

"The eye now sees in substance what the mind formerly could only conceive.

It is a new function added to our senses.

It is a new standard of measurement.

It is a new basis of sensation."

LE CORBUSIER, *Aircraft*

Mapping Houston : Flows, Frameworks, and Revelations

BY RAFAEL LONGORIA

When Le Corbusier proclaimed "the airplane indicts the city" in his 1935 book *Aircraft*, in which he predicted the bird's-eye view made available by airplanes would change the design profession, he could have hardly imagined the tools that would be at the disposal of every architect and planner just seven decades later. Satellite images, geographic information systems (GIS), digital photography, computer graphics, and the internet have transformed design practices. It is not only the amazing amount of information available that has made the difference, but how quickly and inexpensively that information can be accessed, reconfigured, and disseminated.

All this technology is impacting the way we understand Houston. Visit any architecture studio at Rice University or the University of Houston and you will see walls covered with maps of the city and aerial views downloaded from the

internet. The ritual trip to the Houston City Hall Annex to pick up the required monumentation maps—remember diazo prints?—at the start of every project has become obsolete. Now it is all available online, in multiple versions and mostly free of charge.

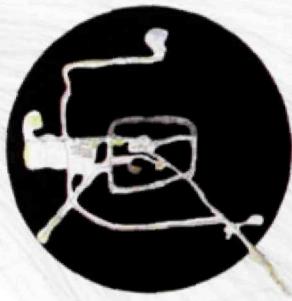
The brave new world of instant information, intelligent materials, and incredible images is brilliantly documented in "Massive Change: The Future of Global Design," an exhibition that originated at the Vancouver Art Gallery last year. Curator Bruce Mau, a Toronto-based design guru, is particularly adept at introducing new ways of seeing our universe. The map section is spectacular. Included in it is a map in which the image of major airline routes outlines an elegant graph of the world; the density of lines indicates the most prominent areas (surely you can find Houston). Another map is a nighttime view of the Earth that differentiates

electrical light from wood-burning fires and is one of the starkest depictions of have and have-nots I have ever seen. And the interactive satellite views are literally out of this world.

Generating specialty maps used to be a labor-intensive task involving ink pens, rub-off letters, and hand-applied color films. Producing maps was so expensive that choices had to be made very carefully as to what images to create. GIS and desktop computer graphics have dramatically speeded up the process. Not long ago, proficiency in GIS was listed as desirable for planners; today, it is essential. Several local colleges now offer courses in GIS, and Texas A&M University is offering a new Bachelor of Science degree in Spatial Sciences that concentrates on the study of GIS, global positioning systems, and remote sensing. According to their promotional brochure, "these cutting-edge technologies help environmental and

Top: Map showing the combined routes of major airlines. From the exhibition "Massive Change: The Future of Global Design." Courtesy the Vancouver Art Gallery.

Next page: Maps created by University of Houston fourth year architecture students show how different people experience the city in very different ways. To make the maps, students light all the places they have ever visited and blacken all the areas they have never been. By next outlining the part of Houston that encompasses their daily routines, and shading the rest, they get a "personal" map of the city. These maps were produced by students from fall 2003 and fall 2004.



natural resource managers map geographical features, patterns, changes, and conditions for environmental decision making, planning and problem solving.”

Today, there are literally hundreds of Houston maps available on various governmental websites. The City of Houston Planning and Development Department, for example, has available on its website an extensive collection under the name of COHGIS (City of Houston Geographic Information Systems). The department has maps that cover almost any demographic aspect of the city: race, income, education, age, and more. Any particular land uses can be easily combined or isolated—did you know that 25 percent of the land within Houston’s city limits is vacant? As an architect, I am understandably interested in the maps documenting building permits and demolition permits in the last decade. But the most surprising realization to me came from a 2000 population

density map that highlights Gulfton, at the intersection of Bellaire and Hillcroft, as the densest spot in the city. It seems counterintuitive, but the many apartments in the area have gone from housing the swinging singles of the oil boom years to providing shelter for extended families of Central American immigrants. Demography is destiny, and these maps tell the story of an extremely vibrant and diverse southwest quarter.

A History In Maps

It must be pointed out that as maps have proliferated, graphic quality has plunged. Where maps were once the domain of specialized craftsmen, today anyone with the right software can produce dozens of maps with very little effort. As welcome as time-saving technologies are, a visit to the map collection in the Houston Public Library’s Texas Room elicits a different

kind of wonder. Sorting through their map flat files, painstakingly organized by decade, provides an unmatched understanding of the evolution of the city.

The Texas Room collection contains not only official documents, but also delightfully odd pieces such as Michael Galbreth’s idiosyncratic “The Human Tour: An Anthropomorphic Route Through the City of Houston,” a 1987 map in which a human figure emerges from the tour’s outlines. The earliest maps of Houston show an elegant symmetrical scheme, with Main Street springing from the intersection of Buffalo Bayou and White Oak Bayou and flanked by Market Square and Courthouse Square. Old demographic maps have later-day hand-pasted labels covering the original ethnic group legends with more politically correct designations. And of course, pre-World War II Houston is clearly demarcated by its numbered wards—the original

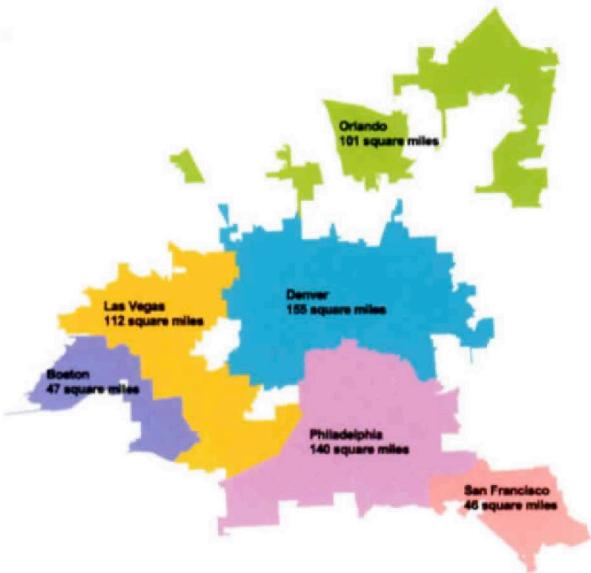
framework for understanding the city.

Looking at the 1942 “Major Street Plan for Houston and Vicinity” is like looking at an alien city. This map was made just before the freeways appeared, and Main Street is still the undisputed main artery. The website TexasFreeways.com displays a complete graphic history of the evolution of the Houston freeway system (as well as those of other Texas cities). It’s a history that is augmented by the Texas Room’s collection of Houston traffic studies, where one can follow in detail the steady increase of travel times along I-10 over the decades.

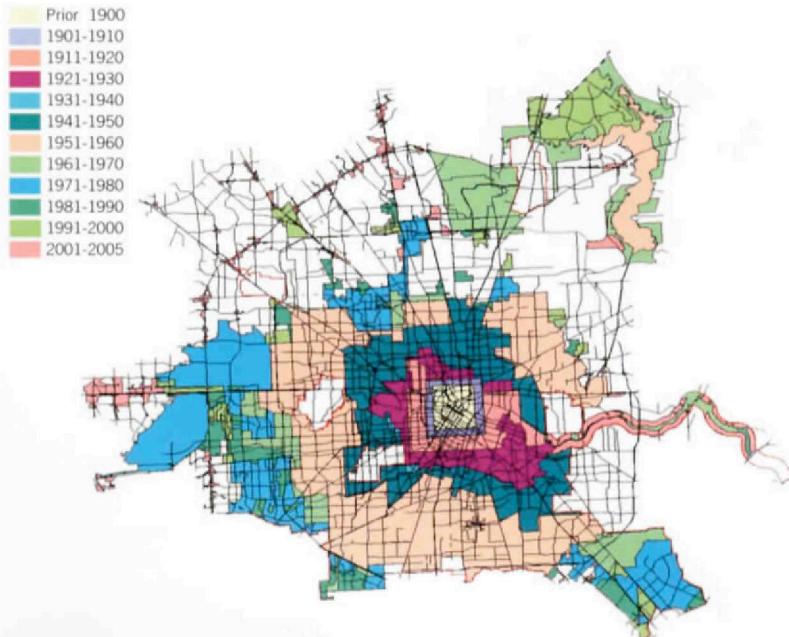
But no other image tells the story as concisely as the map of Houston’s annexation history, which traces the official outline of the city from 1836 to 2005. Because of the generosity of its extra-territorial jurisdiction laws, Texas boasts three of the ten largest municipalities in the United States. And Houston has

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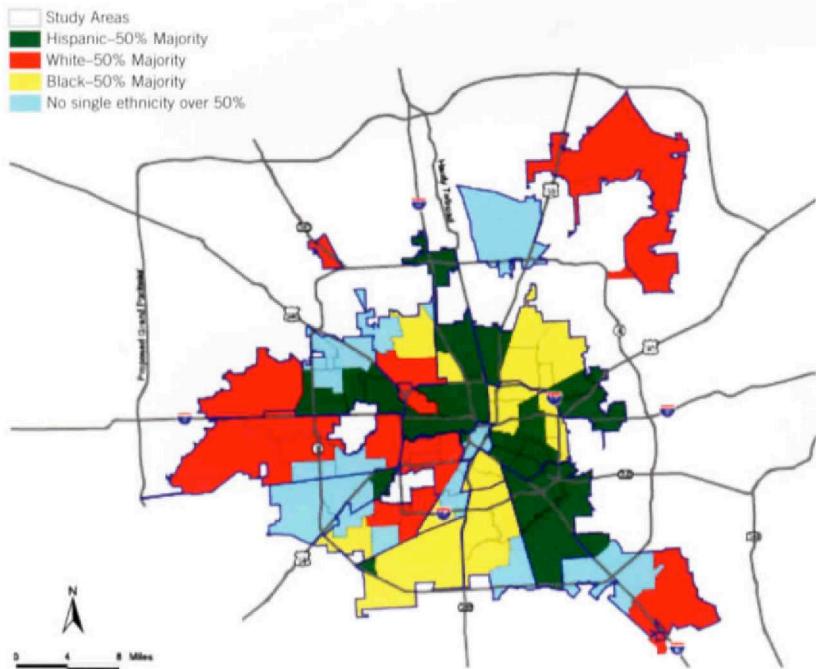
Six Major Cities Fit Inside Houston



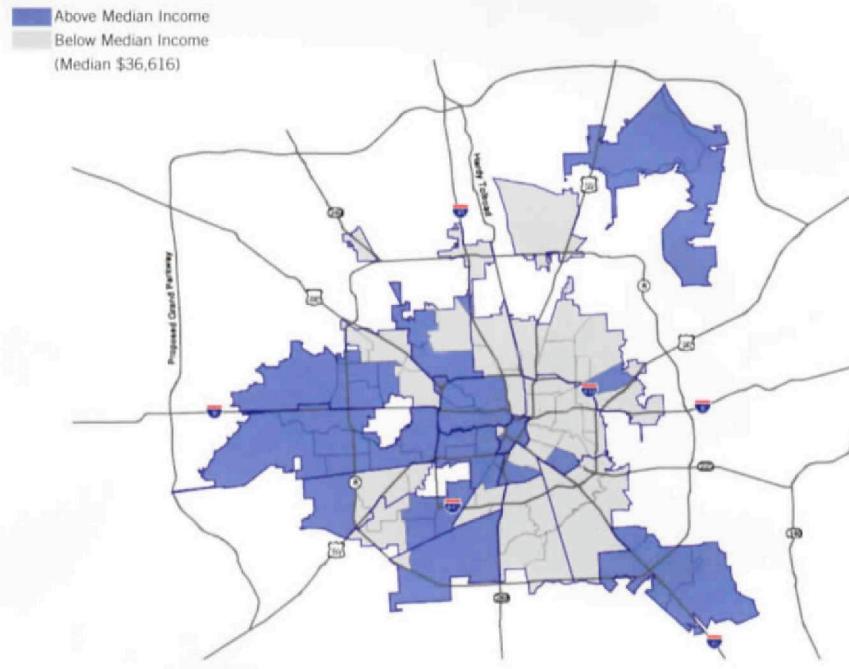
Houston Annexation History 1836-2005



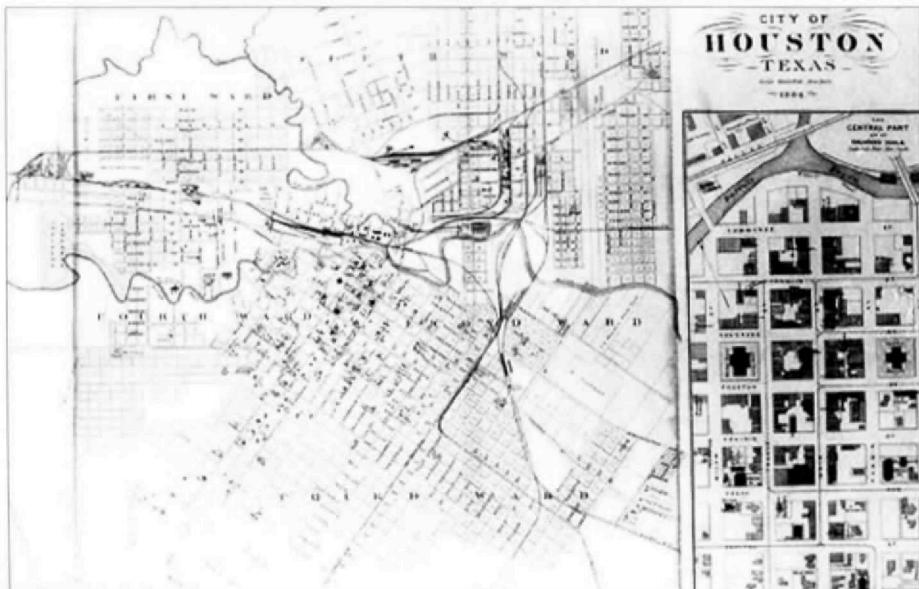
Ethnicity by Super Neighborhoods 2000



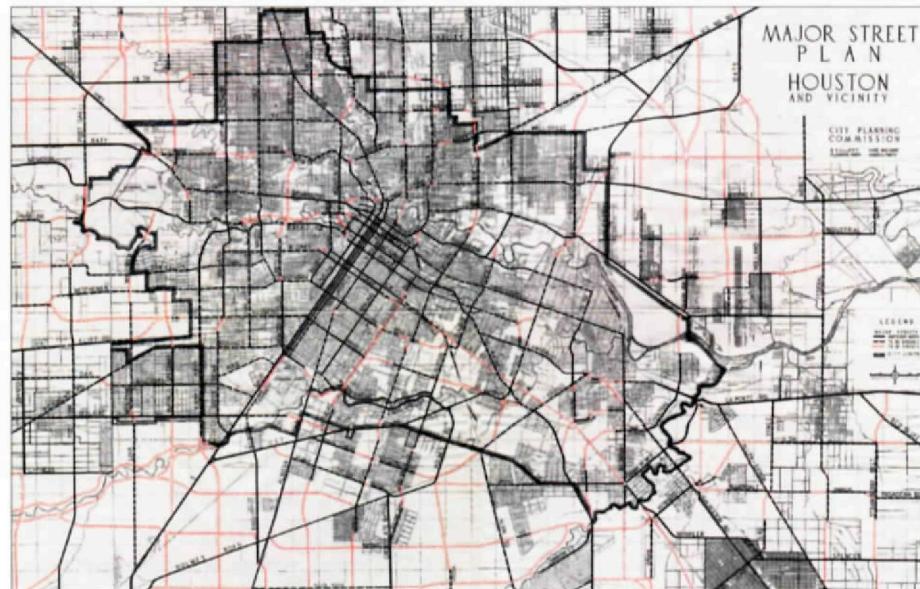
Median Household Income 2000



Houston Wards 1884

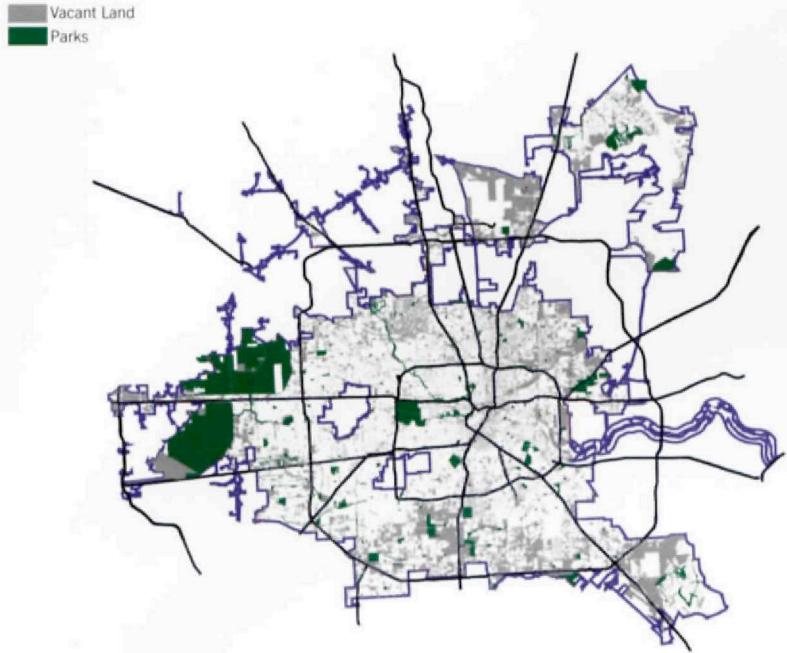


Houston Before Freeways 1942

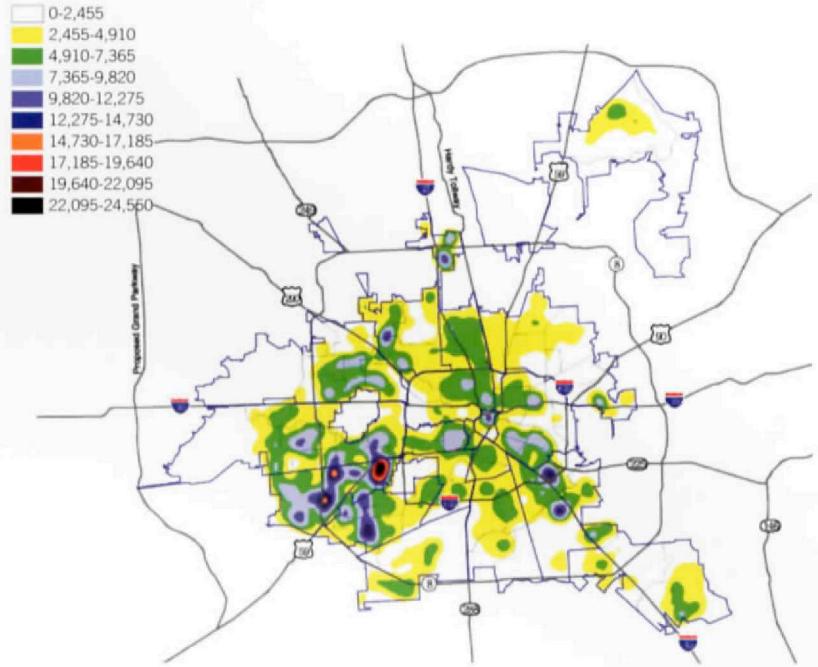


The maps that make up the bottom row on this and the next page are from the collection of the Houston Public Library's Texas Room, and document the evolution of the city. From left: 1884 map of Houston's wards with downtown detail; "Major Street Plan, Houston and Vicinity" from 1942; map showing how long it took in 1979 to get from the central city to an outside point during rush hour, and the speed you would travel along the way; and a 1986 map detailing how much traffic passed along particular roadways in a 24-hour period. The thicker the line, the greater the number of cars that use the road.

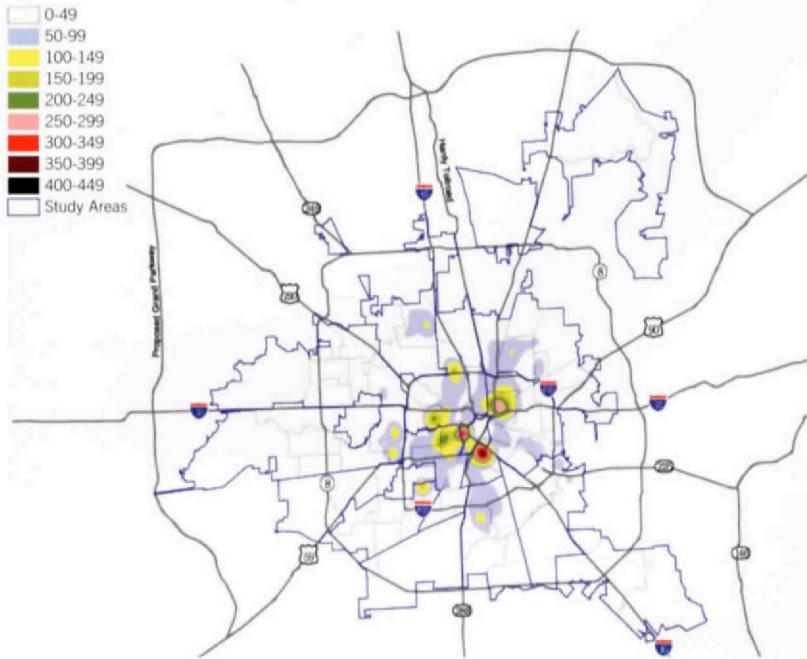
Vacant Land and Parks 2005



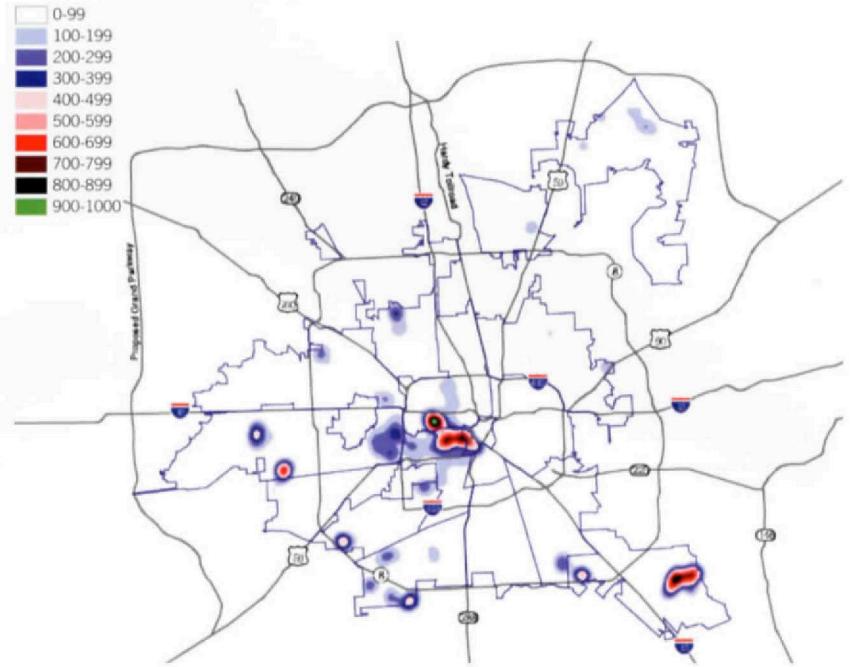
Population Density 2000



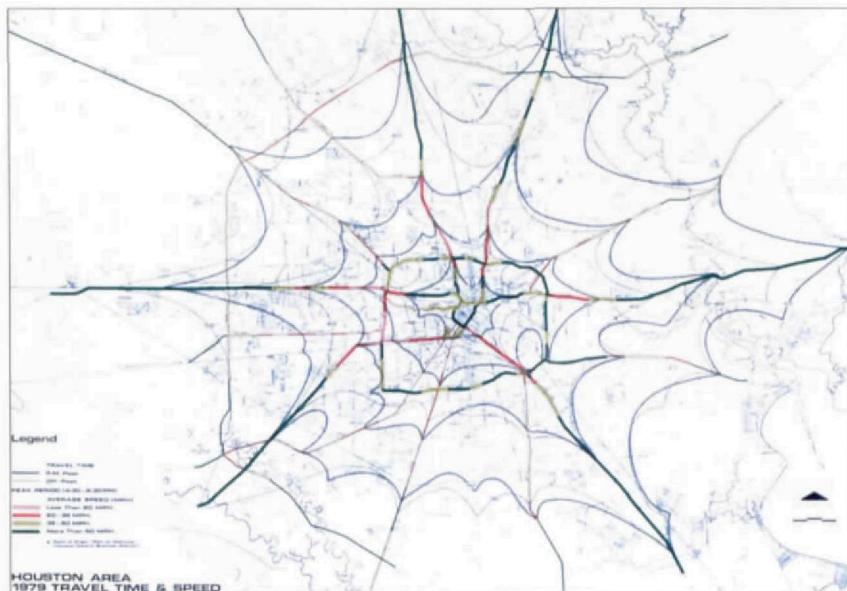
Residential Demolition Permits 1992-2000



Single Family Building Permits 1992-2000



Travel Time and Speed 1979

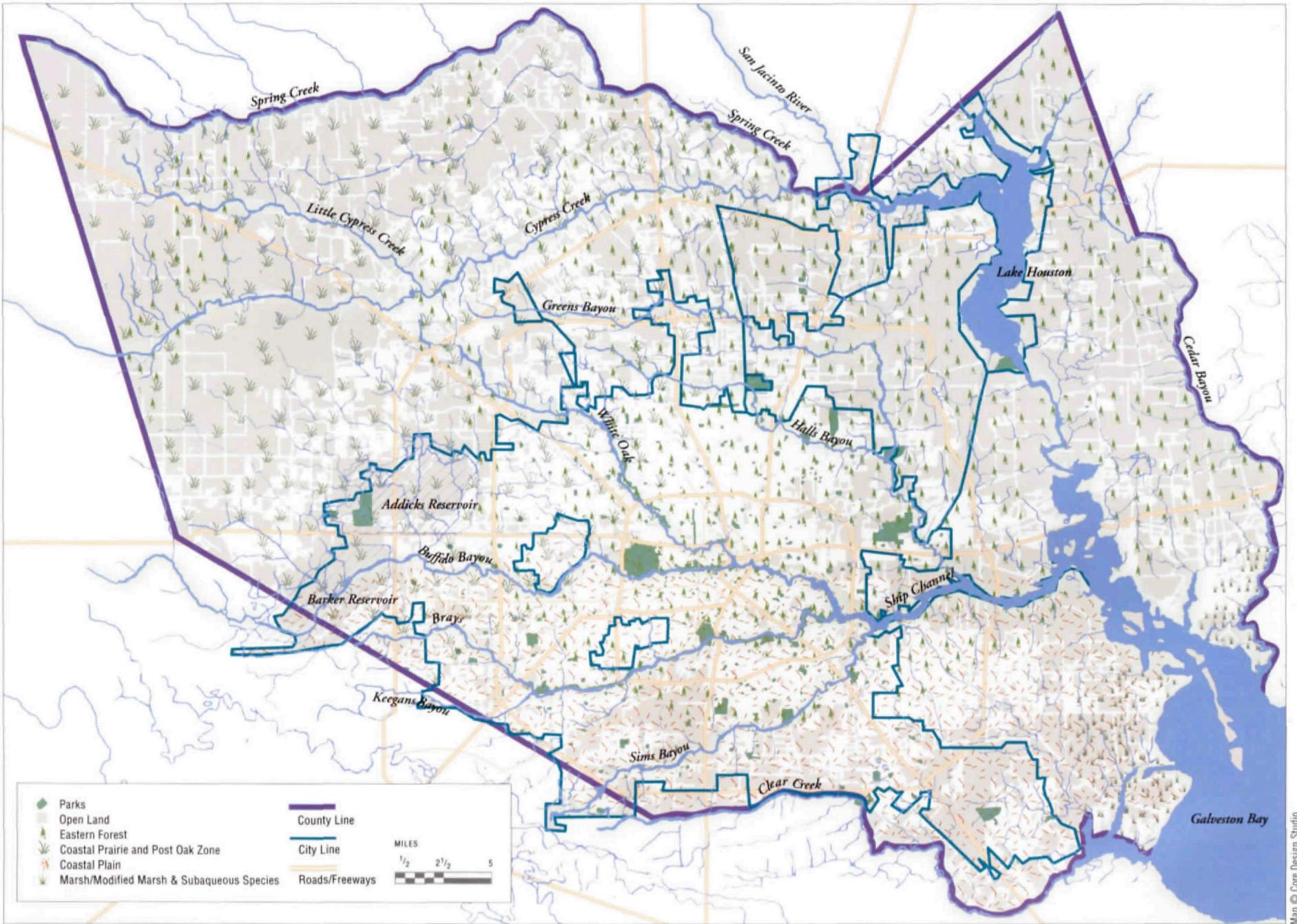


24 Hour Weekday Traffic 1986

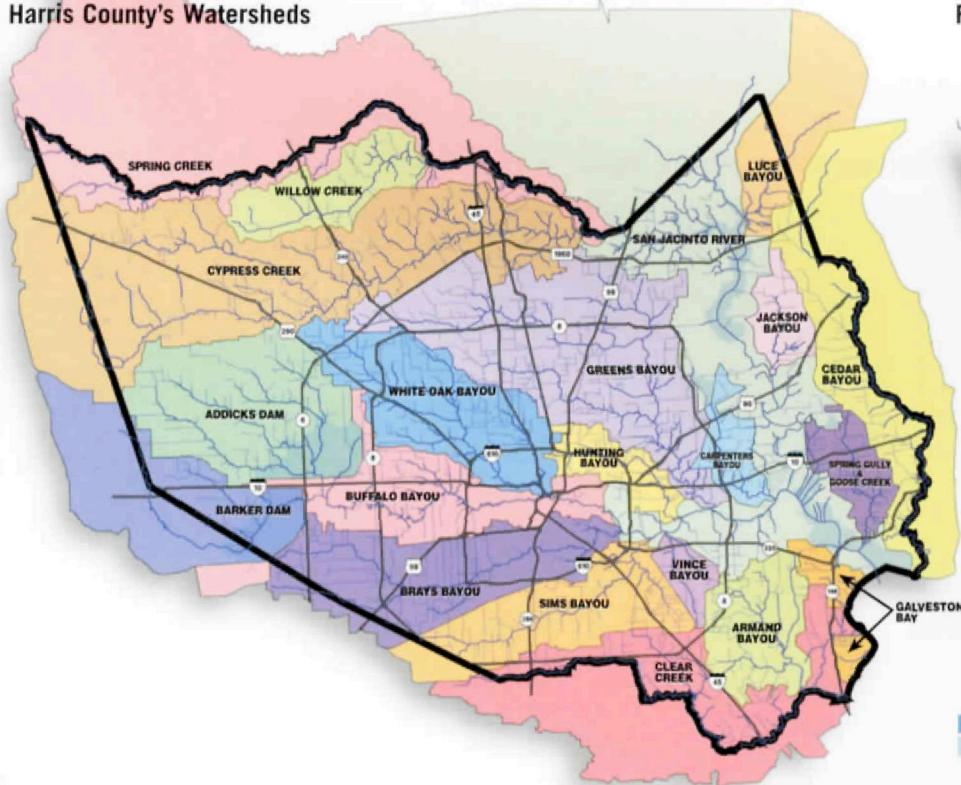


The maps on the top and center rows of this and the facing page are from the City of Houston's Planning and Development Department and cover a number of major demographic aspects of the city. They provide a graphic snapshot of Houston. Top row, from left: A map detailing how Houston's city limits could encompass six other major U.S. cities; a map showing Houston's annexation history from 1836 to 2005; a map showing the relationship between the city's parks and its vacant land; and a population density map, which reveals that the city's densest area is Gulfton. Center row, from left: A map of the ethnic makeup of the city's Super Neighborhoods; a map showing where those above and below the city's median household income live; a map showing where residential demolition has been most active; and a map showing the distribution of single family building permits.

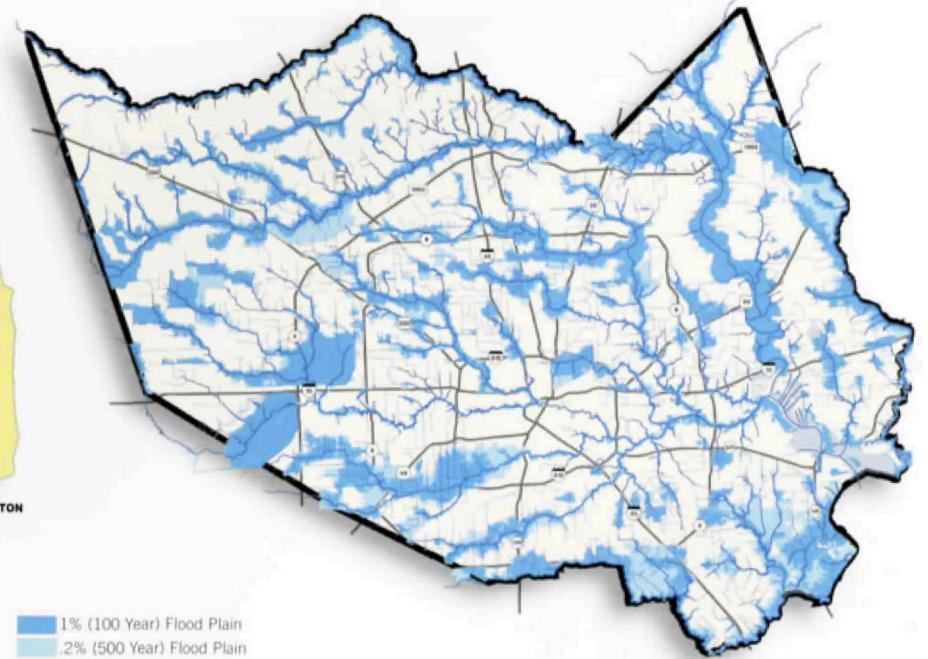
The Houston Framework: Natural Systems



Harris County's Watersheds

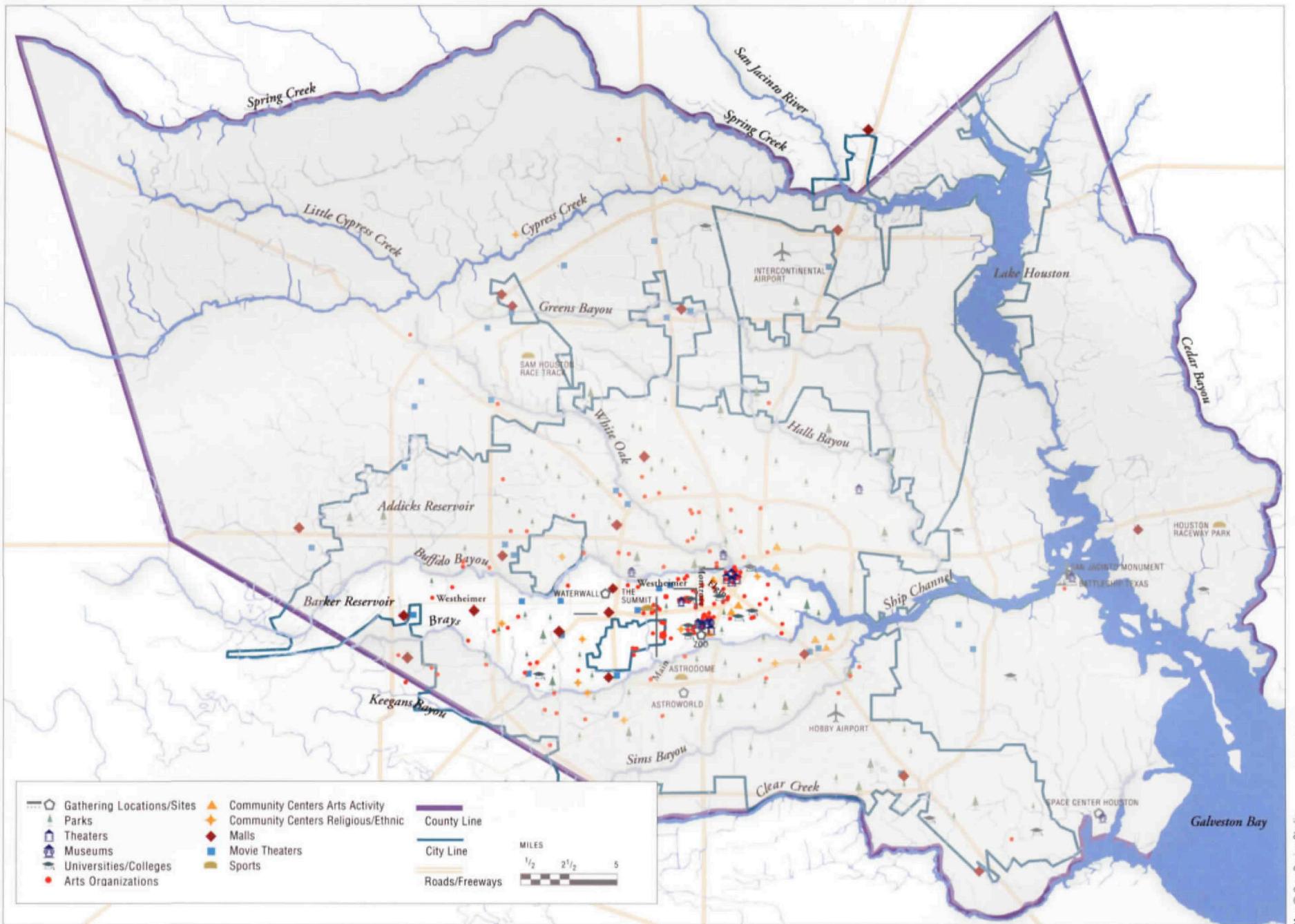


FEMA Preliminary Flood Plains 2004

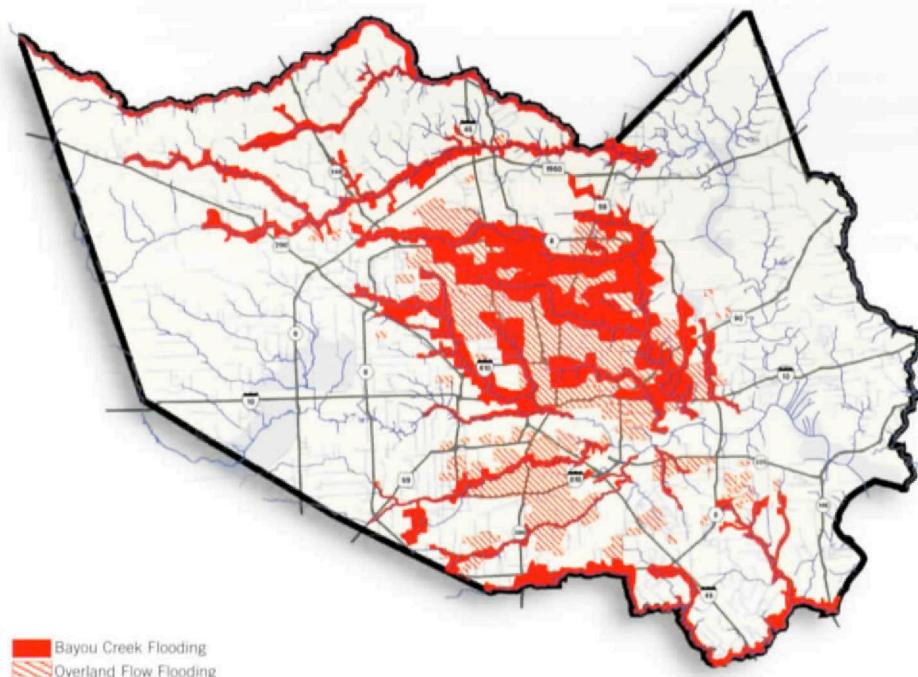


The large maps at the top of this and the next page are from CACHH's 1997 Houston Framework study and document, from left, Houston's natural systems and the places in the city where people gather. The area highlighted in the gathering-places map is referred to as Houston's Manhattan, and contains most of the city's cultural and architectural treasures.

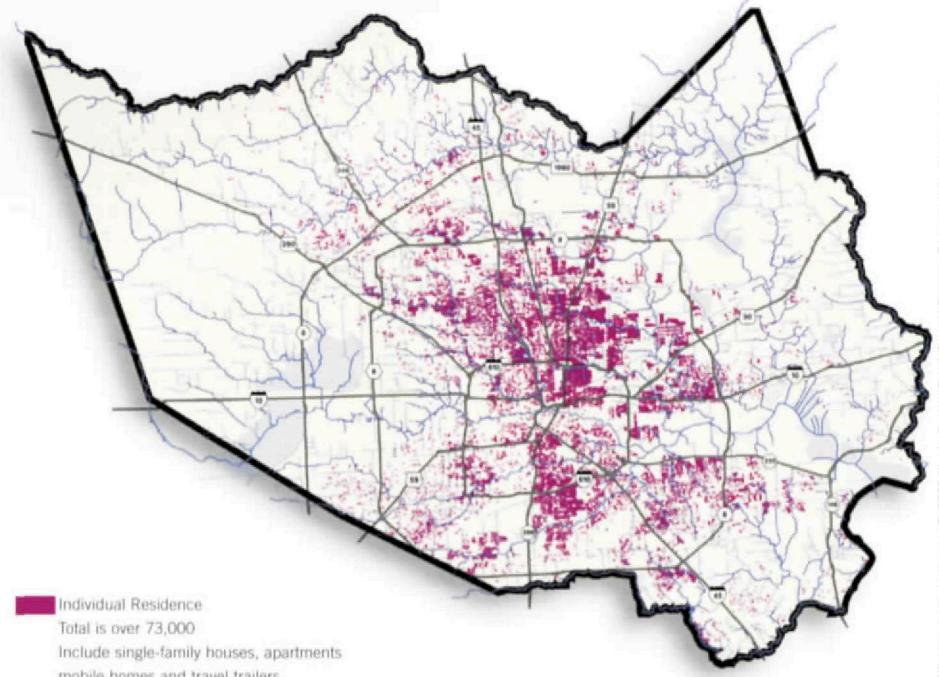
The Houston Framework: Gathering Places



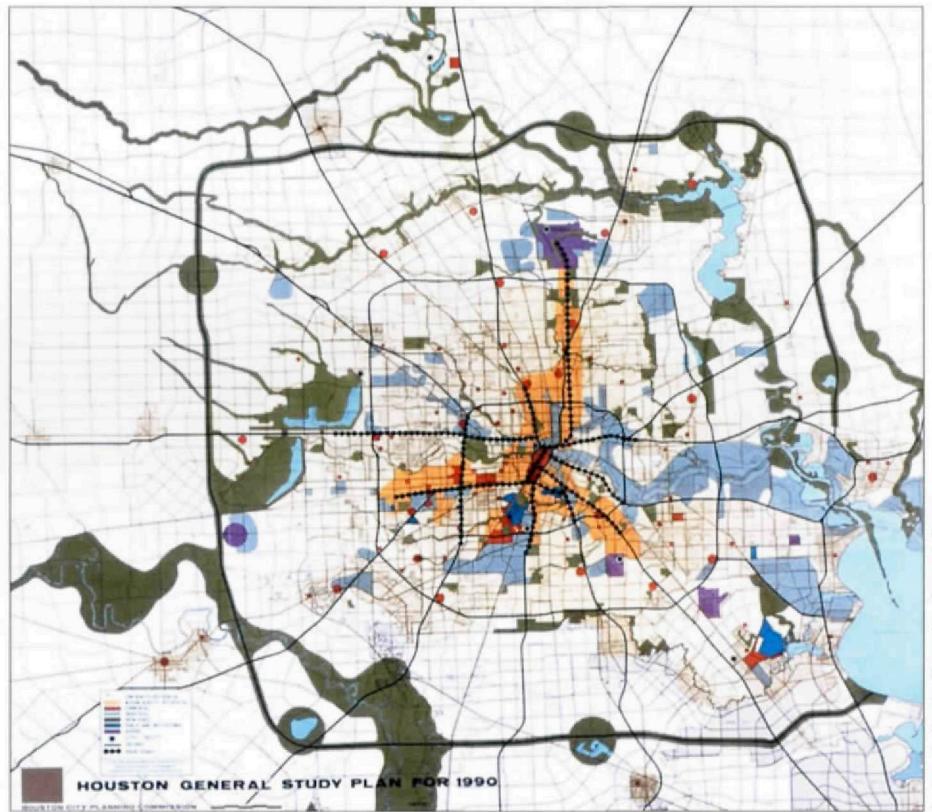
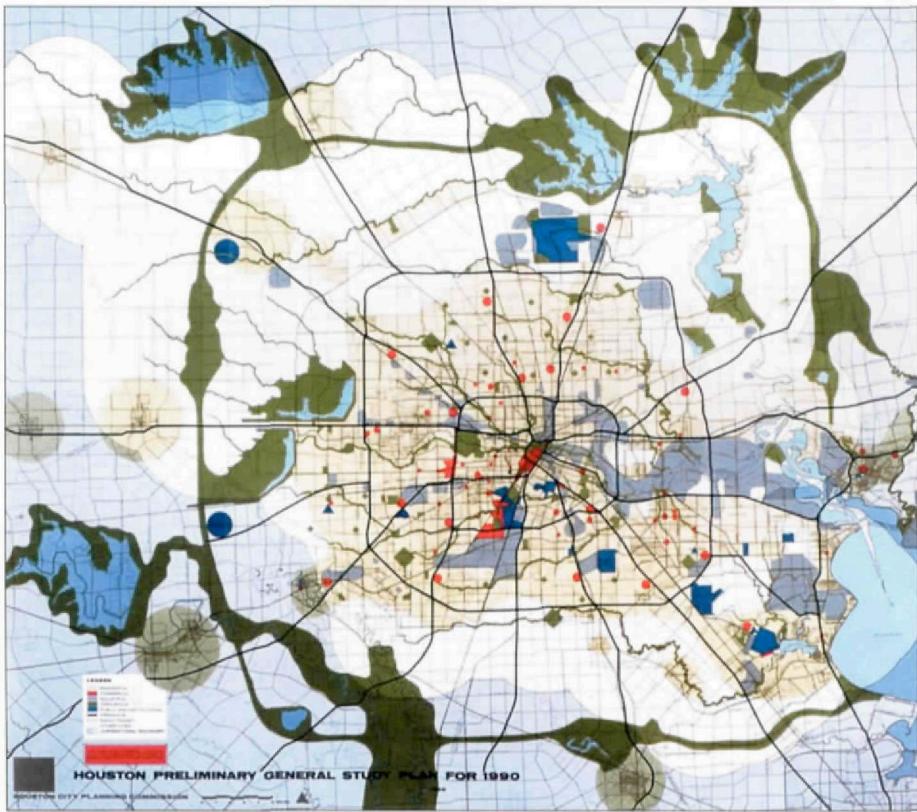
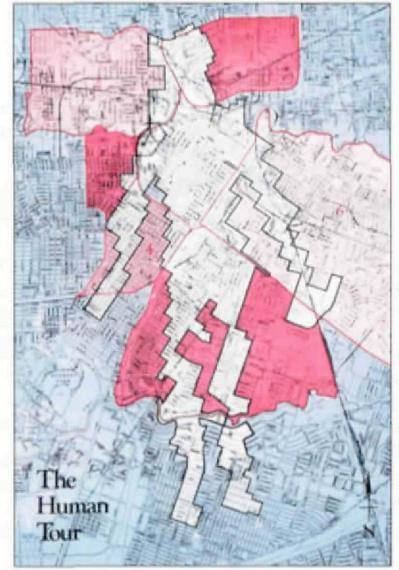
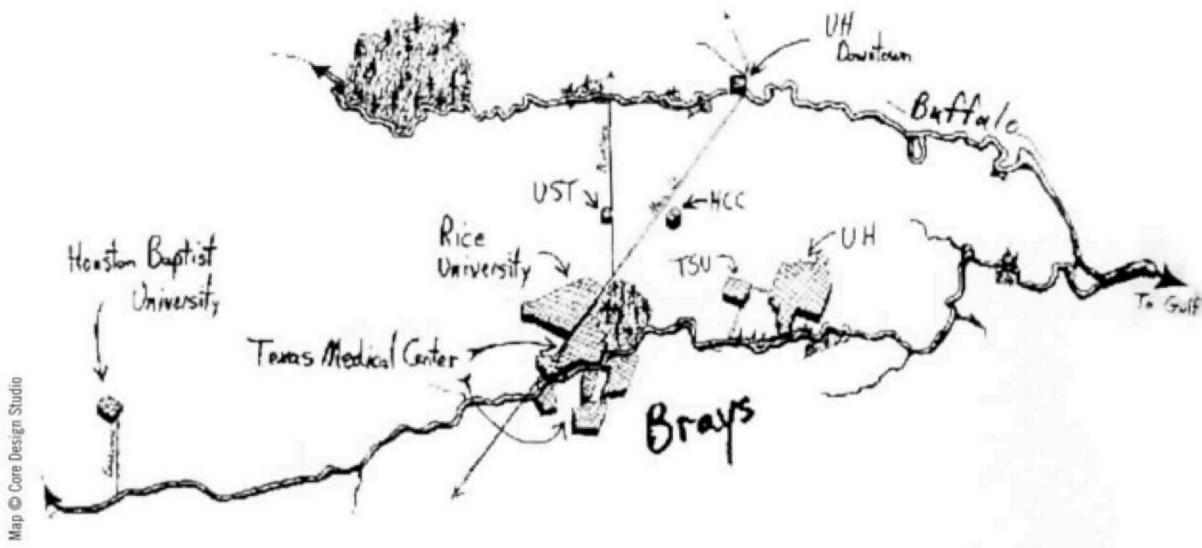
Estimated Allison Flood Damage Areas 2001



Allison Flood-Damaged Residences 2001



The four maps along the bottom of this and the previous page show Harris County's watersheds, the Federal Emergency Management Agency's preliminary revision of flood plains, and the devastating impact that Tropical Storm Allison had on the Houston region in June 2001.



Top, left to right: A diagram showing how Brays Bayou links most of Houston's major educational institutions and a map created in 1987 by artist Michael Galbreth titled "The Human Tour." Galbreth's human form outlines a trail through Houston's historic inner-city neighborhoods. Above, left to right: A preliminary version of a 1990 Houston Planning Commission long-term plan for a ring of green spaces around Houston and the final version of that same long-term plan, with the number of green spaces drastically reduced.

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 expanded steadily. The 2005 annexations stick to a narrow corridor along the edge of the city's northwest quarter following the pattern observed in other Texas towns by Keith Krumwiede in *Cite 53* (Spring 2002).

Houston covers more than 600 square miles with less than half the population density of Los Angeles (3,161 persons per square mile versus 7,415 persons per square mile), but it edges Dallas as the densest city in Texas. As the Planning and Development Department's website proudly illustrates, Boston, Philadelphia, Las Vegas, Orlando, Denver and San Francisco could all fit together inside Houston's city limits.

The Wagon Wheel and the Branches

I often assign my architecture students at the University of Houston to create a map of their "own personal Houston." To begin, they're asked to pick up a

Houston metropolitan map at a local gas station. Next, they're told to outline all the parts of the city that they have ever visited. Then they blacken out those areas of the map that they have never been in. On the area they have visited, they outline their daily routine, and slightly shade the rest. Of course, the map has to be big enough to include the incredibly large area from which UH students usually commute (recently I had a student who drove to school every day from West Columbia).

The resulting "personal maps" invariably feature three or four "village blobs" of various sizes connected by spidery segments of the freeway system. Most maps show some of the highways running off the edge, signifying various trips out of town, but some of the most intriguing maps are self-contained islands, indicating a surprising number of students who have only left the city through the airports. This exercise documents graphically two things we know intuitively: we each

inhabit small villages within the larger city, and the freeways rule.

Peter Papademetriou's text map featured on the cover of the watershed 1972 *Houston: an architectural guide* left no doubts as to what Houston was all about. The then-new freeway system is outlined with a running narrative that wonderfully encapsulates our elusive city. That map, like the rest of the guide, presented an image of Houston that probably was not the one local architects wanted to put forth to their colleagues from around the country on the occasion of the AIA National Convention coming to the city. But like it or not, the freeways have shaped the city and its lifestyle.

Houston is defined by its flows—traffic and drainage. The city can be diagrammed as the intersection of a wagon wheel and fanning tree branches. With no significant hills or untraversable bodies of water on the way, the freeway system is as clear a concentric/radial pattern as they come. And the bayous, equally

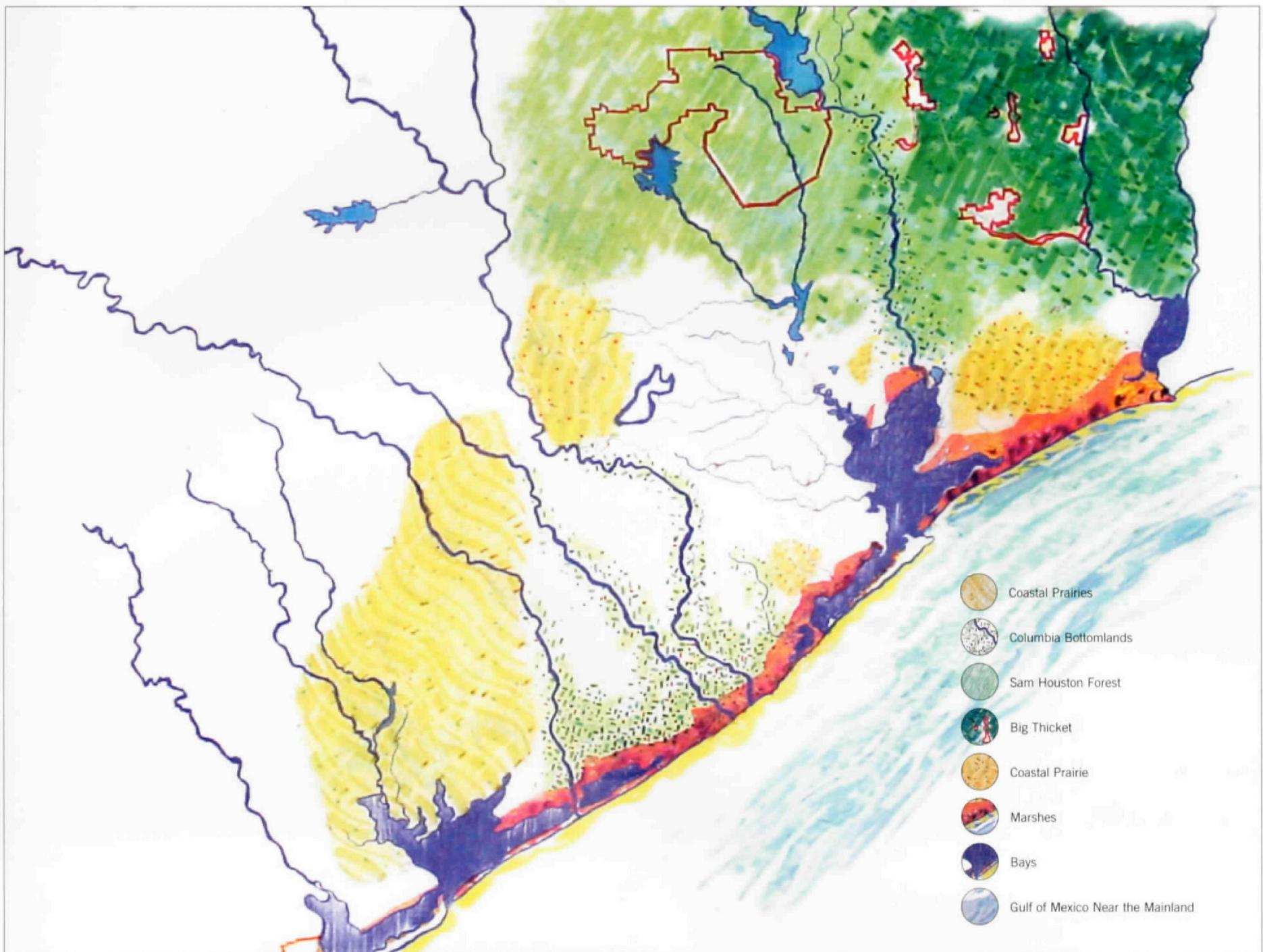
unhindered by major obstacles, constitute a fairly regular bronchial system flowing in a southeasterly direction towards Galveston Bay. Of course, the elevated roads are considerably more visible than the region's millennial bayous. As much as a transportation system, the freeways have become the framework by which we understand the contemporary city.

Primordial Houston

And yet, as important as the freeways are, nature can always assert itself, as it did in June 2001 when the freeways became bayous. The Harris County Flood Control District maps documenting the effects of Tropical Storm Allison are scary. On the maps the bayous thicken till they meet and form a huge lake in the middle of the city. The ongoing reconfiguration of flood plains will have enormous economic implications. And the flood control authorities are actively acquiring flood-prone sites that have the potential of being assembled into

Courtesy the Houston Metropolitan Research Center

Courtesy the Houston Metropolitan Research Center



This hand-drawn map of the ecosystem of the upper Texas coast by Charles Tapley and Jim Blackburn shows the plethora of natural resources that surround Houston.

Map courtesy Jim Blackburn and Charles Tapley

a system of parks and green trails along the bayous that could transform the city.

I first became absorbed with Houston maps when I chaired the Houston Framework effort for the Cultural Arts Council of Houston/Harris County in 1997. This project sought to provide a strategic plan for CACHH's public art program. Through an extensive mapping process it identified a series of catalytic spots where CACHH's civic art and design efforts should be concentrated, such as bayous, parks, freeways, airports, and shopping malls.

Two of the Houston Framework findings related to the bayous stand out. First is what I call Houston's Manhattan, an "island" between Buffalo Bayou and Brays Bayou that extends all the way to the Katy Prairie, is of similar size to the real Manhattan, and contains most of the cultural and architectural treasures of the city. Second is the fact that Brays Bayou is Houston's "education corridor," already connecting the University of Houston,

Texas Southern University, the various Texas Medical Center universities, Rice University, and Houston Baptist University with a bike and hike trail. While subtle and often invisible, the bayous continue to be the preeminent natural armature that ties the whole city together.

One of the most interesting documents I encountered in the Texas Room is a 1990 preliminary version of a Houston Planning Commission long-term plan that proposed a generous green ring encircling Houston where the Grand Parkway now stands. This vision cleverly took advantage of the considerable amount of existing wetlands and undeveloped land around the city. Unfortunately, by the time it went from draft to final report, the most compelling aspects of the green ring disappeared—even though a light-rail network, with the potential of introducing pedestrian-oriented corridors throughout the city, did appear in the final version.

I am still trying to figure out what happened to that plan as it went from

draft to final form. But propelled by the need to face our flooding problem, a vision of linked linear parks could do for Houston what Frederick Law Olmsted's Emerald Necklace did for Boston more than a century ago—particularly when you factor in the potential relocation of railroad traffic to the perimeter of the city and the "rail to trail" conversions this would make possible.

Charles Tapley's and Jim Blackburn's hand-drawn map of the ecosystem of the upper Texas coast dramatizes more than any of the high-tech images the considerable natural wealth surrounding Houston. Ecologically invaluable estuaries, prairies, marshes, and pine forests adjoin the city.

Perhaps what is most important about the proliferation of satellite photography websites, such as keyhole.com, that allow us to zoom in and out of the Earth from our computers is that it reminds us constantly about the interconnectivity of our environment, and the huge consequences of our individual and collective actions. ■

Related Websites

The following websites offer views from space:

Earth.google.com

Eol.jsc.nasa.gov/

Terraserver.microsoft.com

VirtualEarth.msn.com

On these websites you can find maps of Houston:

Pwegis.pwe.ci.houston.tx.us/

Hcfd.org (At site, click on Maps & Exhibits tab.)

Gdc.h-gac.com/

www.houstontx.gov/planning/planning_studies/ludem.html (A number of the maps in this article were found here. Go to Chapter Three, Parts 1 and 2, and Chapter Four to download PDFs with the maps.)

And this website offer maps of the freeways:

Texasfreeways.com