a mile from the business districts in Houston.
- Districts C, G, J, I, and D each have over 70% of the jobs in those districts respectively, within a quarter of a mile to business centers. These 5 districts are also the only ones with a majority of jobs within the business centers. All other districts have a majority of the jobs within in each district respectively, outside of the business centers.
- Districts B, K, H, and E each have less than one third of the jobs in those districts respectively, within a quarter of a mile to a business center.
- Districts C, G, and J are the only ones with the majority of housing units within a quarter mile of business centers. All other districts have the majority of housing units located farther than walking distance to the business centers in Houston.
- Districts B, K, H, and E all have less than 10% of housing units within walking distance of business centers.

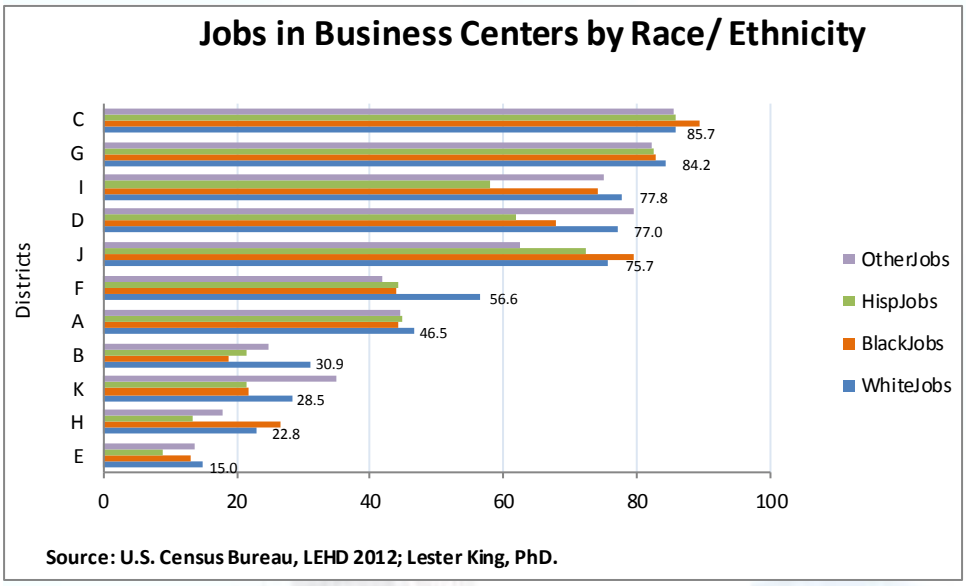


Figure 32: Jobs in Business Centers by race/ethnicity

- The above figure shows the percentage of jobs in each district held by the major racial and ethnic groups.
- Districts C, G, I, D, J, and F each have most of the jobs by the White cohort within a quarter of a mile to business centers. District A comes close to this group with 46.5% of the jobs close to business centers held by the White cohort.
- Most of the jobs in and within a quarter of a mile to business centers in Houston are held by the White cohort.

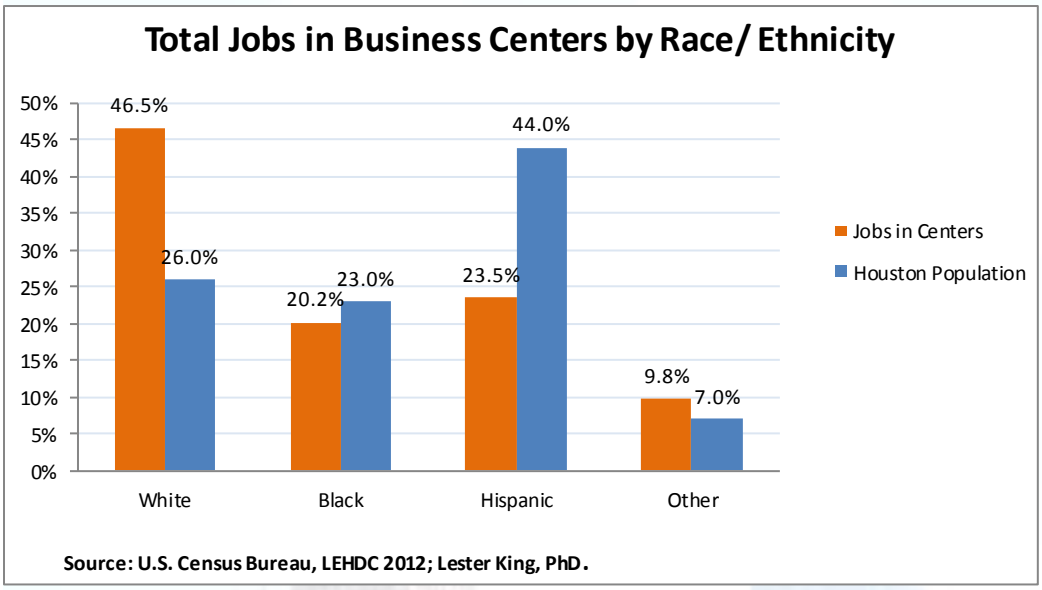


Figure 33: Jobs in Business Centers compared to Houston Demographics

- The above figure compares percentages of racial ethnic groups in Houston, in terms of holding jobs in business centers in 2012 and city wide population distribution in 2010.
- It shows that African Americans and all other racial groups hold jobs in the business centers relatively commensurate with their population distribution in the city as a whole.
- However, the White cohort is overly represented with holding almost twice as many jobs in the business center as their citywide percentage. At the same time, the Hispanic cohort is under-represented in terms of holding jobs in the business centers with almost exactly the opposite trend as the White cohort.

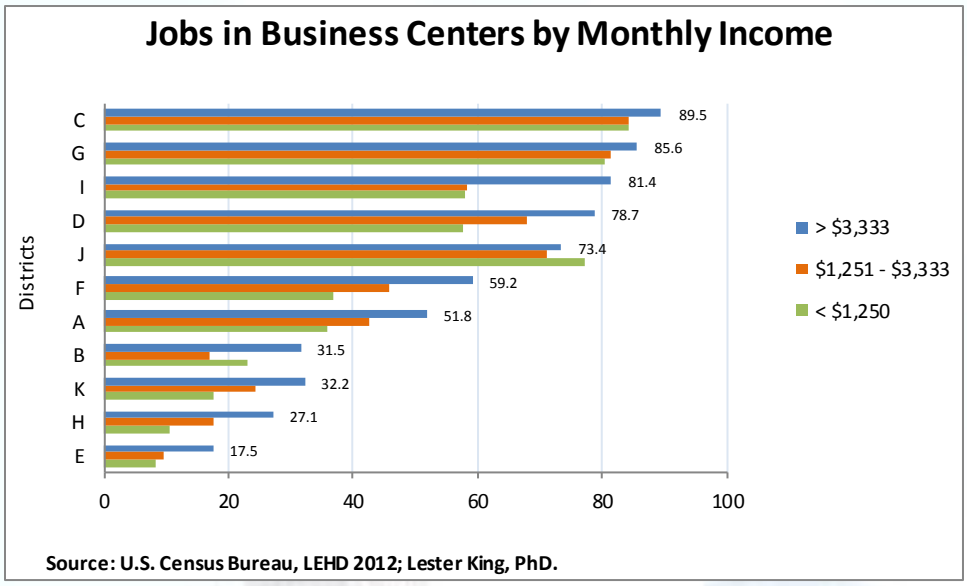


Figure 34: Jobs in Business Centers by income

- The above figure shows the distribution of jobs in business centers within each district according to 3 levels of income.
- Within Districts C, G, I, D, J, F, and A most of the Jobs earning greater than $3,333 per month are located within a quarter of a mile to business centers.

Theme - Consumption and Production

Sub Theme – Capital Improvements

Indicator – Capital Improvements Investment

Capital Investments in a municipality are a key indicator for sustainability in that investments drive the social, economic and environmental fabric of a city. Carefully targeted investment can enhance the social fabric in a visible sense, through such investments as park improvements or public art projects. The economic fabric can be enhanced through efficiencies such as arterial network improvements, and hazard mitigation improvements such as laying subsurface utility arterials. The environmental fabric is enhanced through such efforts as surface runoff improvements to prevent flooding. For the first time ever, there is a General Fund line item of $2.5 million in the proposed City of Houston 2014 budget. This represents approximately 2% of the average annual Capital Improvement Plan for Public Improvement Programs for infrastructure maintenance, renewal and replacement and will be applied to improvements of city facilities (CitizensNet, 2013).

Sustainability Benefit: Houston recently passed an ordinance for a dedicated fund to further improve infrastructure to prevent flooding.

Sustainability Issue: Capital Improvement spending in Houston for stormwater, streets, wastewater, and water infrastructure are not guided by a forward thinking comprehensive plan and as such are more responsive to reactive and extant problems, such as potholes and sidewalk repair.

The following metrics are used to measure the indicator Capital Improvements Investment:

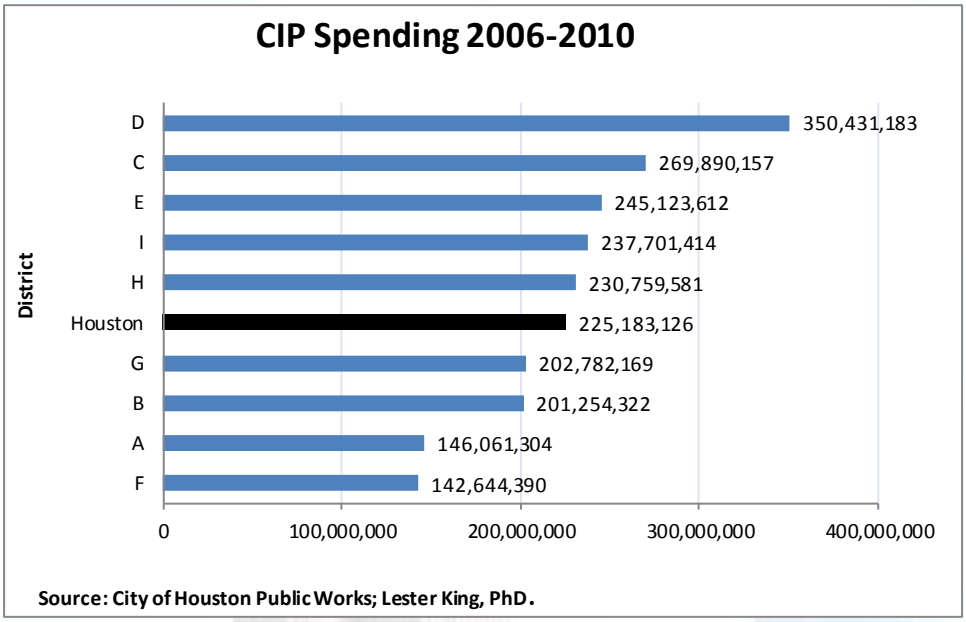


Figure 35: Total CIP Spending for 2006-2010

- For the years 2006 – 2010, $2, 021, 342, 182 was spent in Houston for stormwater, wastewater, potable water delivery and street projects.
- Districts D,C,E,I and H recorded the highest investments of CIP funding, above the average for districts across the city. District D had the highest investment with $350,431,183 between 2006 and 2010.
- Districts G,B,A and F had the lowest investment of total CIP spending. District F was the lowest to be funded with $142,644,390 between 2006 – 2010.

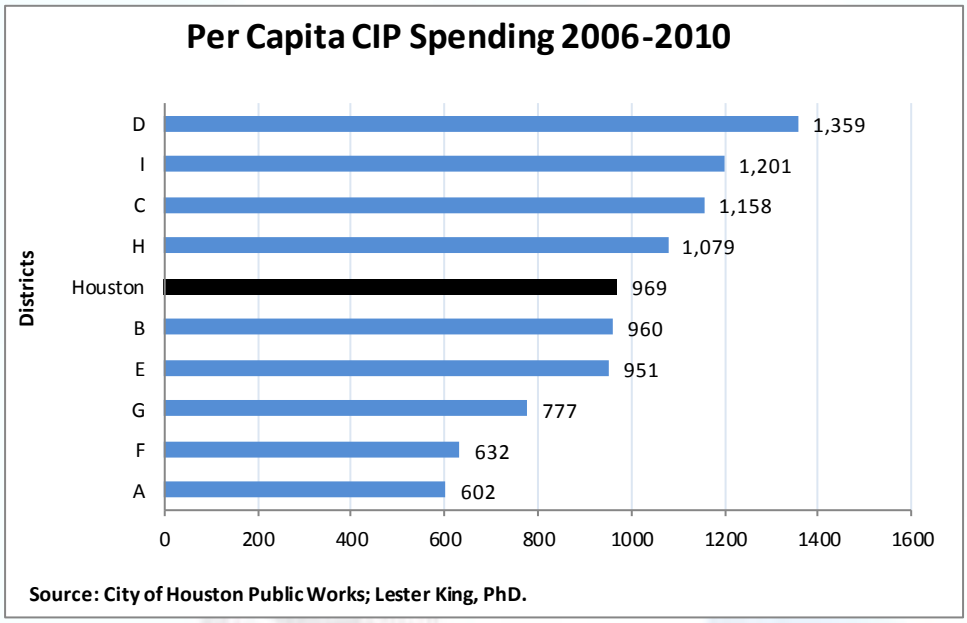


Figure 36: Per Capita CIP Spending

- When viewed on a per-capita basis, CIP spending for districts D, I, C and H remained the highest in the city, while District E was among the below average districts on per-capita spending investment.
- Districts F and A received less than half of the CIP spending compared to Districts D and I, when per-capita funding is calculated.

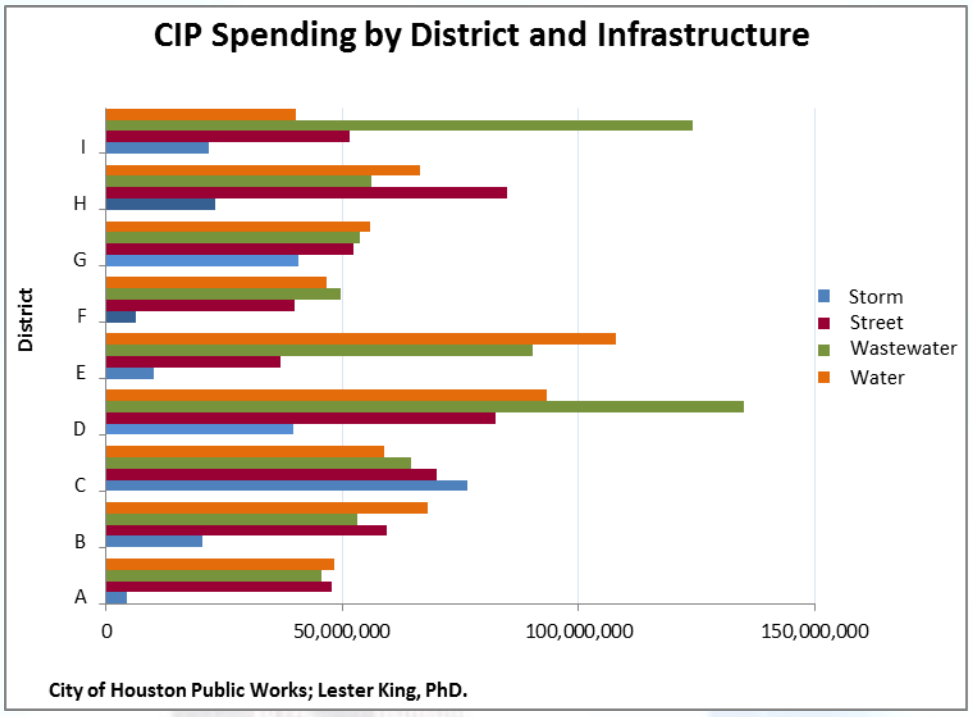


Figure 37: CIP Spending by Infrastructure

- The above figure shows that of the four (4) infrastructure investments, wastewater constituted the highest total spending and Districts D and I received many more funds for wastewater spending compared to other infrastructure investments.

- Total wastewater spending was $672,340,426. Total water spending was $586,162,286. Total street spending was $525,231,991. Total stormwater spending was $242,913,426.
- District D had the highest wastewater spending. District E had the highest water infrastructure spending. District H had the highest Street infrastructure spending. District C had the highest stormwater spending.

Theme - Transportation

Sub Theme - Access

Indicator - Access to Public Transportation

Dr. Martin Luther King, Jr. commented on the failure of public transit to overcome disparities in access to jobs among racial minorities. Several historical studies in the country have pointed to the need to connect central city residents with jobs using transit (Sanchez, 1999). **Access to Transit** in this study is measured by Euclidean (straight line) proximity to bus stops, however other accessibility measures such as frequency of bus routes; proximity to destinations; and congestion time also contribute to accessibility issues.

Sustainability Benefit: Houstonians have moderate access to transit stops that are within walking distance for most areas in the city.

Sustainability Issue: Houston has poor street connectivity and neighborhoods tend to be separated from places of work and school. As a result, even though accessibility to bus stops is good, trip times are long.

The following metrics, are **used to measure the indicator *Access to Public Transportation.***

Figure 38: Percent of population with access to Bus Stops
Figure 39: Intersections by District

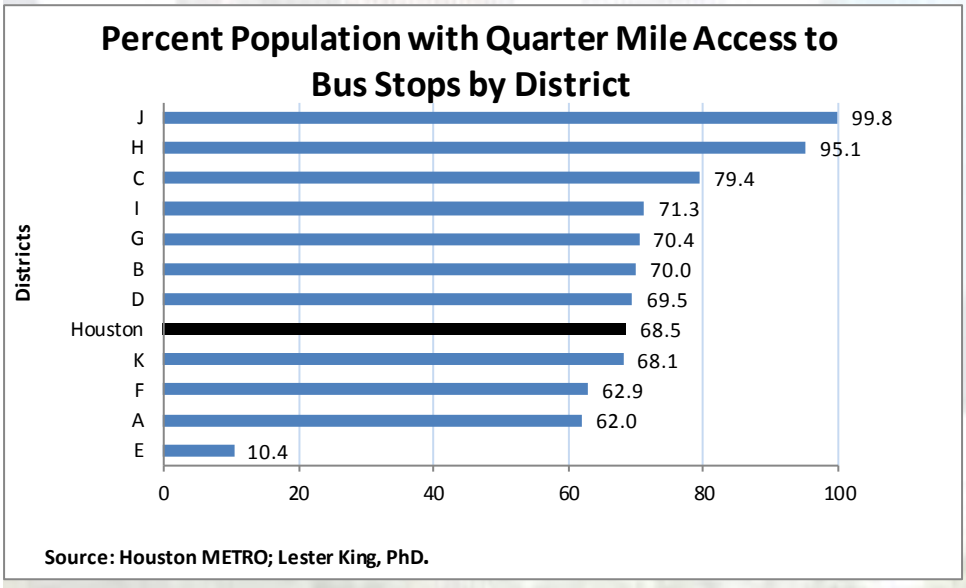


Figure 38: Percent of population with access to Bus Stops

- The percentage of total population within a quarter mile from a bus stop was 68.5% in 2010.
- The percentage of total housing units within a quarter mile of a bus stop was 71.3% in 2010.

- Districts J, H, C, I, G, B and D all had above average rates of access to bus stops. Districts J and H both have greater than 95% of the populations within those districts living within a quarter mile to bus stops.
- Districts K, F, A and E all have below average access to bus stops in 2010. District E has very low access with only 10% of the population located within a quarter mile to bus stops.

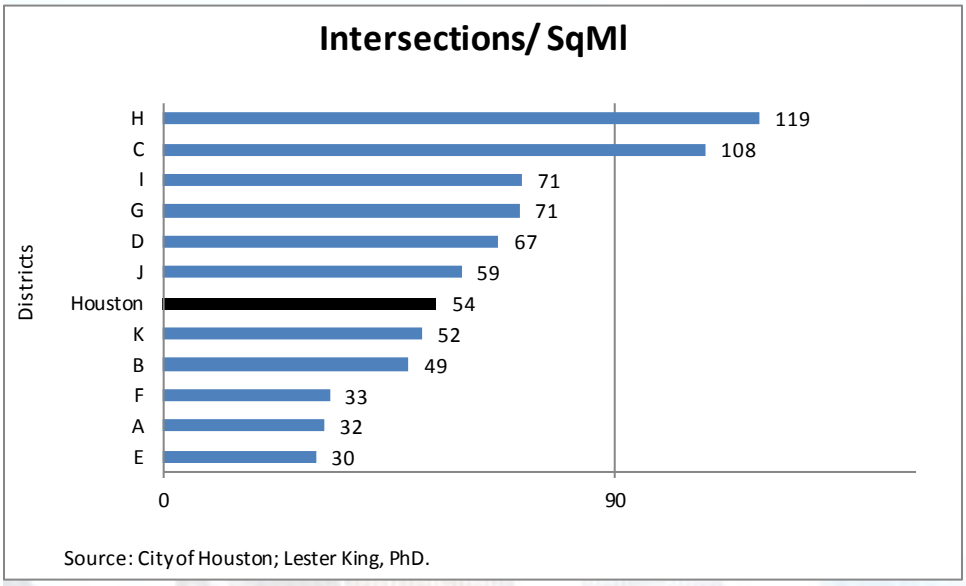


Figure 39: Intersections by District

- Increased street connectivity is related to efficient commuting in getting from origins to destinations such as from home to work or other discretionary stops. The more intersections there are signifies that more options are available for alternative routes, which eases congestion and reduces trip times.
- The above figure shows the average number of intersections per square mile within each of the 11 Districts in Houston. The U.S. Green Building Council (USGBC) developed a rating system for Green Neighborhood Development called LEED ND. This rating system has a pre-requisite of 90 intersections per square mile for any project interested in considering applying for the rating **(U.S. Green Building Council, 2009)**.
- Districts H and C are the only Districts in the City of Houston with average intersections per square mile greater than the LEED ND pre-requisite.
- Districts F, A, and E have very low intersections per square mile and hence have very poor connectivity.

Theme - Transportation

Sub Theme - Demand

Indicator – Travel Time

Travel time from home to work is directly related to reduced emission levels; increased quality of life; economic production and land pricing. In a representative sample of Harris County residents, 48% thought that traffic was the biggest problem in 2005, while in 1990 9% thought that traffic was the biggest problem (Klineberg, 2005). In 2007 the City of Houston reported the highest auto sales of any city in the country, with 379 auto dealers reporting $9.4 billion dollars of sales (U.S. Census Bureau, 2011). Most contemporary urban planners agree that locating jobs and services close to homes would aid in reducing travel time (Cervero & Duncan, 2006).

Sustainability Benefit: Travel times to work for Houstonians are slightly higher than the national average.

Sustainability Issue: Houston roads are heavily utilized by persons living in suburban areas.

The following metric, Travel time to work by District, is used to measure the indicator *Vehicle Miles Travelled.*

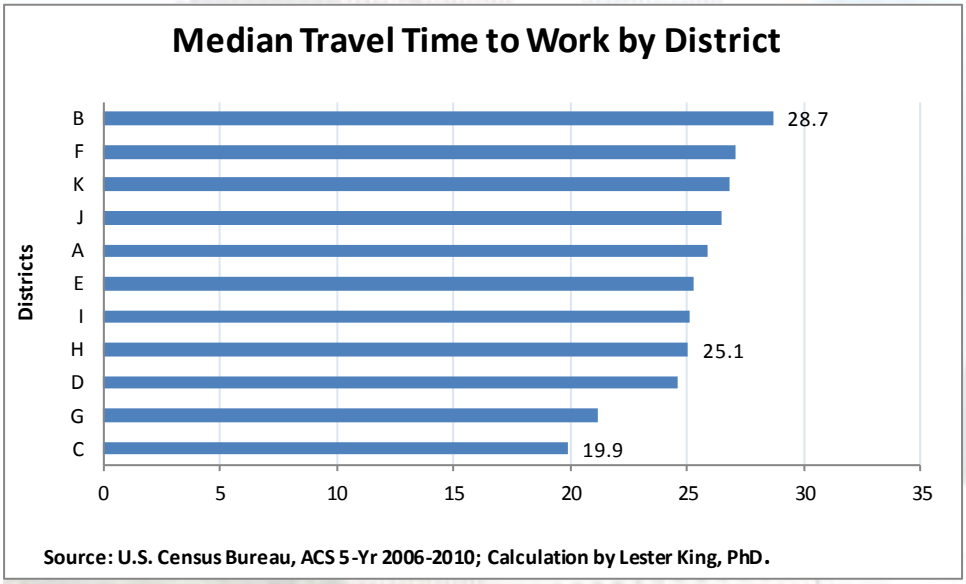


Figure 40: Travel time to work by District

- The average travel time to work in Houston was 25.5 minutes in 2010 (U.S. Census Bureau, 2011).
- Travel times to work in Houston across districts range from 20 minutes to 29 minutes.

- District B has the highest travel time of 28.7 minutes from home to work.
- Districts D, G, and C have lower travel times to work. District C has the lowest average travel time to work at 19.9 minutes.

Theme - Transportation
Sub Theme - Mode

Indicator - Travel Choice

The private automobile has long been the preferred method of travel for most Houstonians (Klineberg, 2010). Is the percentage of persons traveling in private automobile a sign of decreasing community standards, an indicator that population growth is occurring in areas not serviced by public transit, or an indicator that the current transit system, which relies heavily on buses, is not efficient?

Sustainability Benefit: No benefit identified for low use of transit in Houston.

Sustainability Issue: The percentage of persons using transit varies widely by District in Houston.

The following metric, Alternate Means of Travel, is used to measure the indicator *Travel Choice*.

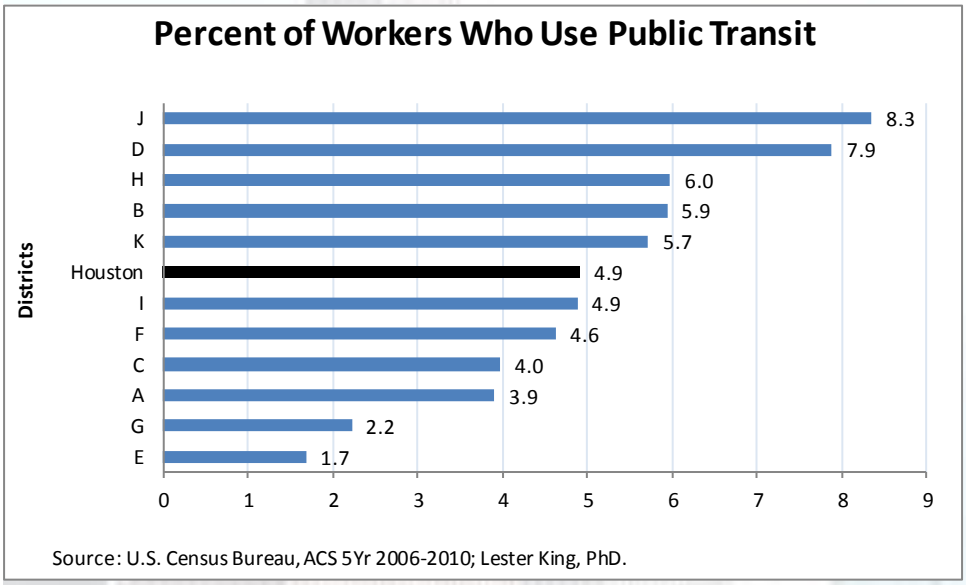


Figure 41: Alternate Means of Travel

- Districts J, D, H, B and K have above average transit use in Houston. District J has the highest level of transit use with 8.3% of workers using transit to get to work.
- Districts I, F, C, A, G and E have at or below average transit use. Districts G and E have the lowest numbers with 2.2% and 1.7% respectively.
- Transit use in the City of Houston is projected to further decline (King, 2012).

Economic Development Policy Recommendations

THEME – Economic Development

Sub Theme – Employment: Indicator – Employment Status

- Need to match skills training from community colleges with demand from employers. Collaboration between community colleges, school districts, and major employers, with support from the city, is necessary. Apprenticeship programs is one type of solution.
- Utilize Science, Technology, Engineering, Math (STEM) training programs more effectively.
    - Citizens can support the following:
        - Support career day opportunities at schools and become more involved at schools.
    - Local government and school districts can support the following:
        - Incentives for companies to provide internships/ apprenticeships.
        - Start stem programs by 5th grade.
        - School district and city partnership
    - Businesses can support the following:
        - Be clear on needs.
        - Provide opportunities for internships/ apprenticeships.

Sub Theme – Macroeconomic Performance: Indicator – Primary Jobs/Green Jobs

- Develop alternative energy industry to attract high end jobs in that sector.
- Develop IT/ Advanced Technologies skills and knowledge labor force.
- Need to improve quality of life to attract professionals and jobs (eg. Arts, eco-tourism, attractions).
- Need to foster and grow Life Science and Bio-Technology industries in Houston.
    - Citizens can support the following:
        - Advocate for improved quality of life.
        - Purchase green products and services.
    - Local governments can support the following:
        - Campaign to raise visibility.
        - Incentives to develop manufacturing and green industries.
        - Market studies.
        - Land planning for enhanced quality of life.
        - Develop workforce to meet industrial needs.
    - Non-profit groups can support the following:
        - Assist businesses to clarify needs.
        - Talent attraction.

Sub Theme – Earnings: Indicator – Income

- Foster development of energy trading (collaboration between Greater Houston Partnership, banks, and universities).
- Develop our opportunity to increase international trade based on large diversity.
    - Local government can contribute in the following ways:
        - Offer incentives to companies to raise level of pay.
        - Facilitate improved education and training for workforce.
        - Address minimum wages.
    - Businesses can contribute in the following ways:
        - Talent retention.
        - Develop non-monetary perks
    - Non-profit groups can contribute in the following ways:
        - Assessment of international trade benefits to local economy.
        - Wage surveys.
        - Identify factors to attract higher paying jobs.

THEME – Economic Development

Sub Theme – Waste Generation and Management: Indicator – Waste Generation

- Reporting requirement for waste haulers to report sources of waste collected.
- We need to be more conscious about decreasing land fill space to work towards a green and sustainable region.
- City of Houston needs to expand the household recycling program to all households.
- Charging a fee for regular stream waste disposal will offset the cost of this important program.
    - Local government can support the following:
        - Education to the general public on waste reduction and management.

Sub Theme – Energy: Indicator – Energy Consumption

- We need to utilize energy efficient building technology such as smart energy meters.
- Educate and incentivize residents on weatherization and energy conservation.
- Need to develop real time pricing policy since we have smart meter capability.
- Need energy disclosure policies and required audits for large users.
    - Non-profit groups can contribute in the following ways:
        - Develop study on real-time pricing policies.

THEME – Economic Development

Sub Theme – Access: Indicator – Access to Transit

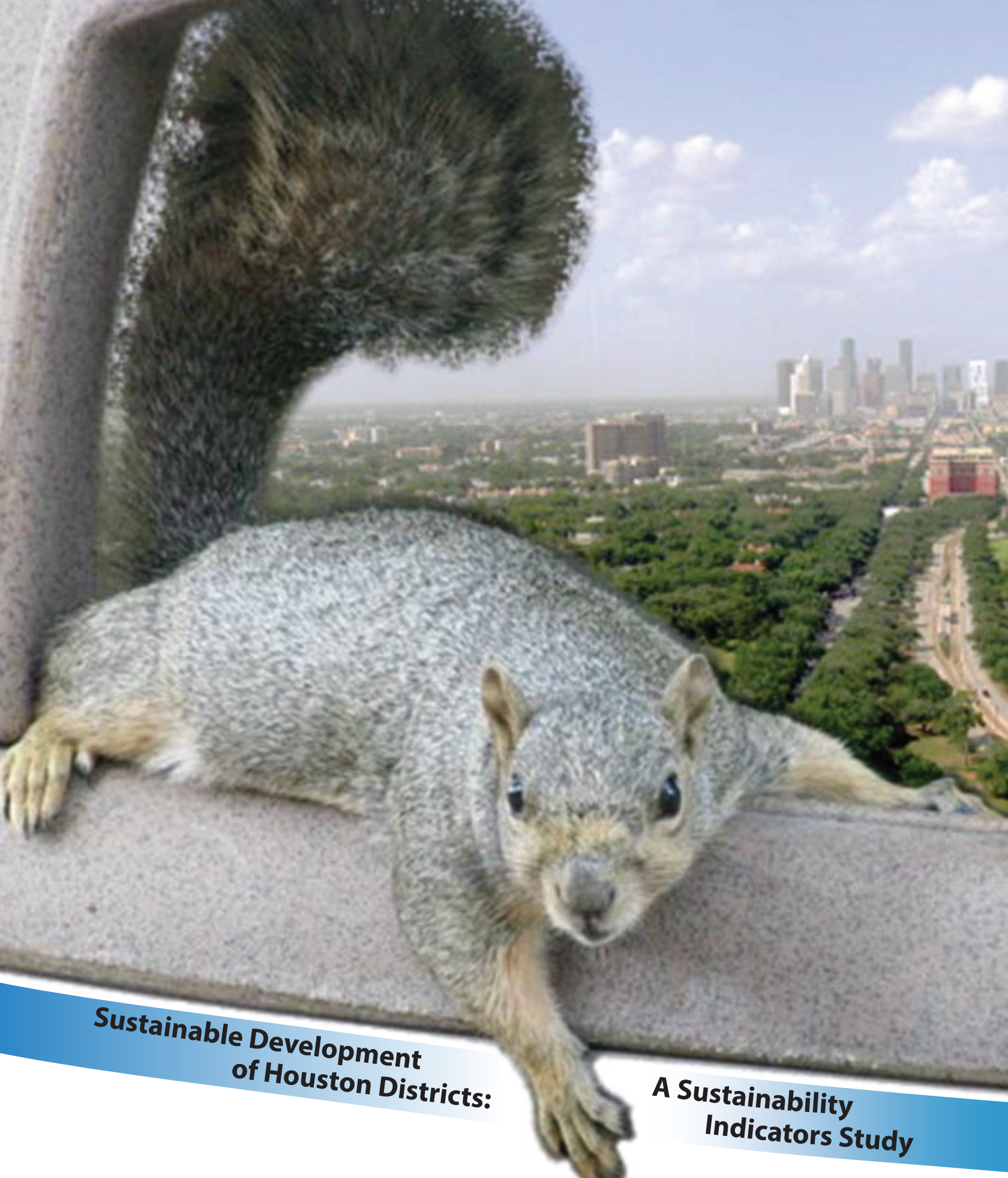
- Transit service improvements - Frequency, circulation services/linkages within strategic areas such as the job centers, and travel time need to be improved to circumvent congestion and long travel time.
- Transit accessibility improvements - Infrastructure such as ramps, sidewalks, bridges over ditches, and sufficient amount of shelters need to be addressed as part of a complete trips package to make public transportation safe, feasible, and desirable.
- Transit coordination - We need coordination of public agencies to plan for improving transit (METRO, Houston Planning Department, Houston Public Works, HGAC, HISD.
- Transit Planning - Transit corridor ordinance has not been utilized effectively in Houston.

Sub Theme – Demand: Indicator – Vehicle Miles Traveled (VMT)

- Incentivize housing development near employment areas.
- Flex Work program is not being effectively promoted and utilized.
    - Local government can contribute in the following ways:
        - Develop vision and goals.
        - Speed up developer permitting processes.

Sub Theme – Mode: Indicator – Travel Choice

- The pedestrian and bicycle network should be developed to complement the bus and rail network as the rail network cannot be as effective without the other modes.
- Develop technologies such as apps to coordinate transit options such as bus, rail, and ride share programs.
    - Local government can contribute in the following ways:
        - Make apps available for citizens to plan trips more efficiently.
        - Land use planning
    - Businesses can contribute by:
        - Offering alternative travel and telecommuting options.
        - Providing facilities for bike and walking.
        - Citizens and non-profits can advocate



Sustainable Development of Houston Districts:

A Sustainability Indicators Study

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Shell Center for Sustainability

SUSTAINABLE DEVELOPMENT OF HOUSTON DISTRICTS:

The Health of the City

ENVIRONMENTAL DEVELOPMENT

LESTER KING, PhD.

RICE


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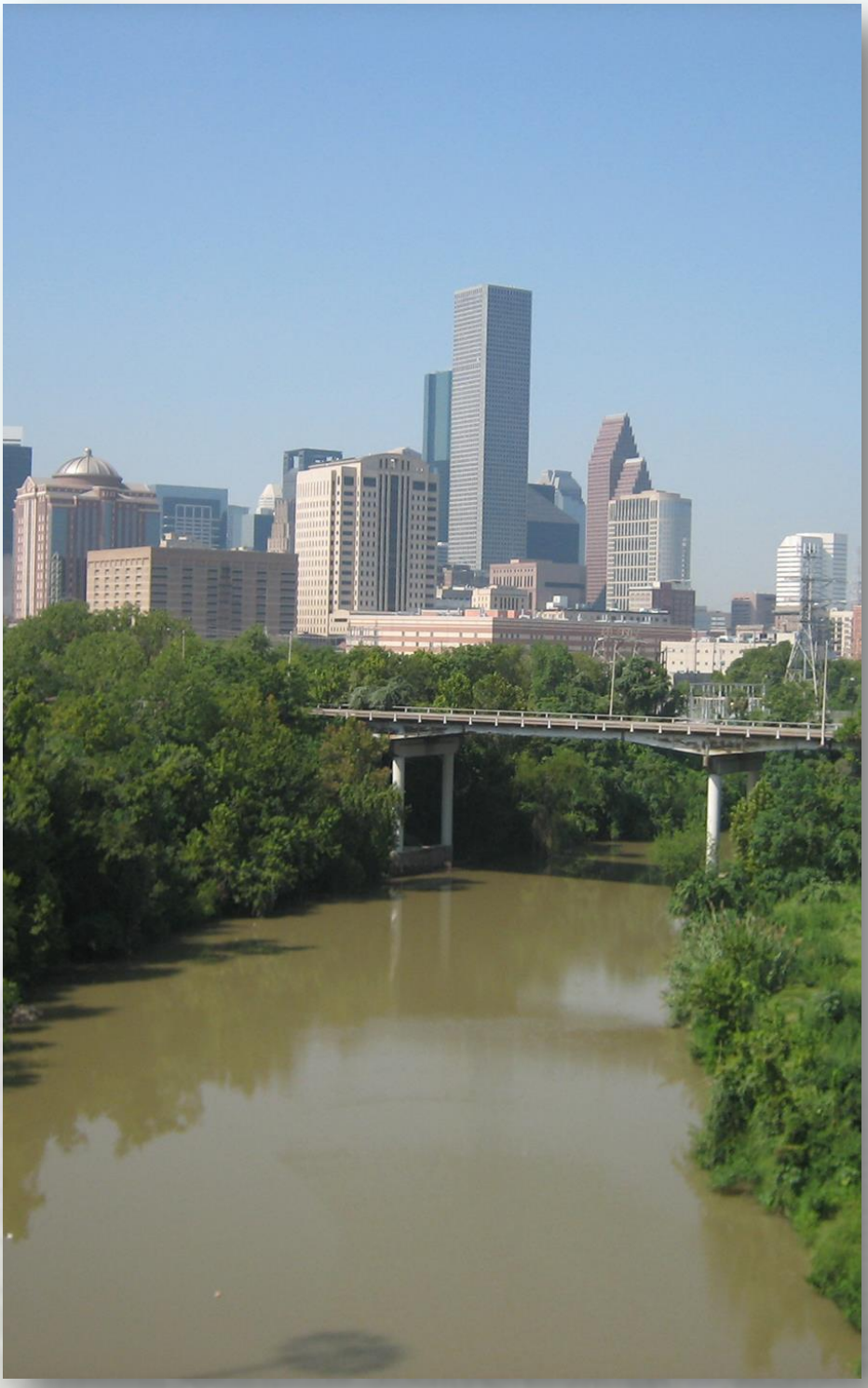
Unconventional Wisdom



Sustainable Development of Houston Districts:

The Health of the City

by

Lester King, PhD, AICP, LEED

Environmental Development Pillar of Sustainability

Theme - Atmosphere
Sub Theme - Air Quality

Indicator - Ambient concentrations of air pollutants

Ground-level ozone is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx) react in sunlight. The Houston area has high ambient concentrations of ozone and has traditionally been in violation of one-hour and eight-hour ozone standards (King, 2012).

Sustainability Benefit: The Houston Region is in attainment for some of the regulated National Ambient Air Quality Standards (NAAQS).

Sustainability Issue: Houston is situated next to petrochemical plants, refineries and one of the largest industrial ports in the country. Additionally, Houstonians drive long distances because the City of Houston is large and homes are separated from jobs, services, and daily needs.

The metric, Maximum Ozone Index Concentration is used to measure the indicator *Ambient Concentration of Air Pollutants:*

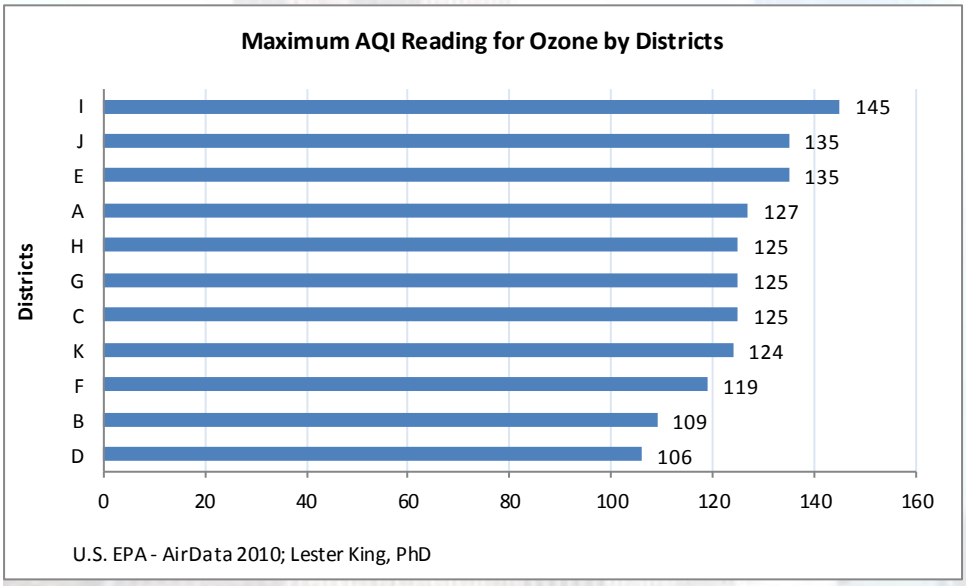


Figure 42: Maximum Ozone Index Concentration

- The average district in the city of Houston had a maximum air quality index (AQI) value of 125 in 2010.
- AQI values of 101 – 150 are 'Unhealthy for Sensitive Groups'. People with lung disease, older adults and children are at greater risk from exposure to ozone. Persons with heart disease are added to the previously mentioned group as also being at greater risk from the presence of particles in the air. All districts in Houston recorded monitors with AQI values in this range.

- AQI values of 151 – 200 are ‘unhealthy’. At this level everyone may experience adverse health effects and persons of sensitive groups may experience serious effects. Monitors outside of Houston but within Harris County recorded AQI values in this range.

Theme - Freshwater

Sub Theme - Water Demand

Indicator - Water Use

In 2006 the City of Houston Municipal water use was 346,393 acre-feet per year. Harris County excluding Houston used approximately 250,000 acre-feet that year for municipal purposes (Region H Water Planning Group, 2010). The City of Houston is the largest water supplier in the region and is responsible for supplying customers in Harris County and portions of the surrounding 7 counties. This complicates issues for drought response management since Houston water needs do not establish hierarchical preference between needs of customers within the city limits versus those outside of the city limits. As a result most reports and policies projecting Houston water needs are regionally focused without ability to identify the specific needs of users within the city limits.

Sustainability Benefit: Water use per capita has decreased over time.

Sustainability Issue: Large quantities of water, treated to drinking standards, is used for lawn irrigation in Houston. Lawn irrigation strains the capacity and infrastructure of the water distribution service and can account for as much as 60% - 70% of a typical residential customer's water usage in the summer months (Texas Agricultural Experiment Station, 2002).

The metric Household Water Use by District was chosen to measure the indicator *Water Use*:

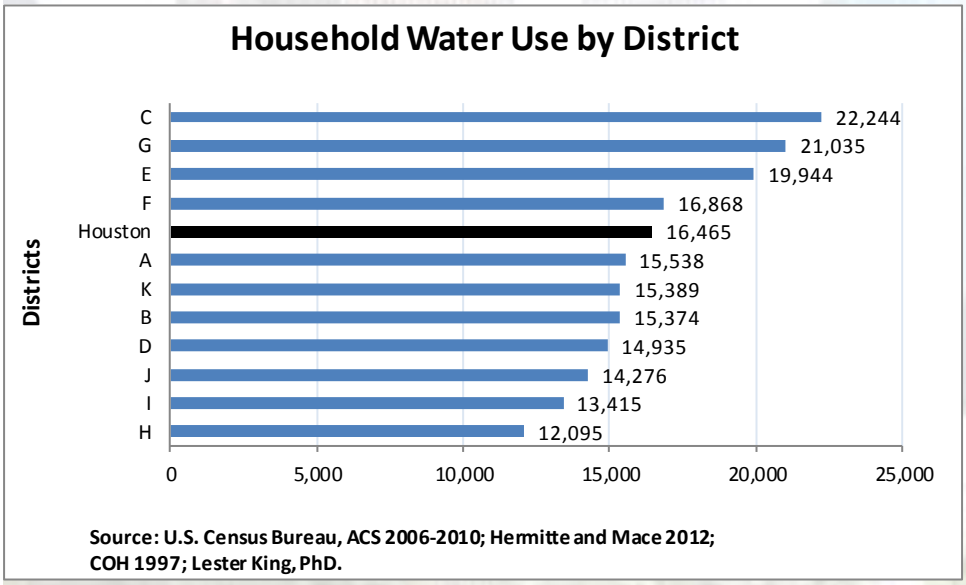


Figure 43: Household Water Use by District

- The analysis of household water use in Houston shows that the average households in the average district in Houston uses 16, 465 acre feet per year of water. This is the

equivalent of 5,365,143,826 gallons of water a year. Households in this analysis represent a total of 52% of the total amount of water consumed in Houston.

- Districts C, G, E and F use above the average in the city as a result of having more households, with district C using the most water among households in the city.
- District A, K, B, D, J, I and H use below the average amount of water among households totaled by district in the city.

Theme - Land

Sub Theme - Flooding

Indicator – Flood Plain Expansion

Flooding in Houston is a critical issue regarding resilience of the city to natural hazards. Resiliency efforts focus on either mitigation efforts or adaptation efforts, which together articulate strategies for hazard reduction or impact response respectively. Mitigation strategies are citied as those proactive solutions to reduce the impacts of natural hazards before they occur and hence are promoted as the best course of action for sustainability (Schwab & Topping, 2008). Mitigation actions for urban areas to reduce flooding focus mainly on increasing development regulations in the floodplains and abandonment of developments in the floodplain (White, 2008). Floodplain mapping helps in the effort to find solutions for flooding mitigation, however according to the Harris County Flood Control District (HCFCD), 65% of the area in Harris County that flooded during Tropical Storm Allison was outside of the mapped regulatory floodplain (Harris County Flood Control District, 2004).

Sustainability Benefit: The delineation of the 100-year floodplain is the first step in targeting areas for flood mitigation strategies

Sustainability Issue: Stormwater detention and retention and efficient conveyance into the bayous; in addition to development restrictions in the floodplain must be increased to significantly combat flooding in Houston.

The following metrics are used to measure the indicator *Flood Plain Expansion*:
Figure 44: Houston floodplain expansion 2000 - 2012
Figure 45: Population within 100 Yr Floodplain

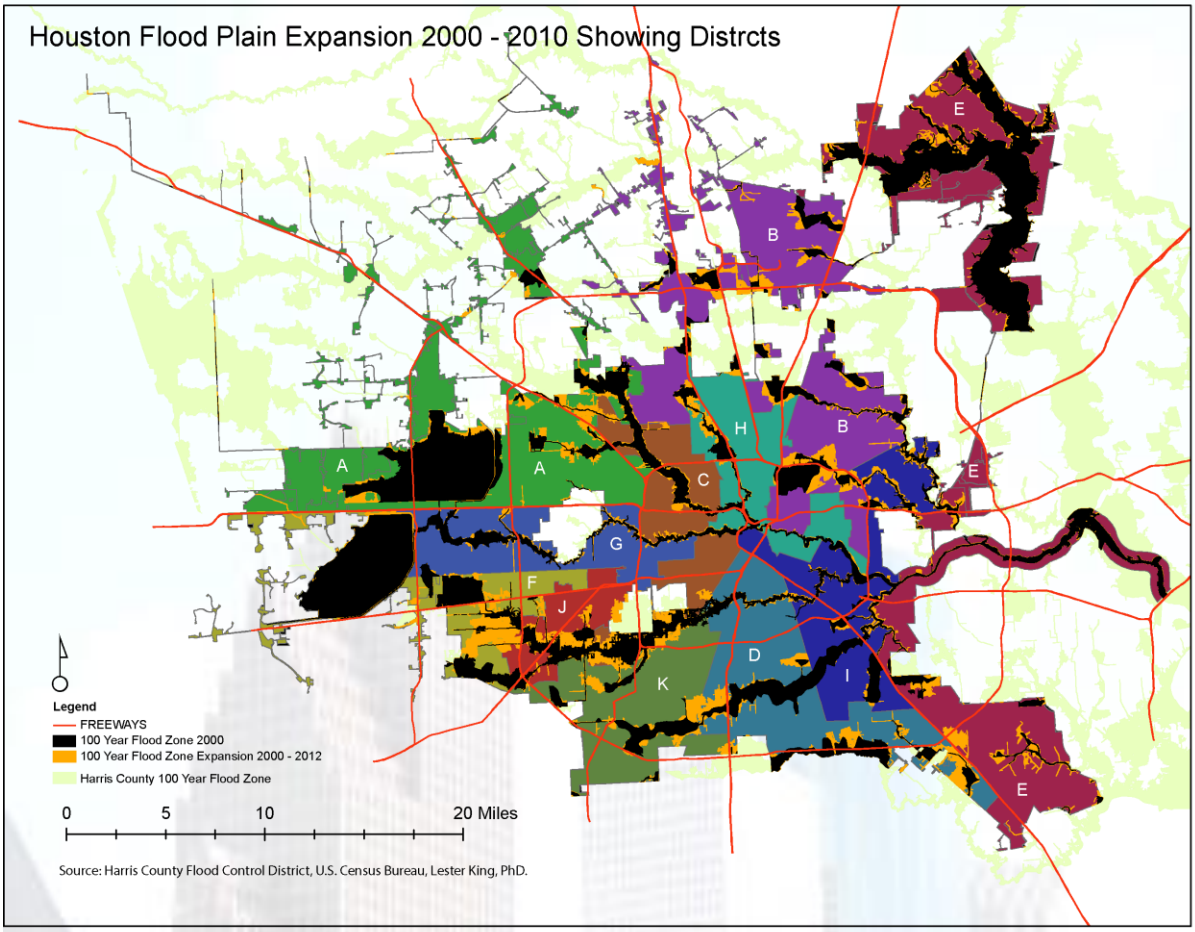


Figure 44: Houston floodplain expansion 2000 - 2012

- The 100 year floodplain expanded by 11,375 acres to cover 26% of the City of Houston, between 2000 and 2012.
- An estimated 17% of Houstonians and approximately 149, 000 housing units are in the 100 year floodplain (King, 2012).

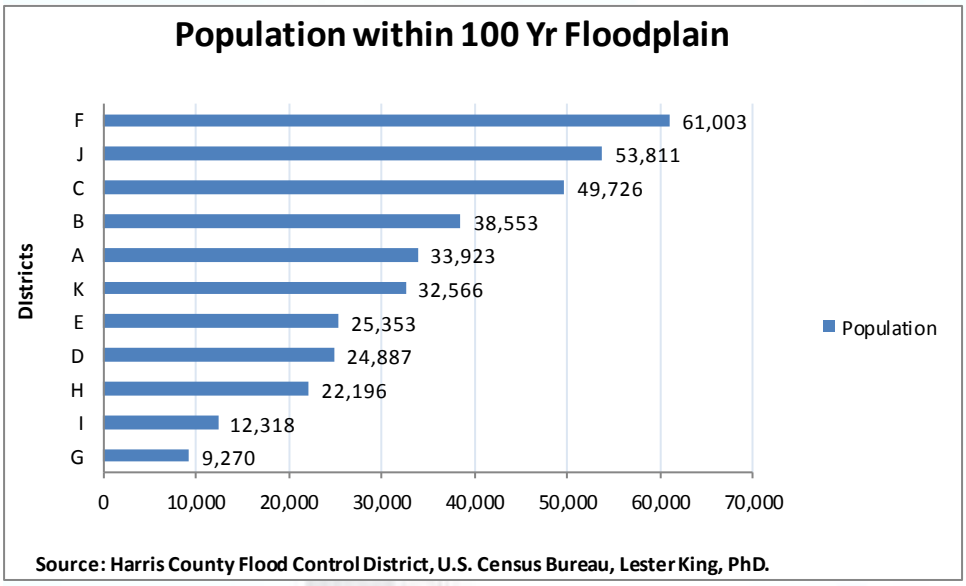


Figure 45: Population within 100 Yr Floodplain

- The above figure shows the tremendous variance of persons vulnerable to flooding disasters in Houston.
- Populations in districts vulnerable to flooding range from 61, 003 persons in District F to 9,270 persons in District G.
- The above figure and previous map shows that flooding is a hazard that impacts persons from every district across the city.


3291

Theme - Land
Sub Theme - Land Cover

Indicator - Land Cover Change

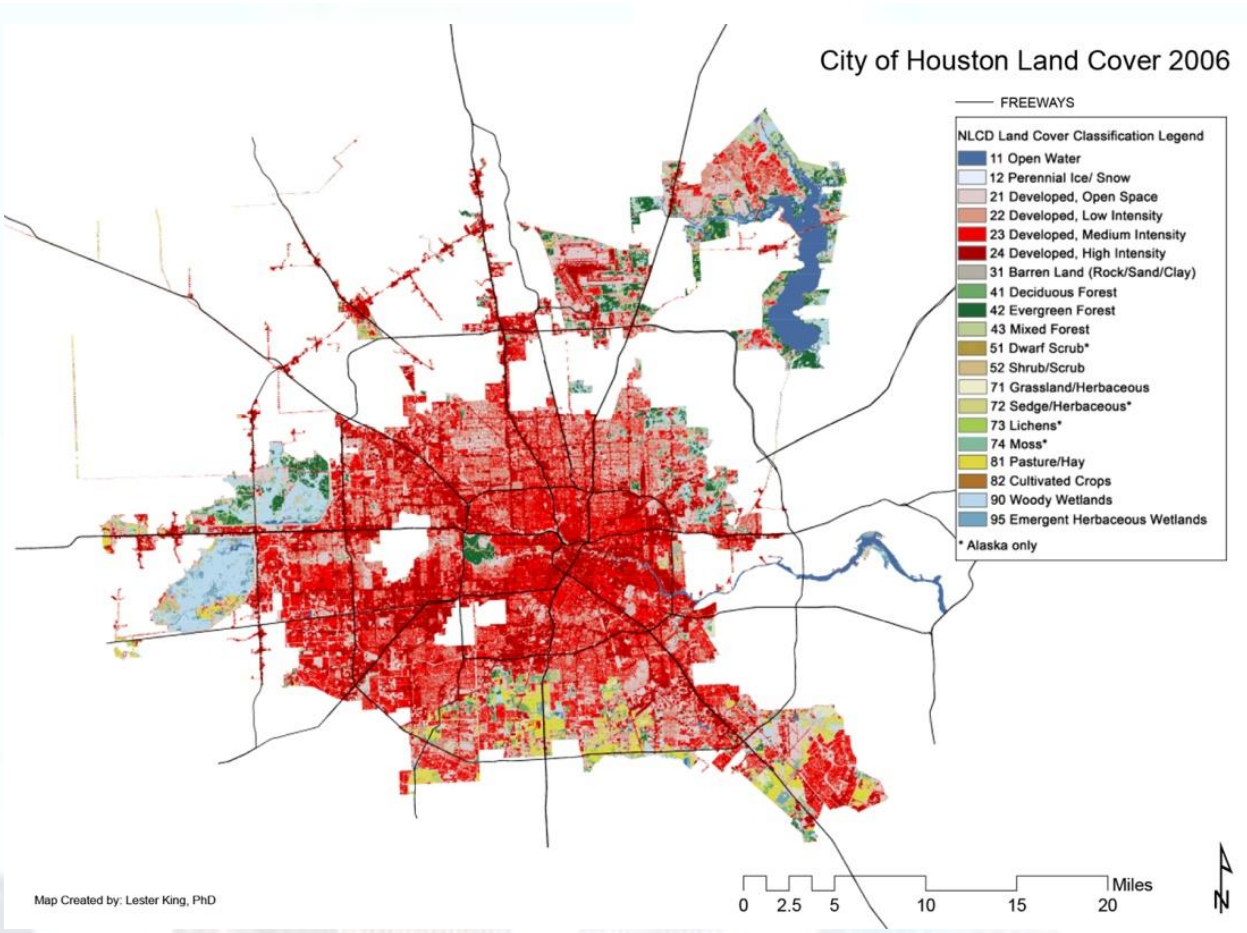
During the period 2000 to 2025, if development practices remain the same, the United States is expected to lose 7 million acres of farmland and 7 million acres of ecologically fragile lands to real estate development (Burchell, Downs, McCann, & Mukherji, 2005). Houston is considered a real estate developer friendly city with few development regulations. It is also considered one of the more sprawling cities in the country. This sprawl can be defined by low density, low accessibility, poor continuity, low centrality, low concentration, and absence of mixed land uses (Cutsinger & Galster, 2006). Since development is not focused in targeted areas, most lands in the city are technically available for real estate development, the resulting land coverage is primarily low density development. As a result of this type of development practice, a significant amount of natural land and habitat has been converted to development. Analysis shows there has been a loss of 25% of Big Thicket, 14% of Coastal Marshes, 21% of Columbia Bottomlands, 31% of Piney Woods, 16% of Post Oak Savannah, 40% of Coastal Prairie, and 11% of Trinity Bottomlands ecosystems in the wider Houston region (Blackburn, 2011).

Sustainability Benefit: Houston is a large city capable of absorbing a lot of growth and development.

Sustainability Issue: Growth and development in Houston does not maximize land utility since most development in the city is comprised of single story buildings. As a result more open space and natural areas are developed, commuting distances increased and the city's overall carbon footprint is increased.

The following metrics were used to measure Land Cover Change:

Figure 46: City of Houston Land Cover 2006
Figure 47: Land cover by district



Source: US Department of the Interior – USGS

Figure 46: City of Houston Land Cover 2006

- The 2006 land cover map shows the newly annexed areas to the north-west and west of the city as being areas of predominately high to medium intensity development.
- The city is primarily covered by low – medium development.

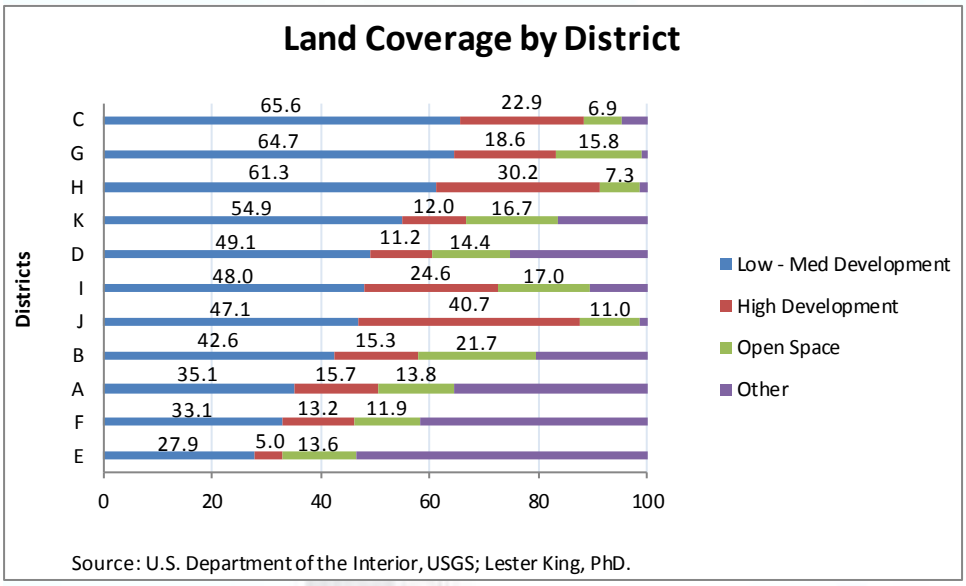


Figure 47: Land cover by district

- Low – Medium intensity development is the prevailing land cover except in Districts A, F and E.
- Low – Medium intensity development is defined as areas with a mixture of constructed materials and vegetation. These areas have impervious surfaces covering 20% - 79% of the total cover and most commonly include single-family housing units.
- Districts J, H, and I have the highest percentages of high intensity development with 40.7%, 30.2%, and 24.6% respectively.
- Open space ranges from 6.9% to 21.7%. This type of land cover includes areas with lawn cover such as parks and golf courses.


TTX

Theme - Land

Sub Theme - Land Use

Indicator - Land Use Mix

Land Use Mix is an important indicator for sustainable development since it addresses the availability of services and activity destinations in proximity to living spaces. The pattern of growth can be considered as more important than the amount of growth, since the pattern determines such things as resource efficiency and traffic management (Roseland, 1998). The major contemporary ideas in planning include increasing land use mix as an objective or goal (U.S. Green Building Council, 2009).

Sustainability Benefit: Since Houston does not have the statutory zoning authority, the process of achieving more mixed-use developments would easier to accomplish. Most contemporary planners do not advocate for Euclidean zoning since it leads to separation of land uses (Schindler, 2012).

Sustainability Issue: Socio-cultural historical norms in Houston have established a precedent for separation of single family housing from other land use types, especially multifamily housing. This practice is very similar to what occurred in the state of Ohio in the 1920s and gave impetus to the development of the practice of land use zoning as a means of preventing mixing of land uses (Power, 1989). In Houston this practice of separation of single family from multifamily developments is even without regard for the market segment the multifamily development will target (Sarnoff, 2013).

The following metrics were used to measure Land Use Mix:

Figure 48: Land Use Mix in Houston

Figure 49: Select Land Use Percentages by District

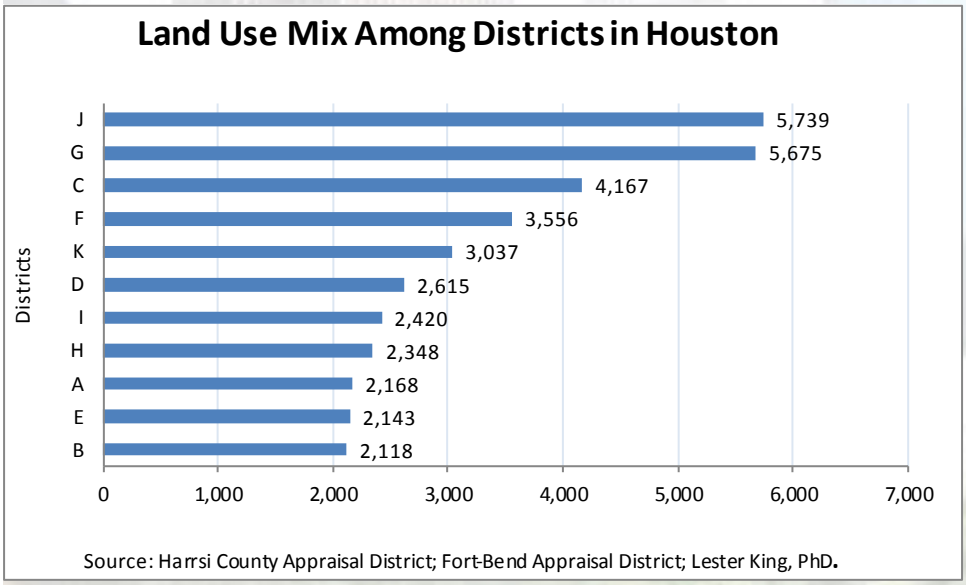


Figure 48: Land Use Mix in Houston

- The above figure shows the degree of land use mix in Houston using the Herfindahl-Hirschman Index (HHI). The index ranges from 0 to 10,000 with zero signifying a high degree of land use mixing and 10,000 signifying no land use mixing.
- District B has the highest degree of land use mixing with an index value of 2,118, while District J has the lowest level of land use mixing with an index value of 5,739.

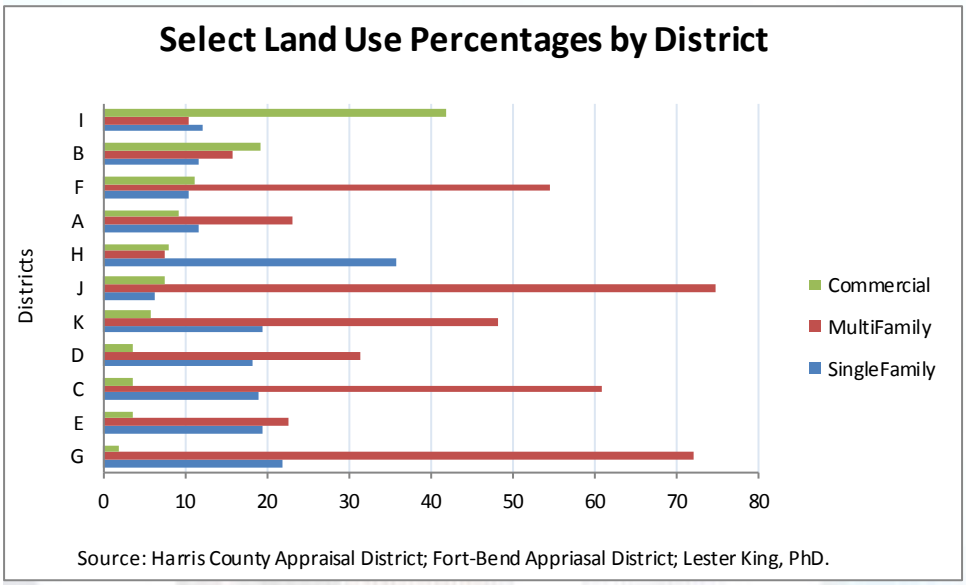


Figure 49: Select Land Use Percentages by District

- The above figure compares percentages of single family, multifamily and commercial land use in Houston.
- The figure shows that districts with higher percentages of commercial land have lower percentages of multi-family and single family property. Further research needs to be conducted to determine the degree to which this is true.
- Four districts, J, G, C and F have more than 50% of the land area devoted to multifamily land use.
- Multifamily, single family, and commercial land use constitute approximately 41%, 16% and 10% of total land uses respectively.

Environmental Development Policy Recommendations

THEME – Atmosphere

Sub Theme – Air Quality: Indicator – Ambient Pollutants

- Expand the air quality monitoring network.
- A Gulf Coast Mobility Plan is needed for coastal cities since the efficient delivery of logistics reduces air pollution generated from this sector.
    - Citizens can help with the following:
        - Organize citizen monitoring projects.
        - Report incidents and odors.
        - More citizen representation on regional planning for air pollution.
    - Local government can contribute the following:
        - Improve toxics monitoring.
        - Determine seamless coverage for monitoring network.
        - Improve regional governance for air quality.
    - Non-profit groups can contribute the following:
        - Organize public meetings for educational and involvement purposes.
        - Organize citizen monitoring efforts.

THEME – Fresh Water

Sub Theme – Water Demand: Indicator – Water Use

- A strong Drought Contingency Plan is needed and public education campaign.
- Need better assessment of end user water demand such as landscape irrigation.
- Need to establish a city Water Vulnerability Tax.
    - Local governments can contribute the following:
        - Improve education of users on water reduction strategies.
        - Improve regulation of irrigation systems.
    - Businesses can contribute the following:
        - Market opportunity for alternative water conservation and delivery syster

THEME – Land

Sub Theme – Flooding: Indicator – Floodplain Expansion

- Need to accelerate conversion of property in floodplains to open space.
- Eliminate development in the floodplain.
    - Local government can contribute the following:

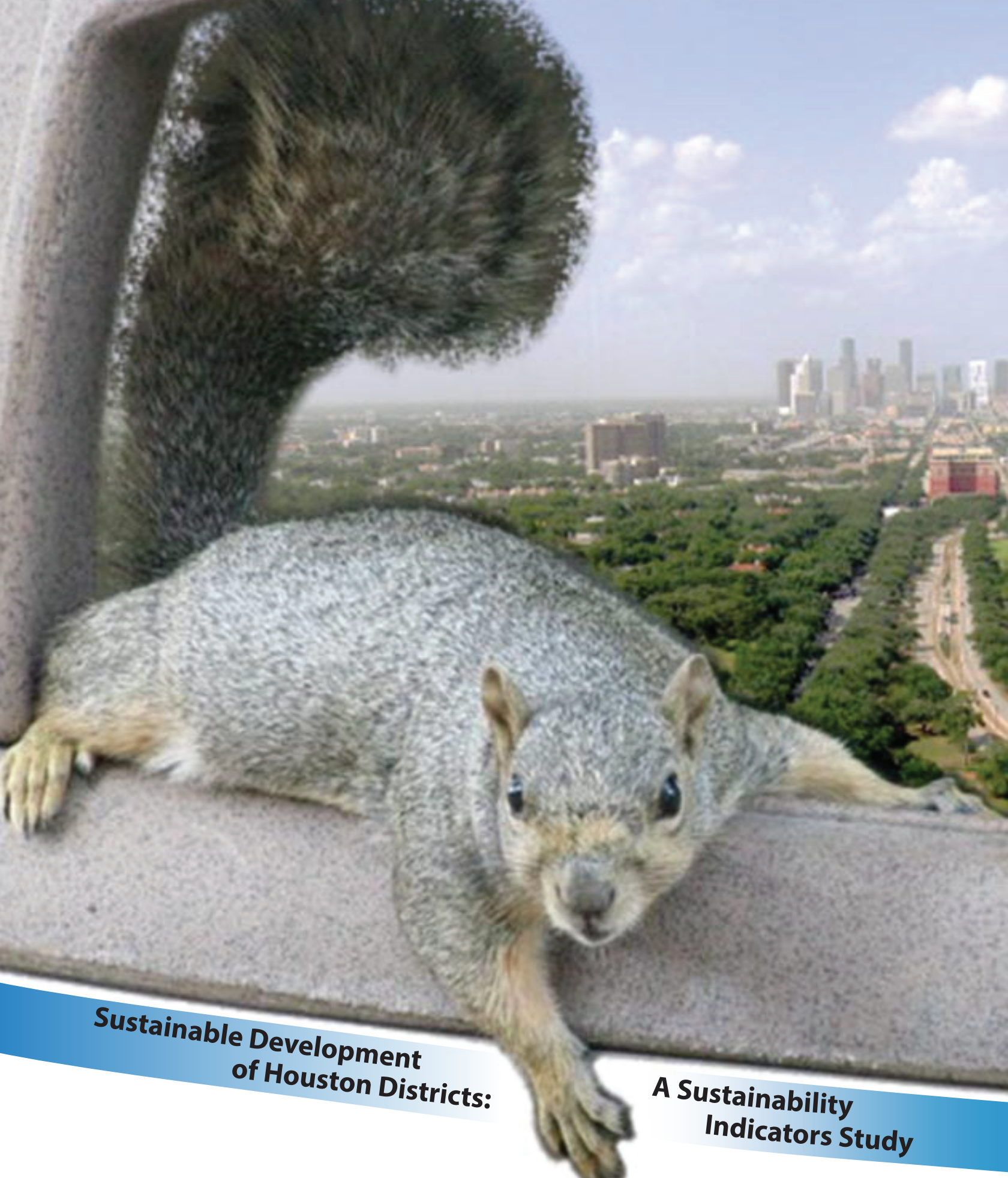
        - Establish a Transfer of Development rights fund to reduce development in the floodplain.
    - Non-profit groups can contribute the following:
        - Advocacy for elimination of floodplain development.

Sub Theme – Land Cover: Indicator – Land Cover Change

- Stronger policies for green space acquisition are needed.
    - Local government can contribute the following:
        - Develop a green space acquisition plan.
        - Convert properties in the Land Assemblage program to greenspace.
        - Collaborate with school for shared use of playgrounds.
    - Non-profit groups can contribute the following:
        - Studies on the benefits of greenspace expansion to business and the community.

Sub Theme – Land Classification: Indicator – Jobs/Housing Balance

- Development codes are not robust enough to increase livability in the city.
- The development codes should include elimination of minimum lot sizes or setbacks; complete streets; encouraging housing closer to job centers etc.
    - Local government can contribute the following:
        - Improve infrastructure efficiencies
        - Implement fee for service based on proximity to job centers.
    - Non-profit groups can contribute the following:
        - Study on local versus suburban costs.



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Shell Center for Sustainability

SUSTAINABLE DEVELOPMENT OF HOUSTON DISTRICTS:

The Health of the City

FINDINGS

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RICE


RICE
Unconventional Wisdom

Conclusion

Council districts are the primary level of governance below city-wide administration in Houston. Every two years citizens go to the polls to elect representatives for their public interests. In 2011, the city increased the number of council districts form 9 to 11 as part of a Department of Justice agreement forged in 1979 (COH, 2011). This major act of defining new spatial boundaries for the efficient representation of citizens' interests was mainly for the purpose of ensuring the protection of minority voting rights, under Section 5 of the Voting Rights Act. The only non-demographic considerations were that the areas identified would be contiguous; county voting precincts should not be shared across districts; and attempts would be made to preserve the boundaries of incumbent representatives. It should be noted that the council districts in Houston are primarily representative of demographic and political contiguity. The structure and findings for this report go far past consideration of solely demographics and politics and takes a truly comprehensive approach of addressing social, economic and environmental considerations as outlined by sustainable development.

This report shows the performance of the health of the City of Houston according to the lens of sustainable development. It shows that although the Voting Rights Act was instrumental to ensure equal representation of minorities in the governance of cities like Houston, that there is still a tremendous amount of disparity between areas. This disparity is clear between areas that are primarily composed of the African-American cohort compared to areas that are primarily composed of the White cohort. It is less clear between areas that are primarily composed of the Hispanic cohort compared to areas predominately occupied by other cohorts. One reason is that the Hispanic cohort constitutes 44% of the population so although there is some concentration; this demographic is well distributed across the entire landscape of Houston. The report also shows that issues in Houston from a sustainable development perspective are not explained by racial disparity alone. Many middle and upper middle class areas are adversely affected in some of the measures in this health report on the state of development in Houston.

The following table summarizes some of the findings contained in this report. It lists the indicators, city level performance, and district level performance for comparative purposes. The indicators are accompanied by a green, amber or red icon, symbolizing good progress towards sustainability, moderate progress towards sustainability, or major intervention needed respectively. These ratings were developed, for the purpose of peer review, by a team of approximately 27 experts and development practitioners over the course of three workshops and three surveys in 2012. We hope the report will be used by citizens, city staff, and local decision makers to better understand the sustainable development of Houston.

Summary Findings		
Indicator	**City Performance**	**District Performance**
 **1. Population Growth**	Population in Houston is currently growing at an average annual rate of approximately 1.42%.	From 1990 – 2010, District E had the highest growth rate of 3.3%, while District I had the lowest growth rate of 0.22%. District I includes downtown Houston, Lawndale and Parkplace. District E includes Clearlake.
 **2. Education Attainment**	There exists an attainment gap between the White student cohort and other student groups. In general all graduation rates have improved. The HISD district graduation rate was 74.3% in 2010.	The district level performance review covered all schools within the boundary of Houston. The graduation rates in District E were the highest in the city. District J graduation rates were the lowest. District E also has a higher median household income that District J with $66,924 compared to $29,286. District J also has the highest percentage of persons in poverty in the city with about 1 in every 3 persons (32%).
 **3. Voter Participation**	Only 7% of the population voted in the local election of 2011.	Districts C and G had the highest percentage of voters. These districts contain the affluent neighborhoods of River Oaks, Memorial, Meyerland and University Place. Districts J and F had the lowest voter participation and contain the less affluent neighborhoods of Sharpstown and Alief. The results of this indicator, gives evidence to the impact of income on citizen participation.
 **4. Indicator – Income Inequality**	Income inequality must be addressed in Houston since the median top 20% earned $140,000; median earnings were $43,000; and the bottom 20% earned a median income of $10,000.	Districts D and C had the highest levels of income inequality in 2010. These districts contain the neighborhoods of Meyerland, Central Northwest, Sunnyside and Museum Park. The districts with the lowest level of income inequality are Districts I and J, which contain the neighborhoods of Sharpstown and Magnolia Park.

5. Poverty Rate	The percentage of persons below poverty was 23% (474,346) in 2010. This metric is increasing, which is not a sustainable trend.	District G has the lowest percentage of persons in poverty with 7.1%, while District J has the highest percentage of persons with 31.8%. District J contains the neighborhoods of Sharpstown, Westwood and Gulfton.
6. Health Coverage	30% of persons had no health insurance in Houston in 2010. Houston has the largest medical center in the world, and boasts many jobs in this sector. However, access to health insurance in Houston is a problem.	A look at the distribution of health centers across the city by district shows that Districts G and E have the highest numbers of persons assigned to centers there with over 40,000 persons per center in those districts. The districts that are more centrally located (districts D, B, H and I) have better proximity to health centers with under 8,000 persons assigned to each center.
7. Affordability	30% of Houstonians spent more than 30% of their income on housing in 2010.	District F has the highest percent of housing units costing more than 30% of incomes. While District E has the lowest percentage of housing units in this indicator. District F contains the neighborhoods of Westchase and Alief and District E contains the communities of Clearlake and Edgebrook. Median income in District E is $66, 924 and in District F is $39,766. This difference may explain why a higher percentage of households in District F are finding housing costs more unaffordable.
8. Accessibility of Public Spaces	44% of the population lives within a quarter mile of a public park. This number needs to increase to ensure accessibility to quality of life in Houston.	Districts I and C have the highest percentage of population with good access to parks. District F has the lowest access to parks.
9. Food Deserts	36% of the population lives within a Food Desert. That is, they live more than 1 mile from a grocery store or supermarket that sells fresh fruit and vegetables.	District B has the highest percentage of persons in the Food Desert, while Districts C and G have the lowest percentage of persons in the Food Desert. District B contains the less affluent neighborhoods of Kashmere Gardens and Greater Fifth Ward; while Districts C and G contain the affluent neighborhoods of the Heights, University Place and River Oaks.

10. Employment Status	The unemployment rate for Houston was 10% in 2010. For the white cohort it was 6.2% and for African Americans it was 16.5%. This means disproportionate hiring or employment stability occurs in Houston.	District B has the highest unemployment rate in the city with 12.6%, while District G has the lowest with 4.6%. Although District J has the highest percentage of persons in poverty, the unemployment rate in this district is under the city average (9.6%). This suggests that incomes in District J may be relatively low compared to the cost of living in Houston.
11. Primary Jobs and Green Jobs	Medical jobs in Houston are increasing while industrial jobs are decreasing as an absolute percentage of all jobs. Together, industrial and manufacturing jobs make up 23% of all jobs and are considered primary jobs for Houston. Less than 7% of all jobs in Houston are green jobs.	The Texas Medical Center is located in District D, so that district has the highest number of medical jobs. District A leads all other areas with manufacturing jobs representing 11% of all jobs. District F has under 2,000 manufacturing jobs equal to just 2% of all jobs in that district. District A contains the Spring Branch area and District F contains the Alief area.
12. Income	Since per capita income in 2010 ($44,001), was slightly below 2007 levels ($44,872), it is estimated that the 2008 economic recession set us back approximately 3 years. Large numbers of unskilled new immigrants will further lower the overall per capita income in the near future unless major intervention is undertaken.	Districts G, E, and C have the highest median household incomes in the city, all over $60,000. Districts J and B have median household incomes under $30,000.
13. Waste Generation	The city of Houston collects waste for single family households but private haulers are contracted for multifamily apartments and businesses. Although these haulers report the content of waste they collect, they do not report the source of the waste and hence data on waste generation is estimated. This is a policy issue that complicates developing a robust sustainability strategy to target waste reduction in Houston.	Waste was not calculated for the districts analysis due to lack of sufficient data to understand the disposal practices of business and households.

14. Energy Consumption	Average residential energy consumption per household has increased between 2000 and 2010 from 13,496 kwh to 14,221 kwh. This accounts for 11 million Mwh needed to power Houston homes in 2010. The city administration of Houston uses only 10% of this number and HISD uses 4%. Recently the city administrative operations increased its share of renewable energy sources to 50% of its total need. That is the equivalent of an estimated 5% of the total energy needed to power homes in Houston. City led goals to reduce non-renewable energy consumption among Houston households and businesses need to be addressed.	Data on energy consumption at the district level is not available, since this data is considered private. Future research to develop a methodology for analysis of Houston residential and business activities would be necessary to estimate energy consumption.
15. Access to Transit	As of 2010, 68.5% of people in Houston live within a quarter of a mile to a bus stop.	District J has just about the total population within a ¼ mile walk to a bus stop. While District E has only 10.4% of the population within a ¼ mile to stops. District E is very much below the city average of 68.5%.
16. Vehicle Miles Travelled	Annual VMT is projected to increase in Houston. This study used *Travel Time* as a proxy for VMT and found that the average travel time for Houstonians was 25.5 minutes in 2010. Persons living in suburban areas and working in Houston would have much larger travel times and VMT, this contributes quite significantly to the degree of wear and tear on Houston roads and environmental pollution from auto use.	District B has the highest travel time and it is located to the far north of the city, this district includes the Houston International Airport. District C has the lowest travel time, is centrally located and includes the neighborhoods of Montrose, Meyerland and the Greenway Plaza and the Upper Kirby business district.
17. Travel Choice	A higher percentage of people in Houston were travelling alone using private cars in 2010 than in 2000. In 2000 28% of persons used alternative travel sources. The number dropped to 25% in 2010.	On average 5% of Houstonians use public transit to get to work. This number varies among districts from 1.7% in District E, 2.2% in District G and on the high end 8.3% in District J, and 7.9% in District D. District E contains the far southeast and northeast communities of Clearlake, Edgebrook, and Kingwood. Accessibility to bus stops is also very poor with 10.4% of the population within walking distance to a bus stop. District G contains the affluent neighborhoods of Riveroaks, Memorial, and Briarforest. Districts J and D, which have the highest percentage of transit users are both less affluent and more centrally located.

 **18. Ambient concentrations of air pollutants**	Houston has attained federal standards for all criteria pollutants except for Ozone. The Houston region is in non-attainment for the federal standard for Ozone.	District I had the highest AQI reading and is located in close proximity to the petrochemical industries to the east of the city. Neighborhoods in District I include Magnolia Park, Hunterwood and Harrisburg.
 **19. Greenhouse Gas Emissions**	Private vehicles CO_2 emissions are increasing and now constitute the largest source for CO_2 emissions in Harris county. GHG emissions data is not available for the City of Houston or areas within the City. The City of Houston has conducted a GHG inventory for its own operations, but has not conducted an inventory of the city as a whole. In the Fall of 2013, researchers from the Shell Center for Sustainability and the School of Engineering at Rice will develop a methodology to conduct the analysis to fill this void.	GHG emissions data is not available for the City of Houston or areas within the City.
 **20. Water Pollution**	Houston water quality monitoring of waterways expanded considerably between 2004 and 2011. Additionally, the City of Houston publishes annual updates of drinking water quality to all residents.	Water pollution in the waterways was not measured at the district level since no clear methodology or data was available to conduct this level of assessment. Our waterways need to be equipped with continuous monitoring systems so reliable trends could be detected and analyzed.
 **21. Water Use**	Per capita municipal water use in Houston increased from 159 gallons per day in 2000 to 165 gallons per day in 2010. Unless this trend is reversed, water consumption will increase disproportionally with population growth, a trend that is not sustainable.	Districts C and G consume the most water among households and District H consumes the least amount of water. The data used in this indicator is based on an estimate since the City of Houston has created a protocol for some consumers to elect to have their usage bills considered private. As a result, data for total water use by district or neighborhood in the city is not considered public data. Without understanding how various businesses consume water, the research community will not be able to assist the city with intelligence for water reduction strategies. The current water reduction for the City of Houston is not considered robust since it is not sensitive to various types of business operations or sizes or types of households.

22. Water Availability	The City of Houston owns access rights to a little less than half of the available water in the region. That was 1,264,231 acre-feet in 2010. The Houston municipal water demand for 2010 was 389,082 acre-feet.	Water availability was not calculated by districts since it is not applicable to his level of study.
23. Flooding	One quarter of the City of Houston is at risk of flooding.	Districts F and J have the highest amount of people in the Flood Zone. This district includes the neighborhoods of Westchase, Westwood, Sharpstown and Gulfton. These two districts also contain large job centers and hence liability for flood damage is very high. Districts G and I have the lowest amount of people in the Flood Zone. Memorial, Briarforest and River Oaks are neighborhoods in these districts.
24. Land Cover Change	The highest increase in land cover between 2001 and 2006 was for medium intensity development. This was an increase from 150 square miles to 160 square miles. Medium intensity development accounts for the highest land coverage type in Houston and most commonly include single family housing units.	Districts C, G, and H have the highest percentage of land dedicated to Low-medium intensity development with over 60% respectively. District E has the lowest percentage with 28%.
25. Jobs / Housing Balance	A higher percentage of jobs are located within business centers, which is good for agglomeration. However only 21% of housing units are located within a quarter mile of business centers. This means that 78% of persons are commuting alone in private autos.	Districts J, G, and C have the highest percentage of housing units close to job centers. Job centers in these areas include Upper Kirby/ Greenway, Sharpstown and the Westchase district. Districts K, H, and E have the lowest percentage of housing units close to jobs. Districts K and H have no major job centers but District E has the Port of Houston, which is a major employer along with its affiliated businesses.


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Glossary

Accessibility: The degree to which a product, device, service, or environment is available to as many people as possible.

Acre-feet: a unit of volume commonly used in the United States in reference to large-scale water resources. Equal to 325,851 gallons.

Affordable Care Act: A United States federal statute signed into law by President Barack Obama on March 23, 2010.

Agglomeration: An extended city or town area comprising the built-up area of a central place and any suburbs linked by continuous urban area.

Ambient concentration: Amount of the particulate or gas pollutant per volume unit of air.

Attainment gap: The observed and persistent disparity on a number of educational measures between the performance of groups of students, especially groups defined by gender, race/ethnicity, and socioeconomic status.

CMSA: Consolidated Metropolitan Statistical area. Houston Region CMSA is an 8 county region. Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller.

CO2 emissions: The release of carbon dioxide gas into the atmosphere.

Contiguous estuaries: Mixed fresh and salt water bodies that are connected or adjacent to each other.

Employment status: Refers to the three recognized work schedules of full-time, part-time and temporary.

Flood plain: A floodplain or flood plain is a flat or nearly flat land adjacent a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge.

Food Desert: Any area more than 1 mile from a grocery store that sells fresh fruits and vegetables.

Fragile lands: Land that is sensitive to degradation when disturbed; such as with highly erodible soils, soils where salts can and do accumulate, and soils at high elevations.

GHG: A greenhouse gas (sometimes abbreviated GHG) is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range.

Globalization: Globalization is the process of international integration arising from the interchange of world views, products, ideas, and other aspects of culture.

GPCD: Unit for the water usage of an area, in gallons per capita per day.

Green jobs: Work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute(s) substantially to preserving or restoring environmental quality.

HGAC Region: 13 county region administered by Houston Galveston Area Council. The HGAC region is composed of 13 counties: Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, Wharton.

Housing affordability: Relates to the ability of individual households to meet their monthly rent or mortgage payments within a reasonable threshold of their income.

kwh: Kilowatt-hour; a unit of energy commonly used for electricity purposes.

Land cover: Land cover is the physical material at the surface of the earth. Includes grass, asphalt, trees, bare ground, water, etc.

Medium intensity development: Includes areas with a mixture of constructed materials and vegetation.

MSA: Metropolitan Statistical Area. The Houston MSA is composed of 10 counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, San Jacinto, Waller.

Municipal Solid Waste (MSW): A waste type consisting of everyday items that are discarded by the public.

Mwh: Megawatt-hour; one thousand kilowatt-hours; a unit of energy commonly used for electricity purposes.

National Ambient Air Quality Standards (NAAQS): Standards established by the United States Environmental Protection Agency under authority of the Clean Air Act that apply for outdoor air throughout the country.

Natural resources: Resources occurring naturally within environments that exist relatively undisturbed by mankind.

Personal Income: Refers to an individuals total earnings involving wages, investment enterprises, and other ventures.

PM 2.5, 10: Particulate matter of 2.5 or 10 micrometers; tiny pieces of solid or liquid matter associated with the Earth's atmosphere.

PMSA: Primary Metropolitan Statistical Area. The Houston PMSA is composed of 6 counties: Chambers, Fort Bend, Harris, Liberty, Montgomery, Waller.

Poverty line: the minimum level of income deemed adequate in a given country.

ppb: Parts per billion; a unit of concentration of chemical compounds in the atmosphere.

ppm: Parts per million; a unit of concentration of chemical compounds in the atmosphere.

Primary jobs: A primary job is a job which brings in new capital (money) to an area.

Street intersection density: The number of street intersection per unit area in a metropolitan area.

Subsidence from groundwater extraction: The sinking of land resulting from groundwater extraction.

Vehicle Miles Traveled (VMT): A measure of the extent of motor vehicle operation within a specific geographic area over a given period of time.

Urbanized Area (UA): Densely settled territory which consists of core census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500 people per square mile. Less densely settled territory may be part of each UA as well.

Water availability: Describes the amount of water available for irrigation or consumption per person, per year in a region.

Wetland: Land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem.

µg: Microgram; unit of weight often used for small concentrations of contaminants.

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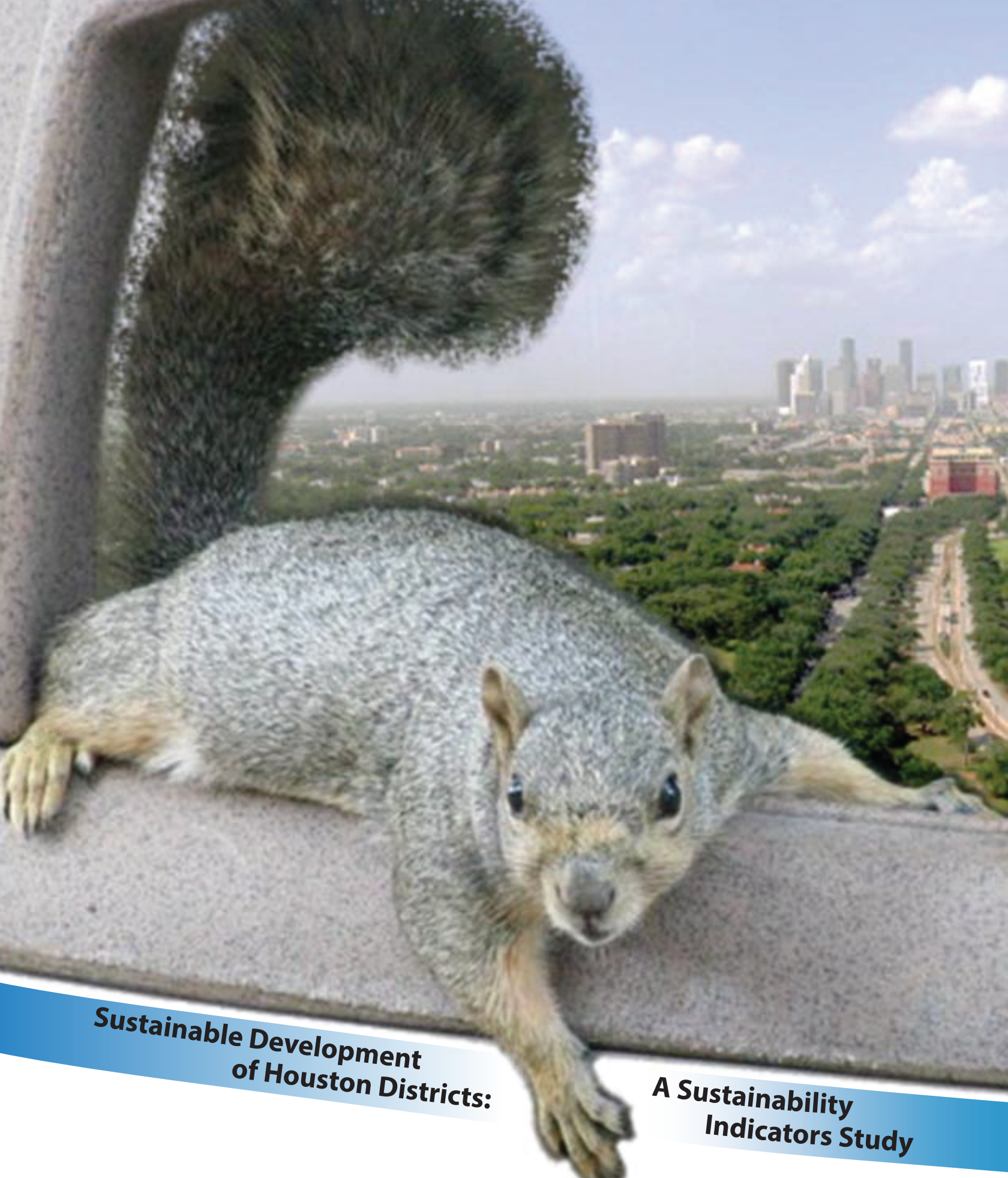

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