2010 Pedestrian and Bicyclist Special Districts Study Update

Pedestrian and Bicyclist Special Districts Program Overview

H-GAC's Special Districts Program aims to provide strategic investments in pedestrian and bicycle infrastructure in areas of the region where walking and bicycling are in greatest demand. The program does this through a three-step approach:

- **Phase I: Regional Analysis**—Identify pedestrian and bicycle "special districts" within the region where there are significant opportunities to replace vehicle trips with pedestrian or bicycle trips and to improve pedestrian and bicycle safety.
- **Phase II: Conceptual Planning**—Develop detailed pedestrian and bicycle master plans in partnership with local government sponsors to identify and prioritize needed infrastructure improvements within special districts for enhancing pedestrian and bicycle mobility and safety.
- **Phase III: Implementation**— Include eligible pedestrian and bicycle infrastructure projects in the Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP) and identify potential local and federal funding sources for implementation.

Why this Approach?

H-GAC serves as the Metropolitan Planning Organization (MPO) for transportation planning in the eight-county Houston-Galveston Transportation Management Area (TMA). As the MPO, H-GAC works with local governments to identify and prioritize regionally significant transportation investments for all modes of travel, including walking and biking. With a planning area of over 7,000 square miles and limited funding for transportation projects, it is important to understand likely locations where pedestrian and bicycle infrastructure investments will have the greatest impact and facilitate planning and project implementation in those high-demand areas.
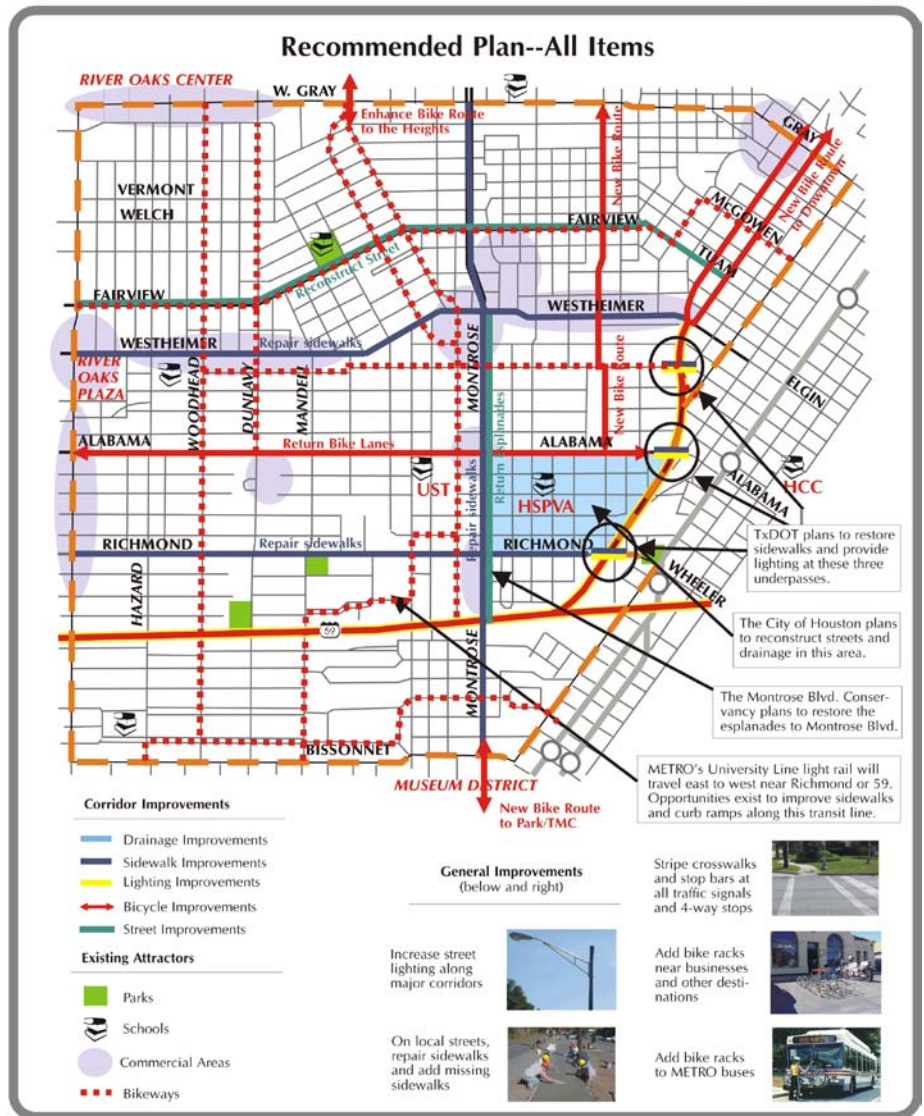
Program Background

H-GAC's Special Districts program began in 2004 with an initial study to "identify districts where there are significant opportunities to replace vehicle trips with pedestrian or bicycle trips and to improve pedestrian and bicycle safety." The study examined a range of factors that influence the demand for bicycle and pedestrian travel in a given area including destinations, demographic characteristics, density of employment and population, and existing rates of walking and biking. The result was a list of the top 500 "districts" in the region with the greatest demand for pedestrian and bicycle infrastructure investments. Clusters of districts were combined and named according to incorporated places or "Super Neighborhoods" within the City of Houston.

H-GAC approached local governments with an opportunity to partner and conduct a detailed pedestrian and bicycle master plan for top-ranking districts in the region. Most plans were funded through a 50-50 funding partnership between H-GAC and the local government sponsor.

The planning process provided opportunities for public input, analysis of opportunities and barriers, and identification of solutions to facilitate safe pedestrian and bicycle travel. A range of recommendations were identified in the plans including policies that could be implemented by the local jurisdiction as well as specific infrastructure improvements that could be funded with local and/or federal funds. To date, the following seven districts have worked in partnership with H-GAC to complete pedestrian and bicycle district master plans:

- Third Ward (Houston), 2004
- Gulfton Neighborhood (Houston), 2005
- Montrose Neighborhood (Houston), 2006
- Central Galveston, 2006
- Sugar Land Town Center, 2007
- Airline Improvement District (Harris County), 2009
- City of Missouri City, 2009

Excerpt from the Montrose Special Districts Pedestrian and Bicycle Master Plan showing a conceptual plan of recommended improvements.

These studies have facilitated the implementation of locally sponsored projects that will improve pedestrian and bicycle mobility in high-demand areas. Table 1 summarizes projects that have moved from the planning to implementation stages.

Table 1: Special District Implementation Projects, 2004-2010

Location	Project Sponsor	Description	Estimated Construction Date	Funding Source
Third Ward Houston	Greater Southeast Management District	Construct ADA accessible sidewalks at various locations and provide curb extensions and crossing islands at various locations.	2011	Congestion Mitigation Air Quality (CMAQ)
Airline Improvement District	Airline Improvement District	Construct sidewalks along major thoroughfares and improve crosswalks at various intersections. Install raised median along Airline Drive for access management and pedestrian refuge.	2012	CMAQ
Sugar Land Town Center	City of Sugar Land	Construct various pedestrian improvements and trails that connect the City's town center to surrounding neighborhoods and existing trail network.	2012	CMAQ
Montrose Houston	City of Houston	Construct sidewalks on north/south streets that connect to METRO Rail on Richmond Avenue to provide improved pedestrian access to transit.	2012	CMAQ
Galveston Island	City of Galveston/Island Transit	Improve ADA accessibility on sidewalks and pedestrian crossings that lead to transit.	2011	New Freedom Grant from the Federal Transit Administration
Texas Avenue	City of Missouri City	Install sidewalks from Cartwright Road to Buffalo Run and improve pedestrian crossings at various intersections providing access to community destinations.	2010	Local Funds

2010 Special Districts Methodology Update

H-GAC undertook a process in 2010 to update the original Special Districts study using current and newly-available data. In the more than five years since the last study was completed, H-GAC developed detailed land use and employment data that would allow a more robust identification of potential pedestrian and bicyclist destinations. The 2010 update also provided an opportunity for H-GAC to refine the initial study methodology to be regularly updated in-house. The results of the updated study will guide the selection of future pedestrian and bicycle district master plans and inform both the 2040 Regional Transportation Plan update and the Regional Bikeway Plan update.

Study Approach

The Special Districts study began with the identification of destinations or attractors of pedestrian and bicycle travel. Such destinations include schools, employers, public buildings, landmarks, retail centers, and parks. H-GAC maintains a Geographic Information Systems (GIS) database of these destinations for the region and mapped 10,429 locations for the study. A map of pedestrian and bicyclist destinations is shown in Figure 1.

A one-half mile radius was drawn around each destination point to form the area of analysis, or district, for each point. Selecting a uniform size for districts was important for ensuring consistency in the analysis. The chosen district size reflects a compromise in determining optimal travel distances for walking and bicycling, recognizing that bicycle trips can be significantly longer than walking trips[1].

Within each district, a series of indicators that have been shown to correlate with high rates of walking and bicycling were analyzed. These indicators were first identified in a literature review for the initial 2004 study. Practical considerations were also taken into account when selecting indicators to ensure that data would be widely available across the region and accessible to H-GAC staff for future updates. The indicators used in the 2010 update are listed and briefly explained in Table 2.

Figure 1: Pedestrian and Bicyclist Destinations in the H-GAC Region

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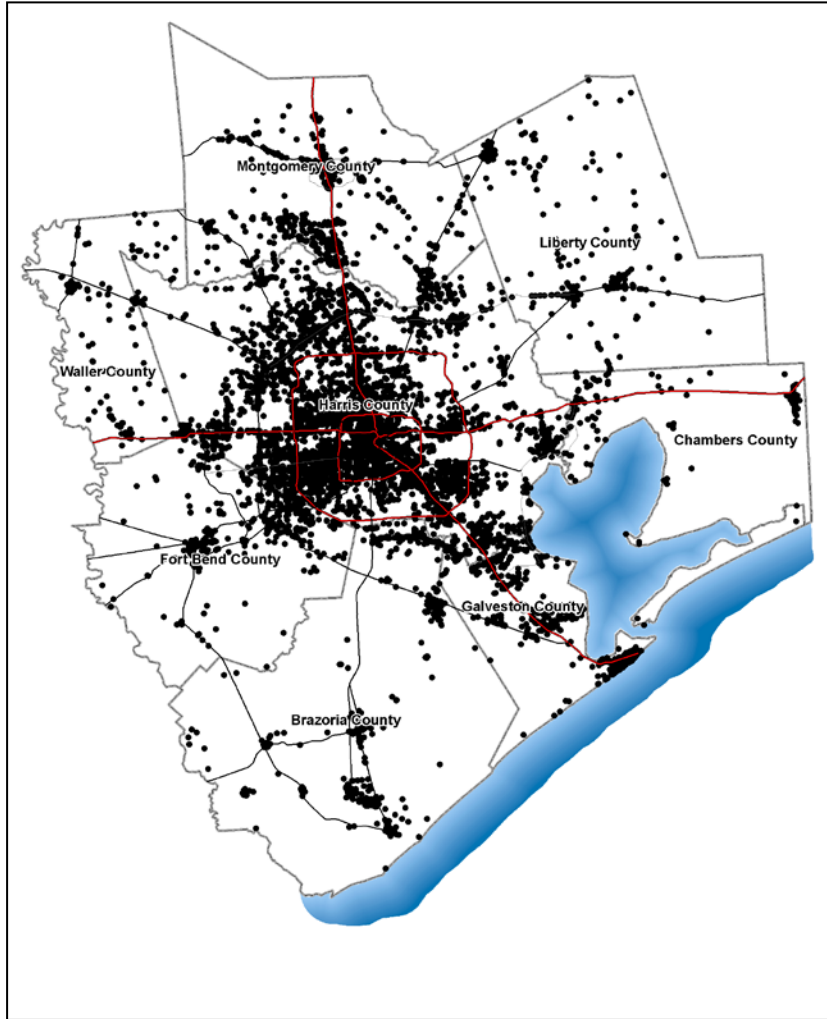
[1] Pedestrian trip length is typically considered .25 to .5 miles (a comfortable 5-10 minute walk) with bicycle trips being longer. The 2001 National Household Travel Survey indentifies the average bicycle trip as .9 miles with 90 percent of trips as less than 4 miles.

Table 2: Indicators of Pedestrian and Bicycle Travel Demand

Indicator/Variable	Description	Rationale	Data Source
Population Density	Total population within district	Higher population density is associated with increased rates of walking and bicycling	2000 Census (Block Group Level Data)
Children	Percent of persons age 5-17	School-aged children tend to walk and bicycle more than adults	
Older Persons	Percent of persons age 65 and older	Older persons tend to be more dependent on non-motorized transportation options when compared to working adults	
Income (per capita)	Percent of persons in lowest income quintile	Low income rates are associated with low rates of automobile ownership and greater dependence on non-motorized transportation. Per capita is used over household income because household size can skew income factors	
Home-Work Distance	Number of workers with a commute to work that is less than 10 minutes	People with short commute times or distances are more likely to walk or bicycle to work	
Existing Walking Rates	Percent of people who walk to work	High walking rates demonstrate an existing desire and willingness to walk for transportation	
Existing Bicycling Rates	Percent of people who bicycle to work	High bicycling rates demonstrate an existing desire and willingness to bicycle for transportation	
Employment	Number of jobs within the district	Jobs are significant trip attractors for all modes of travel and are important	H-GAC Land Use Database
Diversity of Land Uses	Percentage of land not categorized as the predominant land use within the district	A mix of land uses (demonstrated as the lack of one dominant land use in the area) is associated with higher rates of pedestrian and bicycle travel	
Destination Type	Category of destination type (i.e. school, office, retail center, park)	Certain land uses/types of destinations may be more attractive for pedestrians and bicyclists when compared to others [2]	
Presence of Other Destinations	Count of other destination points within district	Clusters of destinations within a compact area tend to encourage walking and bicycling trips	
Number of Pedestrian Crashes	Count of pedestrian crashes within district	Indicates heavy use and/or safety issues that need to be addressed	TxDOT Crash Record Information System (2003-2008)
Number of Bicyclist Crashes	Count of bicyclist crashes within district	Indicates heavy use and/or safety issues that need to be addressed	
Street Density	Ratio of streets to land area	Smaller street blocks and more street miles per square mile are more supportive of bicycling and walking	H-GAC StarMap
Number of Transit Stops	Count of transit stops within district	Walking and bicycling are commonly combined with transit for trips	Houston METRO, Island Transit, Fort Bend County Transit

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[2] Destination types were grouped and given scores from 0-100 based on research documenting which land uses are generally most conducive for walking and bicycling trips.

Each indicator was measured for the 10,000 districts throughout the region. In order to standardize the scores for the various types of indicators, the scores were indexed. The indexing was done by expressing the value for each district for a given indicator as a percentage of the highest value recorded across all the districts for a given indicator. This rescaled the values so that the highest score for each indicator is always 100 while the lowest score corresponds to the ratio of the minimum-to-maximum values expressed as a percentage; therefore the minimum indexed scores can vary across the indicators.

The original 2004 study used a weighting scheme that gave certain indicators a higher weight in the final score. The 2010 study update examined three different weighting schemes and performed a sensitivity analysis to determine whether or not a weighting scheme was warranted for the study. The sensitivity analysis showed that the results were not likely to change greatly with a change in weighting scheme. Therefore, it was decided not to use differential weights for the indicators, so each of the 15 indicators was given the same weight of 1/15.

A single composite score for each district was calculated by assigning the weight to each indicator and adding the scores together. Therefore, a perfect score of 100 would mean that the district was the top scoring district for all of the 15 indicators. Of the more than 10,000 districts analyzed, the highest scoring district received a score of 44.4.

Figure 2 shows the location of the top 1,000 districts in the region with the high scores representing the districts that are most conducive to pedestrian and bicyclist travel.

Because each district represents a relatively small area of less than one square mile, and because districts tend to cluster together, districts were grouped into to Super Neighborhoods within the City of Houston, or incorporated places. Table 3 lists the top 25 scoring district clusters, showing the highest scoring district in each neighborhood or community. The highest scoring district (with a score of

Figure 2: Highest Scoring 1,000 Districts in the H-GAC Region
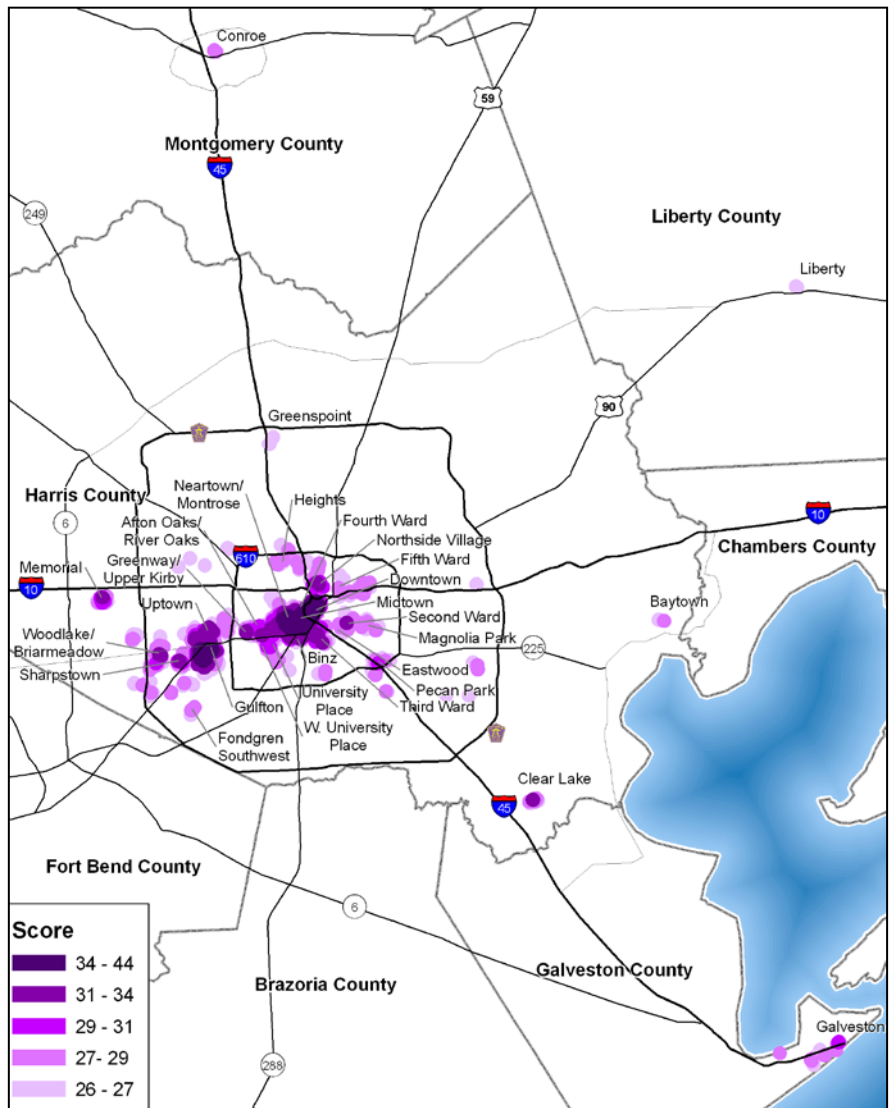
44.4) is located in downtown Houston. The next 23 highest scoring districts are also in downtown Houston, so the next ranked cluster is located in the Gulfton neighborhood. As a result, the top 25 neighborhoods or communities encompass the top 585 districts.

Table 3: Top 25 Districts Grouped by Neighborhood

Rank	Neighborhood	District Top Score	Top District Score Rank
1	DOWNTOWN	44.4	1
2	GULFTON	40.6	24
3	MIDTOWN	39.4	44
4	NEARTOWN - MONTROSE	37.9	65
5	SHARPSTOWN	35.5	122
6	NORTHSIDE VILLAGE	33.3	192
7	GREENWAY / UPPER KIRBY AREA	32.5	212
8	WOODLAKE / BRIARMEADOW	32.4	213
9	UNIVERSITY PLACE	31.9	231
10	GREATER UPTOWN	31.8	234
11	MEMORIAL	31.5	244
12	GREATER THIRD WARD	31.1	271
13	FOURTH WARD	30.7	285
14	BINZ	30.6	290
15	SECOND WARD	30.2	315
16	CLEAR LAKE	30.2	321
17	GALVESTON	29.7	362
18	PECAN PARK	29.3	407
19	AFTON OAKS / RIVER OAKS AREA	29.1	431
20	GREATER HEIGHTS	28.9	466
21	WEST UNIVERSITY PLACE	28.8	507
22	MAGNOLIA PARK	28.7	510
23	GREATER EASTWOOD	28.7	511
24	GREATER FONDREN SOUTHWEST	28.4	575
25	GREATER FIFTH WARD	28.3	585

As with the 2004 study, high scoring districts are concentrated in urbanized areas within the City of Houston where population and employment densities are high, a variety of land use mixes are found, and transit access is widespread. Outside of Houston, high scoring districts are found in older communities that have a traditional grid pattern and a concentration of destinations clustered together within a compact area. The characteristics of the highest scoring communities provide "common sense" support for the Special Districts methodology, demonstrating that the study is an effective tool for identifying areas within the larger region that are conducive to walking and bicycling.
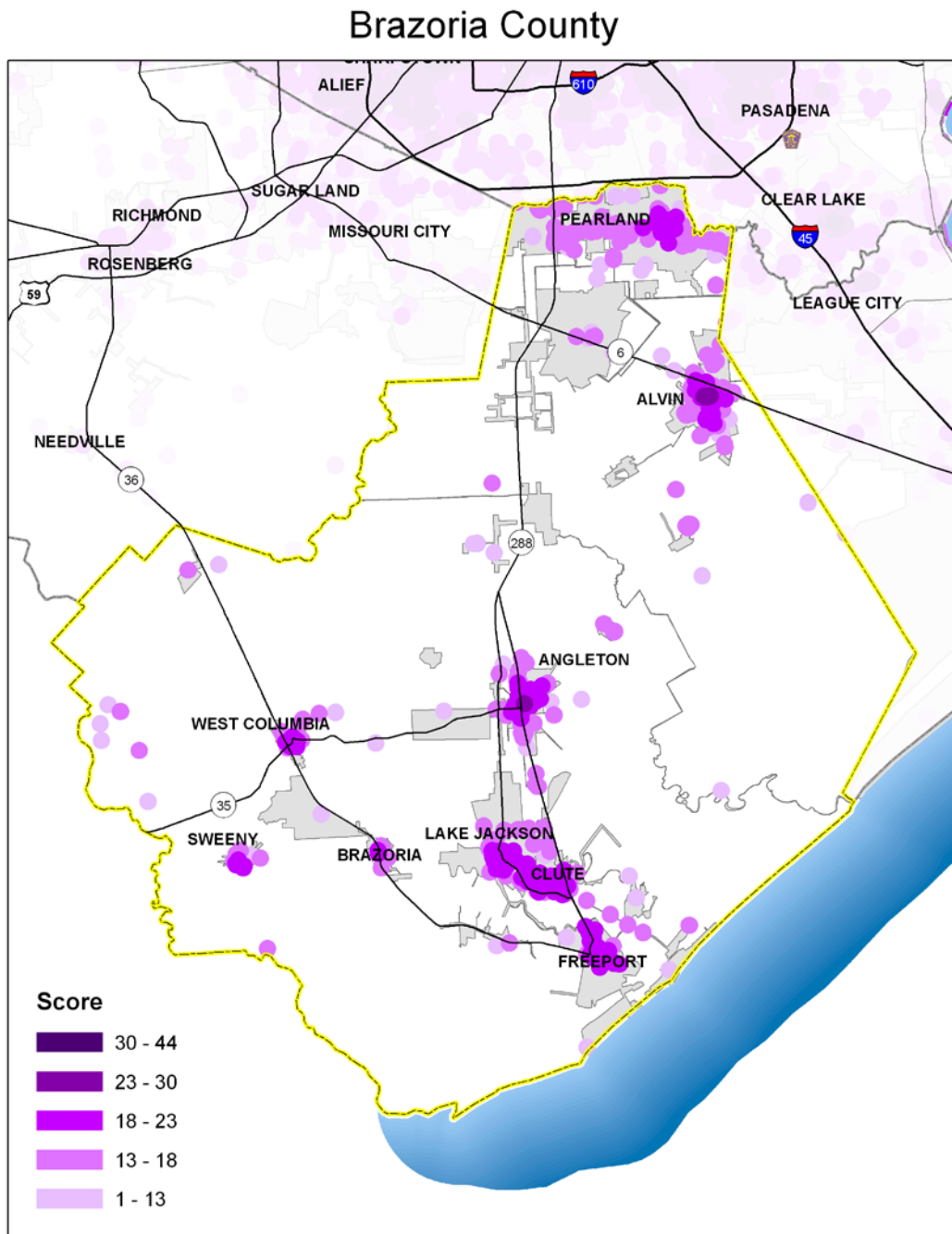
Next Steps

The creation of safe and attractive pedestrian and bicycle networks are important strategies for improving mobility, quality of life, and sustainability across the broader H-GAC region. The Pedestrian and Bicyclist Special Districts Study is not intended to suggest that investments in pedestrian and bicycle infrastructure should be limited to high scoring special districts. Rather, the study serves as a starting point to identify focus areas for further planning and investment that could result in the creation of several highly walkable and bikeable districts throughout the region. Specifically, the 2010 study update will be used to guide the selection of more detailed planning studies that are funded through H-GAC's Special Districts Program. The study will also be used in the 2040 Regional Bikeway Plan Update and Regional Transportation Plan Update to identify regional priorities for investments in pedestrian and bicycle infrastructure and encourage local government agencies to pursue pedestrian and bicycle investments in these areas.
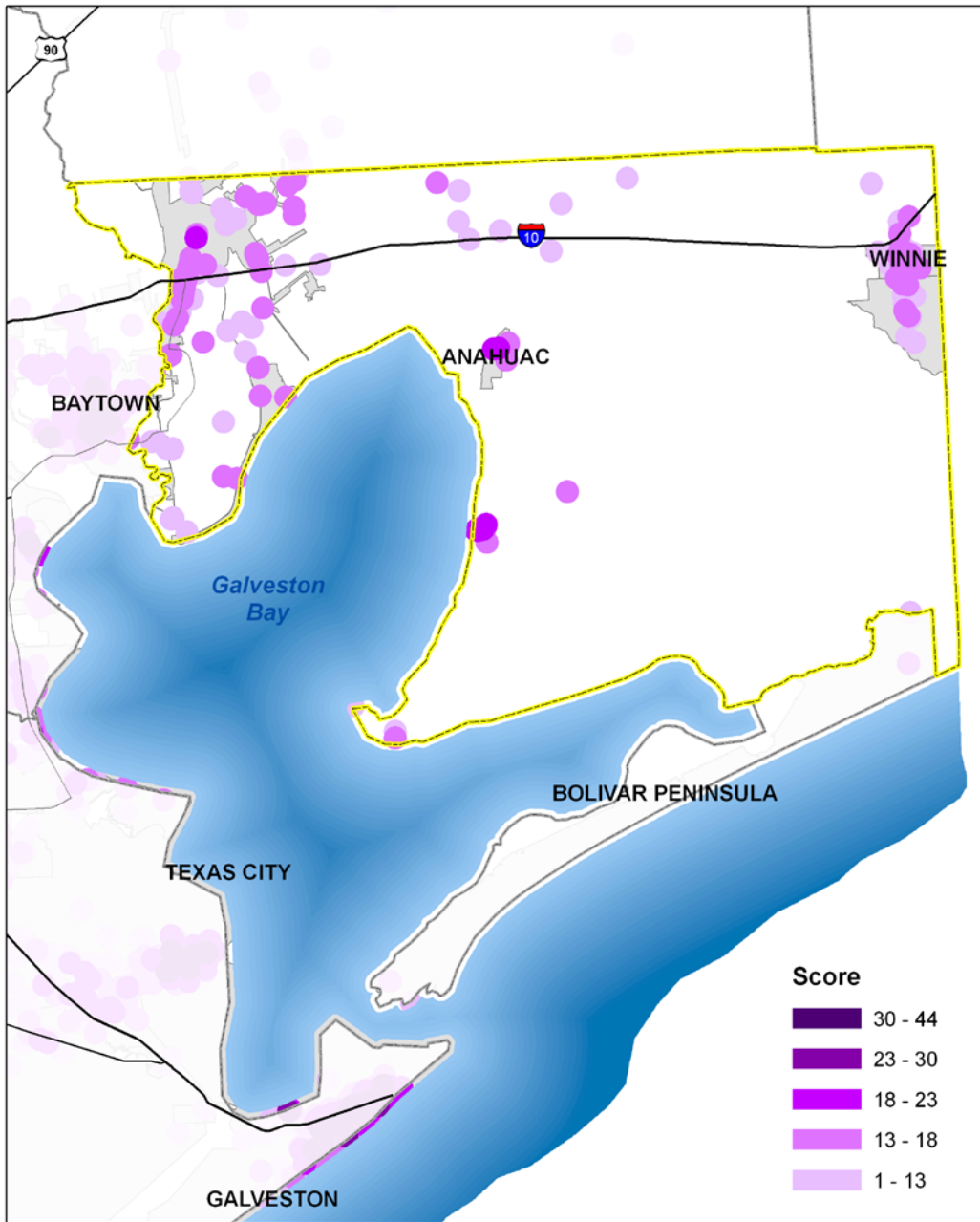
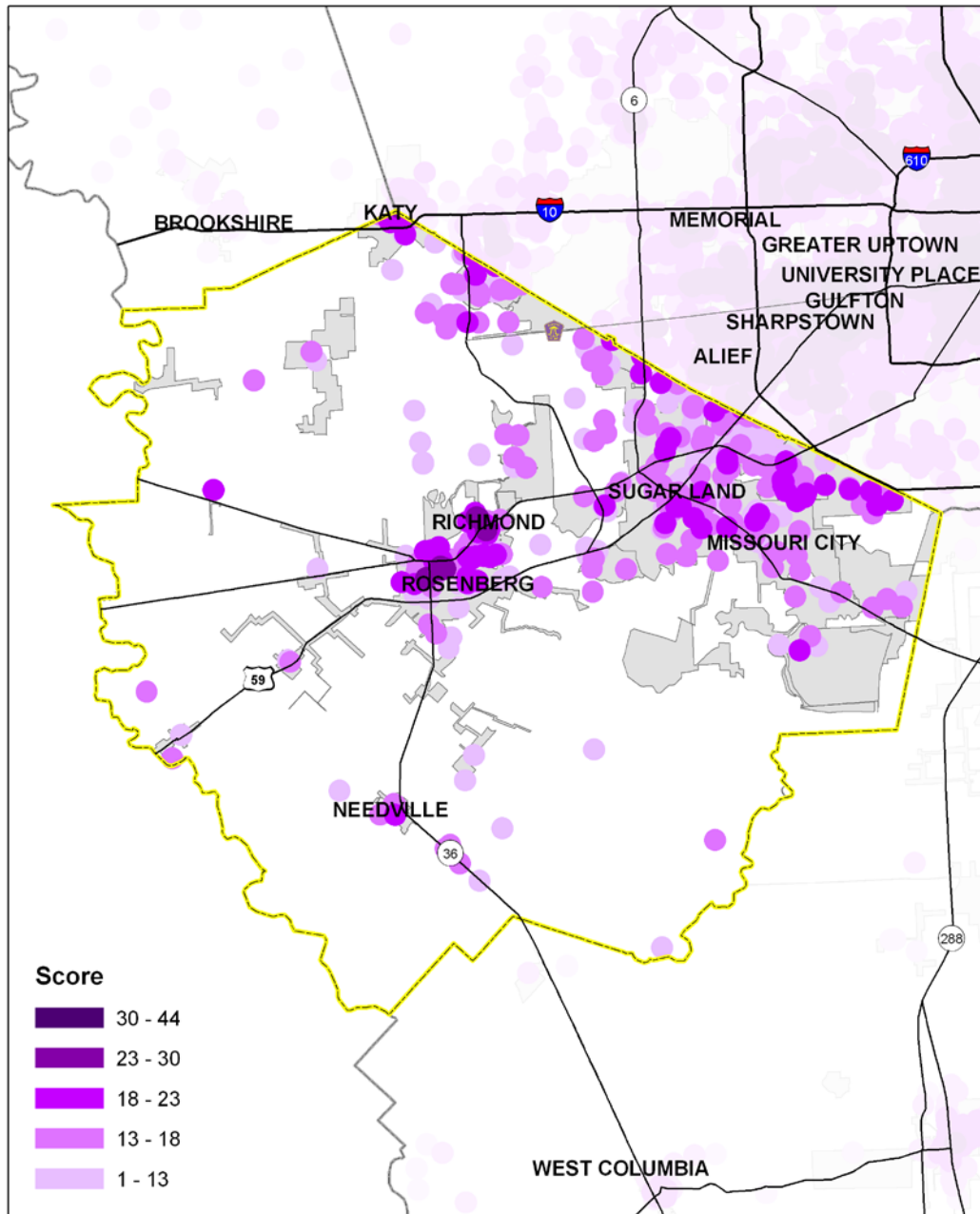# Appendix A: Top Districts by County

The following maps identify the top scoring districts in each of the eight-counties of the H-GAC Transportation Management Area, allowing a more localized comparison of districts within each county.
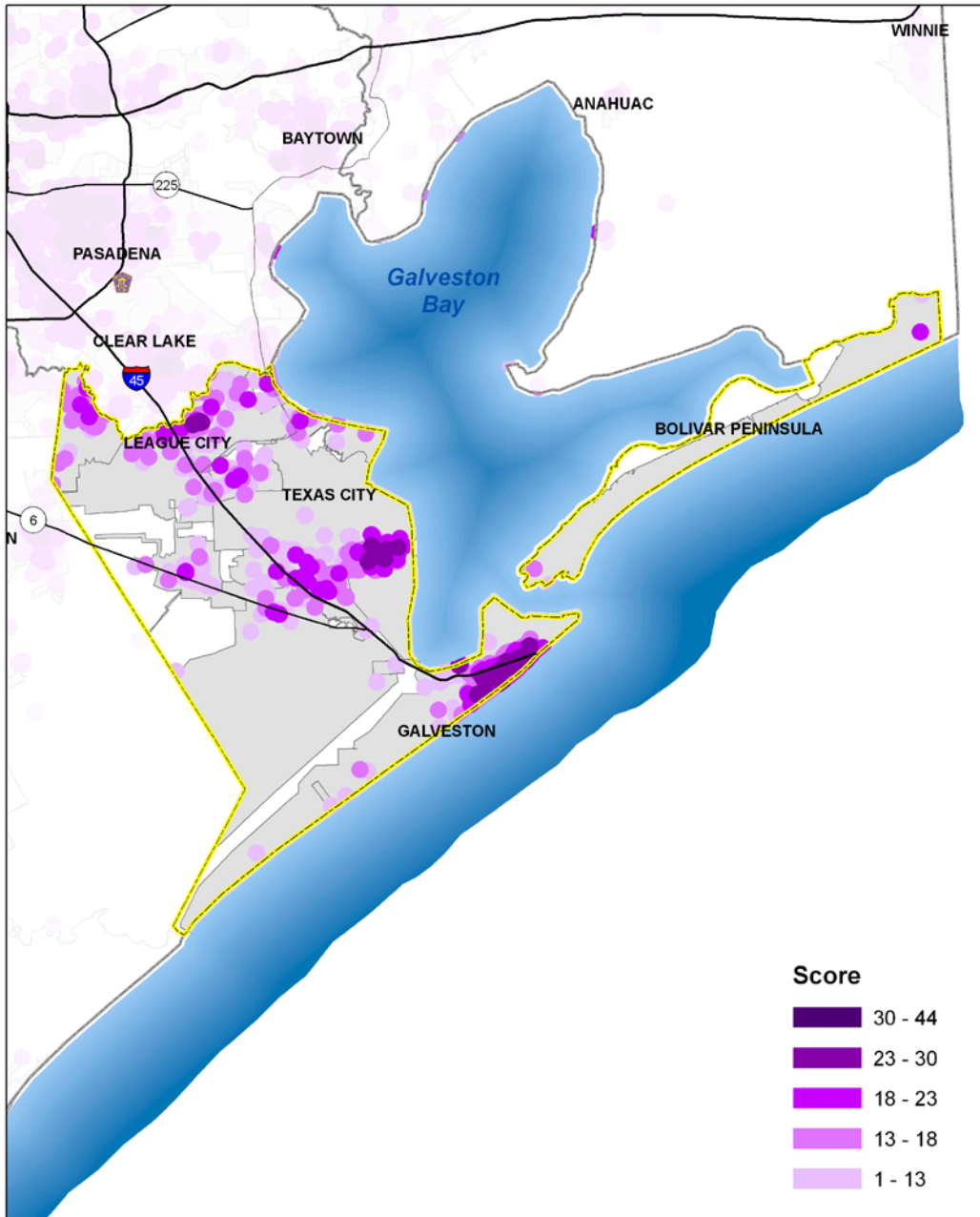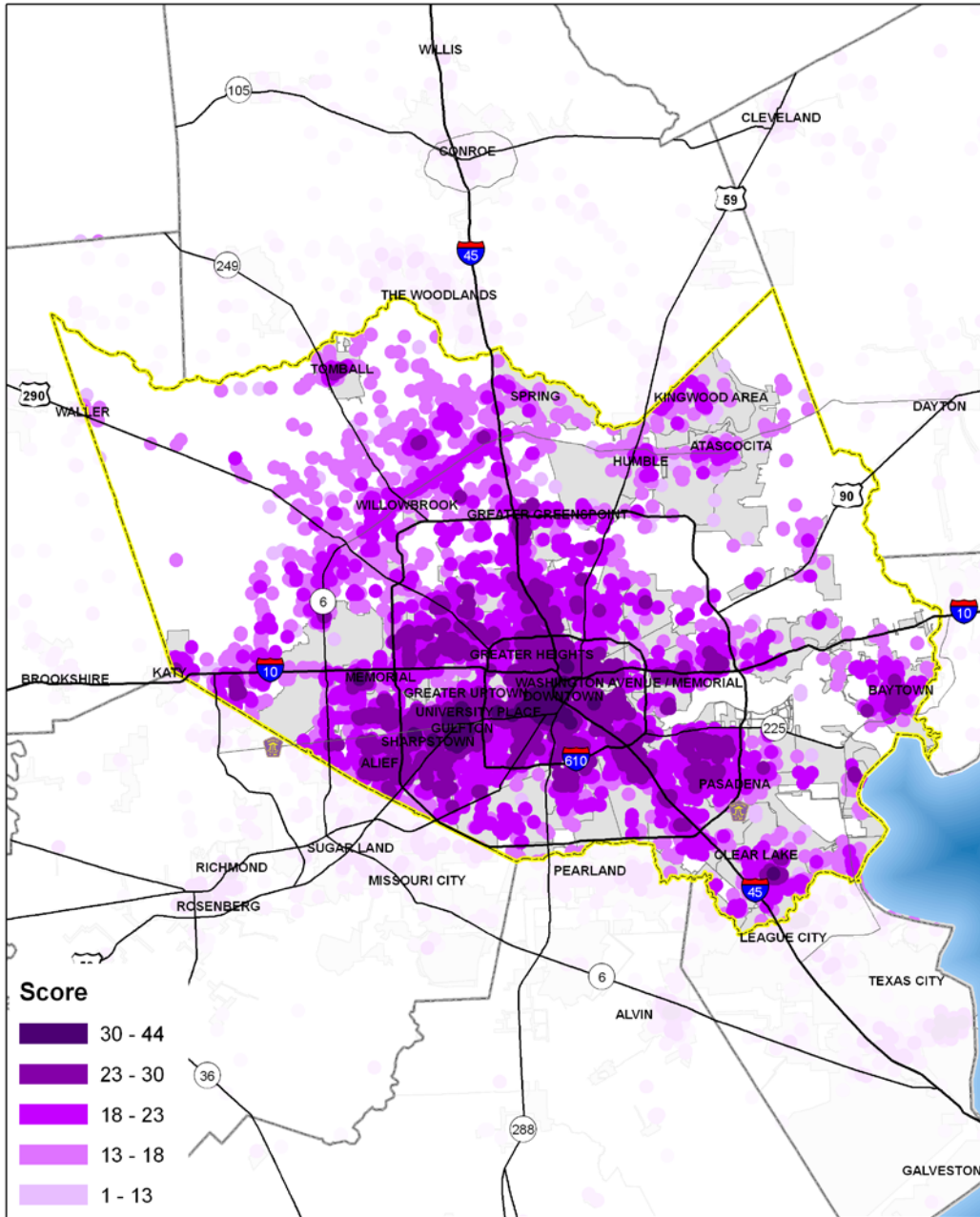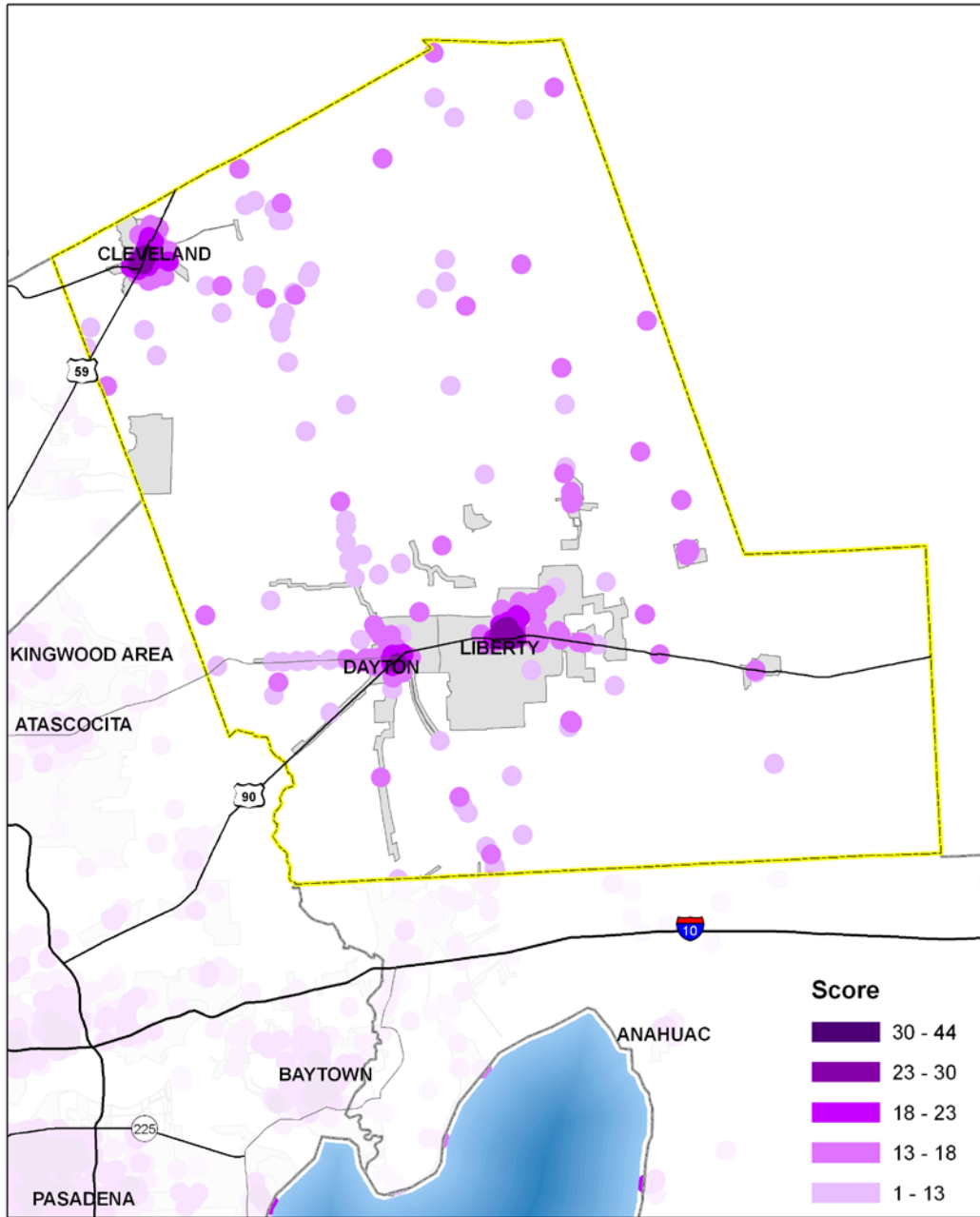

Brazoria County

Chambers County

Score
- ■ 30 - 44
- ■ 23 - 30
- ■ 18 - 23
- ■ 13 - 18
- ■ 1 - 13

Fort Bend County

Score
- ■ 30 - 44
- ■ 23 - 30
- ■ 18 - 23
- ■ 13 - 18
- ■ 1 - 13

Galveston County

Score

- ■ 30 - 44
- ■ 23 - 30
- ■ 18 - 23
- ■ 13 - 18
- □ 1 - 13

Harris County

Score
- 30 - 44
- 23 - 30
- 18 - 23
- 13 - 18
- 1 - 13

Liberty County

Score
- 30 - 44
- 23 - 30
- 18 - 23
- 13 - 18
- 1 - 13

Montgomery County

Score
- 30 - 44
- 23 - 30
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- 13 - 18
- 1 - 13

Waller County

Score
- 30 - 44
- 23 - 30
- 18 - 23
- 13 - 18
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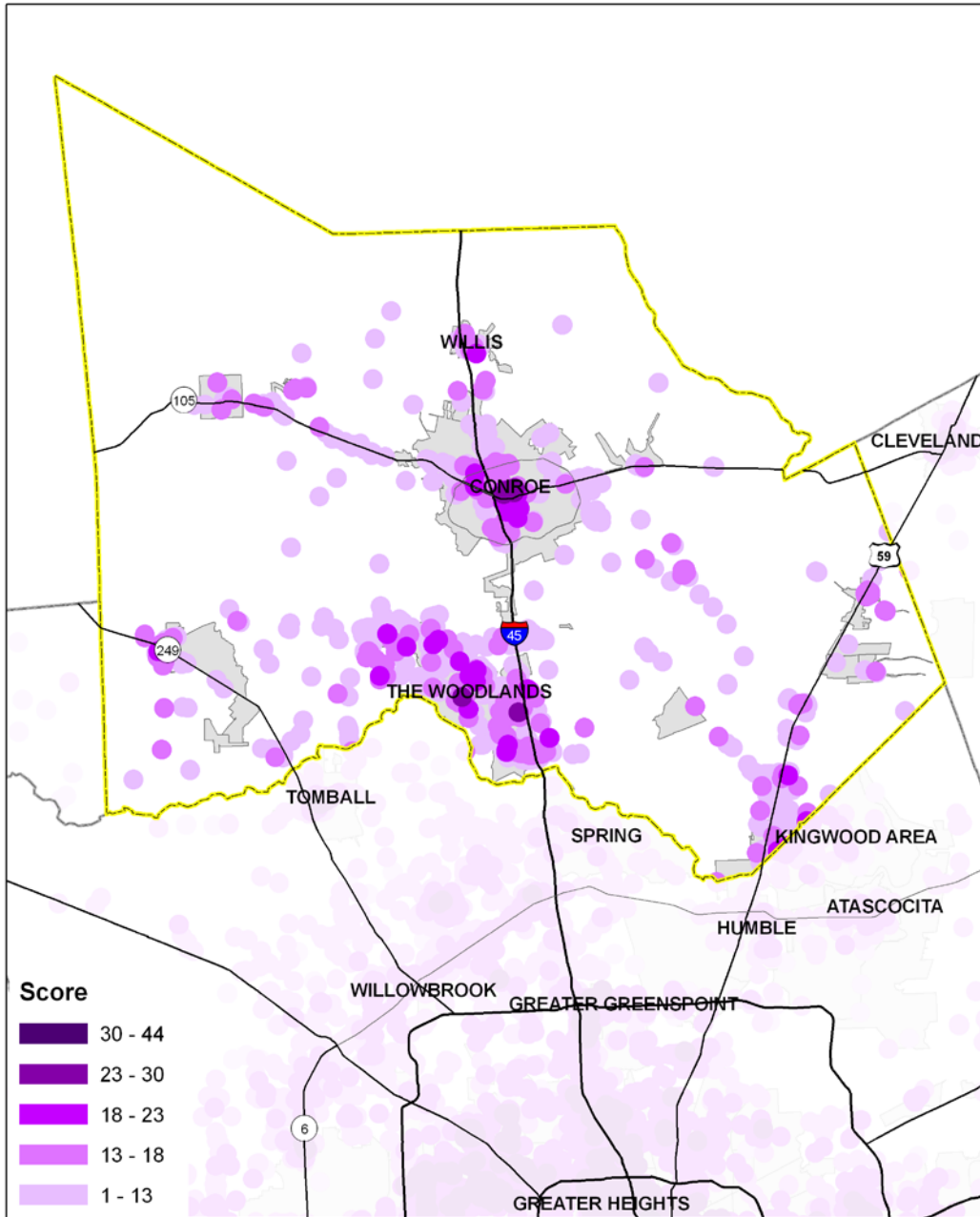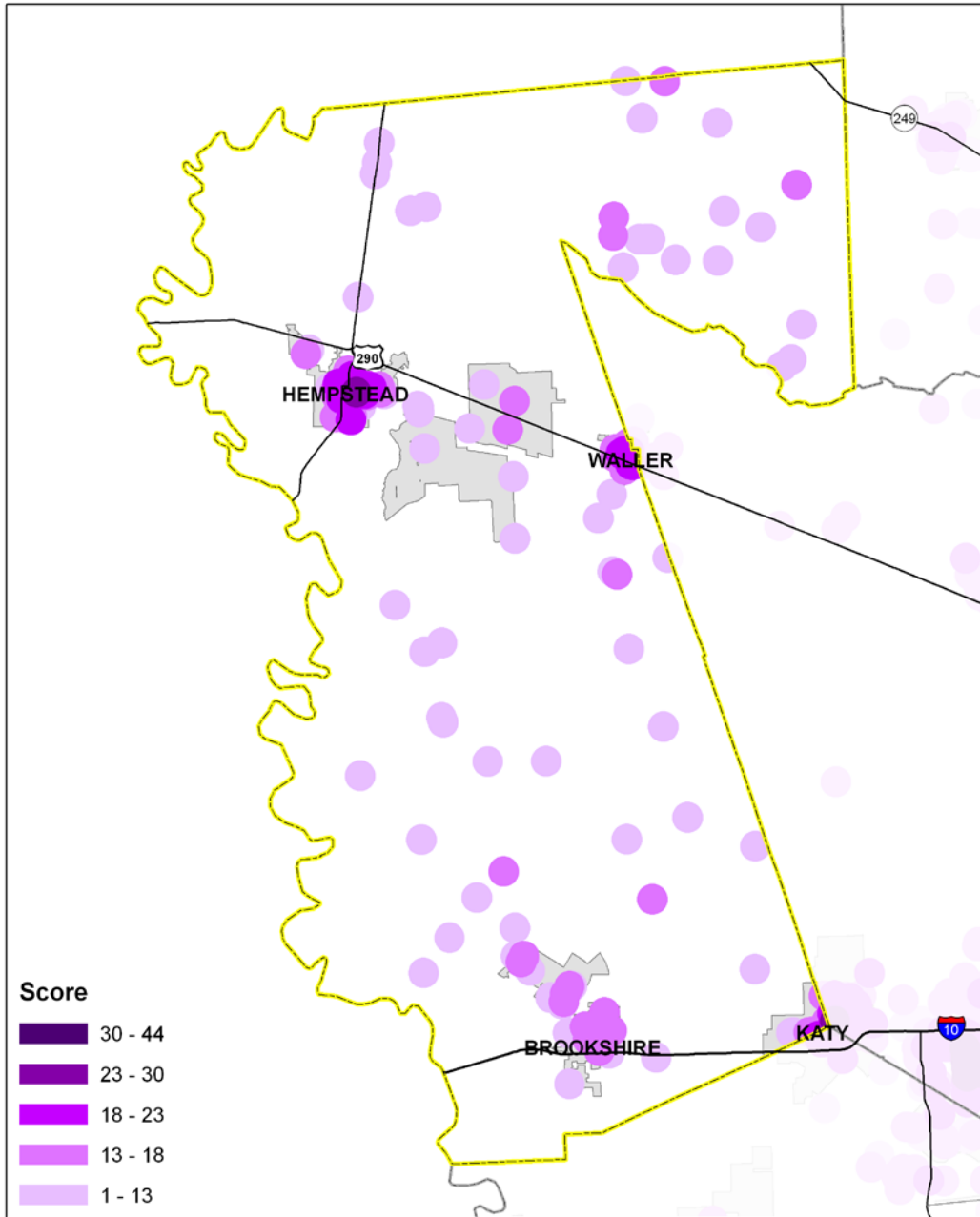
APPENDIX B: Comparison of 2010 Study Update to Original 2004 Study

Identification of Districts

The study methodology begins with the identification of likely destinations or attractors of pedestrian and bicyclist activity as the district centers. Both the 2004 and 2010 studies identified the same types of destinations as attractors for pedestrian and bicyclist activity including schools, libraries, public buildings, parks, employment centers, retail, and landmarks. The 2010 study had the benefit of newly available land use and employment data from H-GAC's socioeconomic forecast model to identify likely trip attractors. Aside from using updated data, the changes in this aspect of the study include:

- The 2010 study did not include centroids of Census block groups or traffic analysis zones as district centers as was done in the 2004 study. Though these centroids generally represent populated areas, they were excluded because they did not represent a physical destination or trip attractor.

- The 2010 study did not combine destination points that were located within close proximity to each other. The 2004 study aggregated points that were close together (generally within 600 feet of each other). Because clusters of destinations are conducive to biking and walking, the 2010 update accounted for all destination points, especially those that are close together.

- The 2004 study identified 9,219 district centers and the 2010 study included 10,429.

- The 2004 study used varying district sizes in the analysis of indicators, ranging in size from ¼ mile to 1 mile based on the indicator. The 2010 study defined districts as a ½ mile radius around the center for consistency and ease of analysis.

Indicators

Table A1 describes the indicators used in the analysis and scoring of districts in the 2010 study. Table A2 lists the indicators that were included in the 2004 study, but not carried forward into the 2010 update.

Table A1: Description of Indicators used in 2010 Special Districts Study with

2010 Indicator	Description	In 2004 Study?	Notes/Description of Change
Population Density	Total population within district	☑	
Children	Percent of persons age 5-17	☑	
Older Persons	Percent of persons age 65 and older	☑	
Income (per capita)	Percent of persons in lowest income quintile	Modified	2004 study used median household income. Per capita was chosen for 2010 update to ensure that household size did not bias data.
Home-Work Distance	Number of workers with a commute to work that is less than 10 minutes	☑	
Existing Walking Rates	Percent of people who walk to work	☑	
Existing Bicycling Rates	Percent of people who bicycle to work	☑	
Employment	Number of jobs within the district		2004 study used trip attractions from H-GAC travel demand model. Employment data was selected as a comparable alternative.
Diversity of Land Uses	Percentage of land not categorized as the predominant land use within the district	☑	
Destination Type	Category of destination type (i.e. school, office, retail center, park)		The literature review for the 2004 study identified that some destinations are more likely to attract pedestrians and bicyclists than others. Based on this assumption, various land uses were given a score of 0-100. This was used instead of trip attractions from the travel demand model.
Number of Pedestrian Crashes	Count of pedestrian crashes within district	☑	Updated records were used in 2010 study (2003-2008)
Number of Bicyclist Crashes	Count of bicyclist crashes within district	☑	Updated records were used in 2010 study (2003-2008)
Street Density	Ratio of streets to land area		There was a desire to incorporate the physical development patterns and street network in determining pedestrian and bicycle compatibility for the 2010 update.
Number of Transit Stops	Count of transit stops within district	☑	Used updated records from fixed-route transit providers within the region.
Presence of Other Destinations	Count of other destination points within district		Clusters of destinations within a compact area tend to encourage walking and bicycling trips. As a result, the presence of other destination points or district centers within the boundaries of a district was seen as positive.

Table A2: Indicators Removed in 2010 Update

Indicator	Description	Rationale
K-12 education employment	Number of education jobs as a proxy for school enrollment figures	Removed because schools were given a high ranking in the "destination type" indicator, and was therefore seen as duplicative.
Employment Diversity	Number of different job categories in an area	Removed because it is highly correlated to land use diversity.
Balance of Households and Employment	Ratio of households to employment	Removed because it is highly correlated to land use diversity as well as population and employment density indicators.
Higher Education	Higher education enrollment numbers from H-GAC travel demand model	Removed because higher education land uses were given a high ranking in the "destination type" indicator, and was therefore seen as duplicative.

Scoring of Districts

The scoring of districts for both the 2004 and 2010 studies used a composite score (values were multiplied by a weight and then added together). Differences in how the composite score was determined in each study are described briefly below:

- The 2004 study gave indicators different weights since some indicators were seen as more important than others in determining pedestrian and bicycle demand. This was initially repeated in the 2010 update, however, a sensitivity analysis showed that the scores were not sensitive to weighting. As a result, each of the 15 indicators used in the 2010 study was given an equal weight of 1/15.

- The 2004 study normalized the variables or indicators using the mean score for all of the districts, with the mean score for each indicator equaling zero. The 2010 study indexed the scores according to the maximum score for each indicator, which created a more standard scale from 100 to 0 (though the minimum score could vary slightly). Using an indexed score of 0-100 was selected to have a more standardized range of scores for each indicator.