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16. ABSTRACT <p>A central feature of population growth and expansion has been spatially uneven development in central cities and suburban areas. This study describes the results of a research which was designed to examine critical issues pertaining to suburban employment, population growth and dispersion, and public transit accessibility and availability for residents in the central city. The study explores the scope of suburban employment opportunities and public transit access to them and relates these findings to spatial-specific factors and other impediments to job opportunities and access.</p> <p>Four primary sources of information were used in the study. One source involved the review of relevant studies pertaining to urban/suburban growth, economic activity, land use, transportation availability and accessibility. Another source involved a survey of residents in two study areas with large concentrations of inner city residents, particularly minority groups. Using a random sample of residents in these areas, data on demographic characteristics and travel behavior were collected. To augment this information, telephone interviews were conducted with other scholars, public officials, and transportation professionals throughout the United States and North America about population migration and growth. These data, combined with a series of special studies on employment growth, suburban mobility, and travel characteristics, and site visits to several suburban activity centers, round out the pool of information from which many of the findings were drawn.</p> <p>The findings of the study suggest the need for effective approaches to conserving energy. A "Transportation for Energy Conservation" demonstration project is proposed. The cooperative project, using alternatively-fueled vehicles, will be designed to provide a public transit service delivery model for enhancing mobility, reducing vehicular pollution, improving the efficiency of fuel pricing, reducing urban/suburban congestion, and promoting clean fuel and engine technologies. The results of this demonstration project can result in energy savings.</p>					
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Suburban Employment Growth and
Public Transit Accessibility:
A Comparative Analysis

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Suburban Employment Growth and Public Transit Accessibility: A Comparative Analysis

Executive Summary

This study examined issues pertaining to suburban employment, population growth and dispersion, and the availability/accessibility of public transportation for residents living in the central city. The main focus of the study was designed to determine the availability of suburban employment opportunities and to assess the public transportation needs of the inner city workforce in accessing them.

Data from special studies and the 1990 Census of Population reveal that population growth in the central cities of America declined or remained relatively stable while suburban population growth continued to increase. The out-migration of the population and the concomitant shifts of major industries to suburban locations have modified the travel characteristics of urban and suburban residents alike. Traditional service delivery strategies are ineffective in meeting the new demands for public transportation. With the vast numbers of people living in suburbia and exurbia, public transit service delivery must be tailored to a different set of circumstances. Trip origins and destinations are becoming increasingly more widely dispersed. Large residential, shopping, and employment centers are often located in the suburbs. As a result, travel patterns are more random in nature, and are taking place in every direction. This study examined problems associated with job availability in suburban areas and public transit accessibility to suburban job locations.

The problem addressed in this study relates to shifts in the location of employment opportunities to suburban areas, and structural impediments faced by central city residents in their efforts to gain access to sources of blue-collar and other entry-level jobs in areas outside the Central Business District (CBD). While public transportation is readily accessible to individuals to travel within central city corridors, the dispersed nature of employment sites makes its use impractical to thousands of workers.

Four primary sources of information were used in the study. One source involved the review of relevant studies pertaining to urban and suburban growth, economic activity, land use, transportation availability and accessibility. Another source involved a survey of central city residents. Using a random sample of residents in selected areas, data on demographic characteristics and travel behavior were collected. To augment this information, telephone interviews were conducted with other researchers, public officials, and transportation professionals as well as leaders from business and industry. In addition, site visits were made to suburban activity centers to assess employment availability; to transit centers to determine origin, destination, and public transit access to jobs in suburbia. Data were also obtained from special census reports, origin-destination surveys, and journey-to-work data for selected areas.

Two primary suburban activity centers were used in the study: North Houston and West Houston. Data from the findings of studies conducted in 1989 on these areas were compared with similar data for the Dallas-Fort Worth area in North Central Texas. Two Primary Sampling Units were selected from the inner city of Houston for use in assessing the public transit needs and travel behavior patterns. An interview schedule was developed for use in the survey of the central city areas.

Major findings of the study included the following:

- The approach to developing flexible public transit service delivery must be comprehensive in scope. The current transit service delivery system in the Houston metropolitan region does not accommodate workers who live in the central city who are interested in accessing jobs in suburban areas. This lack of access has contributed to people who have become disconnected from the economic mainstream. It should be noted that not all of the disconnections can be attributed to the lack of public transit access. Problems associated with unemployment are linked to several factors, including the decline in the quality of education and training provided by secondary schools, lack of access to public transportation, changing job requirements, racial discrimination, industrial restructuring, and shifts in the location of the region's employment growth.
- The findings of previous scholars were reaffirmed in this study. The uneven growth and redistribution created by the regional dispersal of jobs and housing produced major problems. The increasing popularity of suburban areas as major activity centers has contributed to inequities in the ability of certain population segments' abilities to access different economic, social, and cultural opportunities. For the nation's underclass (e.g., those without a car, the poor and disabled), the scattering of workplaces, shopping malls, and recreational centers along the suburban fringes has physically isolated the transit dependent. This isolation inhibits their movement into society's mainstream.
- The lack of available and accessible public transit closes the window of opportunity to basic opportunities and services if the individuals are too poor, too young, or too infirm. Further, the suburbanization of workplaces is believed by some scholars to contribute to the high jobless rate among central city minority groups. In the study areas used in this study, there were no reverse-direction or cross-town transit runs connecting core neighborhoods with outlying business parks and office centers during peak periods. Park and Ride service is provided, for example, by Houston METRO, but this service is restricted to suburban commuters, with early morning and evening runs from city-to-suburb or vice versa.

Recommendations

Major recommendations of the study include:

1. It is recommended that serious consideration be given to extending public transit service to peripheral and suburban areas by utilizing a range of two-directional alternative mode options to provide access to suburban activity centers. To test the efficacy of these alternative solutions, it is proposed that a demonstration project be funded by the public/private sector. The project would be designed to demonstrate how public transit can be made available to transit dependent groups in a cost effective way while saving energy.
2. The environmental rehabilitation approach should be used to alleviate the problem of suburban immobility. This approach would be multifaceted in its application. It will depend on two components: (a) improvements to the central city through municipal programs; and (b) improvements to individual parcels of land by the owners of such property. These measures would be designed to rehabilitate and stabilize areas in the central city and on the periphery.
3. In formulating policies to improve public transit accessibility to suburban areas, it is not sufficient merely to know where the growth takes place. It is equally important to know what must be done to deal effectively with the suburban mobility issue. It is recommended that a metropolitan-wide public transit service delivery model be developed. The model should be developed within the framework of intermodal transportation, and serious consideration should be given to mass transit modes (urban rail, maximum utilization of taxicabs, and other forms of mass transportation).

Energy Savings/Application of the Results

To apply the results of the study, a two-year demonstration project is proposed. The demonstration project would be designed to address changing market configurations to accommodate multi-hub suburban development patterns and to attract new riders inside IH Loop 610 in Houston.

The findings suggest the need to design and implement a joint project between the public transit system and the private sector. The project would be designed to provide access to job opportunities outside the central city, to reduce private travel, to reduce vehicular pollution, urban/suburban congestion, and promote clean fuel and engine technologies. Every effort will be made to create incentives for using public transportation and for high occupancy vehicle use to save energy.

The project, "Transportation for Energy Conservation," would be a cooperative project in which alternatively - fueled vehicles will be used to transport central city residents from a selected corridor to

urban and suburban locations during peak and off-peak periods, The maximum size of the fleet to be used in the demonstration project would be four vehicles, all of which will use alternative fuels. Graduate students will be used as interns in the program which may utilize mini-buses or van pools. The fleet of vehicles will be given regular maintenance and routine repair in a private facility.

Without going into greater detail, the performance measures will entail comparing productivity , energy conservation and cost factors with the same factors in previous years. "Performance indicators" will be used to measure cost-efficiency and effectiveness, productivity, and safety.

Implementation Statement. The taxpayers of Texas, public transit authorities throughout America, and the Texas Department of Transportation will receive benefits from the results of the demonstration project. Other potential benefits will include energy savings, increases in transit ridership, and the multi-hub concept for service delivery that may result in improved services to urban and suburban areas.

Given the relevancy of the findings to energy conservation, the demonstration project has the potential for increasing public transit's share of the urban/suburban travel market and for conserving energy through the reduction of vehicular traffic volumes. The economic benefits will accrue from a reduction in unemployment among the central city residents and through meeting the "supply and demand" for employees in suburban activity center locations.

Suburban Employment Growth and Public Transit Accessibility: A Comparative Analysis

I. Introduction

This study describes the results of a research designed to examine issues pertaining to suburban employment, population growth and dispersion, and the accessibility or availability of public transportation for residents living in the central city. The main focus of this study was to determine the location and nature of suburban employment opportunities; to assess the public transportation needs of the inner city residents and their ability to access public transit to take advantage of employment opportunities in suburban areas.

A central feature of demographic and employment growth has been spatially uneven development. "As more efficient transportation and communication technologies emerge, modes of production organization and services transform, and new locations of economic opportunities arise. People, in turn, have tended to follow opportunity, leading to marked temporal disparities in the growth of cities, suburbs, nonmetropolitan areas, and entire regions", according to Kasarda (1988: 83). Previous scholars have suggested that a number of economic, political, and technological forces have combined to accelerate industrial restructuring and to shift the nation's employment growth pole — first to the outer rings of urban centers and then to suburbia and exurbia (Hawley, 1971: 187, 256-57). Additionally, the location of residences and employment opportunities in suburban areas has adversely impacted job availability and employment accessibility for residents living in central cities.

Data from special studies and the 1990 Census of Population reveal that population growth in the central cities declined or remained relatively stable while suburban population growth continued to increase. The out-migration of the population and the concomitant shifts of major industries to suburban locations have modified the travel characteristics of urban and suburban residents alike. Traditional service delivery strategies are ineffective in meeting these new demands. With vast numbers of people living in suburbia and exurbia, public transit service delivery must be tailored to a different set of circumstances. Trip origins and destinations are widely dispersed. Large residential, shopping, and employment centers are often located in the suburbs. As a result, travel patterns are more random in nature and are taking place in every direction (Nwokolo, 1990:1). This study examined problems associated with job availability in suburban areas and public transit accessibility to suburban job locations.

The Problem Addressed

The problem addressed in this study relates to shifts in the location of employment opportunities to

suburban areas, and structural impediments faced by inner city residents in their efforts to gain access to sources of blue-collar and other entry-level jobs in areas outside the Central Business District (CBD). While public transportation is readily accessible for individuals to travel within central city corridors, the dispersed nature of employment sites makes its use impractical for thousands of workers.

The Study Approach

Four primary sources of information were used in the study. One source involved the review of relevant studies pertaining to urban and suburban growth, economic activity, land use, transportation availability and accessibility. Another source involved a survey of residents in two study areas with a large concentration of inner city residents. Using a random sample of residents in these areas, data on demographic characteristics and travel behavior were collected. To augment this information, telephone interviews were conducted with other researchers, public officials, and transportation professionals throughout the United States and North America about population migration and growth.

Another source of information for the study involved site visits to several suburban activity centers to assess employment availability; to transit centers to determine origin, destination, and public transit access to jobs in suburbia.

Other sources of information included the U. S. Census for 1990 and a series of special studies on employment growth, suburban mobility, travel characteristics, and travel behavior. Suburban travel patterns were identified from a number of secondary sources. These included origin-destination surveys, journey-to-work data for selected areas from the U. S. Census, on-board transit surveys, Park and Ride surveys and related studies.

To fulfill the goals and objectives of the project, several study areas were used to identify the availability of employment opportunities in suburban activity centers. An analysis of the historical and forecasted growth of population and employment in the Primary Metropolitan Statistical Area (PMSA) revealed that within Harris County, significant growth occurred in the outer sectors. Two areas where substantial population and employment increases occurred during the last decade were selected for use in this study. Included were West Houston and North Houston. Additionally, two areas were selected inside IH 610 Loop were identified as the sample population for the central city. Sample Area 1 corresponds to Study Area 5, and Sample Area 2 corresponds to Study Area 11, as described in the Comprehensive Plan for the City of Houston, 1992.

Description of Suburban Areas and Primary Sampling Units (PSUs)

The study areas, identified as West Houston and North Houston, were used in the study as major suburban activity centers.

West Houston includes the western portion of Harris County and parts of Waller and Fort Bend counties.

The area's boundaries are Gessner on the east, Bissonnet on the south, the intersection of SH 249 and the Harris County line on the north, and the proposed Westside Regional Airport on the west. The area is bisected by Interstate Highway 10 (IH 10) West. Along IH 10 is the Energy Corridor, a concentration of 12 million square feet of office space. A major concentration of regional and neighborhood retail centers has been developed along IH 10 West in this area. An additional 8.5 million square feet of office space is found at the Westchase activity center. The estimated population for the area is 742,193.

North Houston, the second study area, comprises an area of approximately 630 square miles. This area includes the northern portion of Harris County and the southern portion of Montgomery County. It is an area bounded on the south by State Highway 525 (SH 525); on the east by Lake Houston; on the north by the City of Conroe; and on the west by Compaq Computer/Champions area at the intersection of Farm-to-Market 1960 (FM 1960) and State Highway 249 (SH 249). North Houston is served by Intercontinental Airport, IH 45 North, U.S. Highway 59 (US 59 North), Beltway 8, and FM 1960. The Greenspoint Mall and the North Belt Business Corridor comprise the largest activity center in the area with approximately 10 million square feet of office space. North Houston includes two master-planned residential communities — The Woodlands and Kingwood — as well as concentrations of residential neighborhoods in the FM 1960 corridor between IH 45 and SH 249. The 1988 population was estimated to be over 441,000, according to the North Houston Association's FACTBOOK.

In addition to the two suburban activity centers utilized in the study, several Primary Sampling Units (PSU's) were used to conduct a survey of inner city residents. Residents were asked to respond to inquiries pertaining to their employment status, level of education, job availability, public transit accessibility, and travel behavior patterns. Data were also collected regarding transit system performance, origin-destination, trip purposes, number of transfers, and job-seeking efforts.

The Primary Sampling Units (PSU's) used in this study were selected from study area profiles developed by the City of Houston's Planning and Development Department in June, 1992. The two areas chosen for our sample were: PSU Area 1 has the second largest population of the fifteen areas identified in the profiles developed by the City of Houston. It is bounded by IH 610 on the north, Hardy Toll Road and Houston Belt and Terminal Railroad west to downtown and Highway 288 on the west, Holcombe, MacGregor and IH 610 on the south, and the city limits on the east. Major rail lines include the Houston Belt and Terminal, Southern Pacific, and Mission Pacific railroads. Major roads are IH 610, IH 10, US 59, IH 45, SH 288, and SH 225. These freeways cut through the core of areas inhabited by a diverse mixture of inner city residents.

PSU Area 1 comprises 42 square miles or 26,608 acres. Major environmental features within the boundaries of our Primary Sampling Unit 1 are Buffalo and Brays Bayous. In addition to having the largest percentage of industrial land use in the city, the area has some distinctive regional features consisting of the Ship Channel/Port of Houston, Texas Southern University, University of Houston, and Englewood rail yards.

Table 1
Demographic Characteristics, Study Area 1, 1990

Demographic Characteristics, 1990	Percent Study Area 5	Percent (PSU Area 1) Houston
Population	171,738	1,637,650
Percent of Total	10	100
Percent Change, 1980-1990	16	2
Number of Households	52,702	617,229
Persons per Household	3.2	2.6
Households		
Married with Children	25	23
Married without Children	15	21
Single Person Living Alone	24	31
Female Parent with Children	15	10
Other	21	15
Ethnicity		
White	8	41
Hispanic	56	28
Black	35	27
Asian	1	4
Other	0	0
Sex		
Male	50.1	49.6
Female	49.9	50.4
Age		
17 & Under	32	27
18-64	58	65
65 & Above	11	8

Source: U. S. Dept. of Commerce, Bureau of the Census, 1990

and other group homes (875). Because of these population segments, the male to female ratio is 3 to 1 and over 80 percent of the population is in the working age group, consisting of persons 18-64 years. Yet, the CBD is a major urban activity center with major employers located there.

Jail inmates and others in group homes were excluded from household data and the survey. This was necessary in order to ensure the true character of the area and to eliminate biases in the survey sample. To this end, less than one percent of Houston's families and households live in this study area. Yet, substantial traffic congestion occurs in the city's core during peak hours. This congestion can be attributed to the ebb and flow of public transportation modes that circulate people in the downtown area and the Park and Ride buses used to transport suburban residents to and from work in the Central Business District (CBD).

The second study area selected for the study has the largest percentage of commercial and office land uses. PSU Area 2 comprises four square miles or about 2,351 acres. Houston's downtown encompasses PSU Area 2. This PSU has the smallest population (11,792) and the smallest number of residential housing units. The area was chosen because the Central Business District (CBD) serves as one of the major hubs for the public transportation network. Data for this area are different from other study areas, because over 50 percent of the population is in the Harris County jail (6,003),

Table 2
Demographic Characteristics, Study Area 2, 1990

Demographic Characteristics, 1990	Percent Study Area 11	Percent (PSU Area 2) Houston
Population	11,796	1,631,650
Percent of Total	0	100
Percent Change, 1980-1990	1	2
Number of Households	2,135	617,229
Persons per Household	2.3	2.6
Households		
Married with Children	11	23
Married without Children	10	21
Single Person Living Alone	48	31
Female Parent with Children	10	10
Other	21	15
Ethnicity		
White	24	41
Hispanic	24	28
Black	49	27
Asian	2	4
Other	0	0
Sex		
Male	68.5	49.6
Female	31.5	50.4
Age		
17 & Under	12	27
18-64	81	65
65 & Above	6	8

Source: U. S. Dept. of Commerce, Bureau of the Census, 1990

PSU Area 2 also has the second highest amount of single persons living alone (48 percent); while PSU Area 1 has less than one percent (0.5%) This high percentage of single households keep persons per household down to 2.3. Tables 1 and 2 show the demographic characteristics of the study areas that comprise the Primary Sampling Units (PSUs) for the study.

Survey Instrument and Data Collection Procedure

An interview schedule was developed for use in the survey of inner city residents. Data were collected from a random sample of residents living in the Primary Sampling Units (PSU's). Respondents were selected from census tracts in the Houston metropolitan area. All census tracts comprising the two areas were not used. The random selection from among the universe of tracts included in PSU Area 1 and PSU Area 2 were: 300.24, 304.01, 304.02, 305.01, 305.02, 306, 307.01, 307.02, 308, 316.01, and 316.02.

The interview schedule was designed to elicit responses consistent with the following variables: respondents' origin, destination, home address, automobile ownership, household size, gender, age, race, household income, occupation, employment status, public transit availability/accessibility, and other transit-related information.

Additional data were obtained from surveys conducted by the Metropolitan Transit Authority of Harris County, the Houston-Galveston Area Council of Governments, and a study commissioned by METRO and conducted by Turner, Collie and Braden (1992) in cooperation with the West and North Houston Associations. These data were used to provide up-to-date information on two major suburban activity centers. Additional information was obtained from a survey of employees employed by companies/industries in suburban areas. This survey was divided into several parts: Current commuting habits from home-to-work; congestion on freeways, thoroughfares, intersections during the commute from home to work; and potential alternative commuting choices. The survey included 3,900 respondents who were employees at participating companies in suburban areas.

The sample for the survey of inner city residents consisted of 2,641 respondents. Interviews were conducted with those working within the central city; with those working in peripheral, and suburban areas.

II. Suburban Growth and Population Redistribution

This section of the report is designed to provide an economic profile of the metropolitan area, with the intent of providing a theoretical orientation to the demographic and employment dynamics that influenced the

direction of population growth and redistribution. Of particular significance is the attention devoted to interregional employment shifts, regional employment locations, public transit accessibility and corresponding public transportation needs.

Urban and Suburban Growth Trends

The redistribution of population in metropolitan areas has been, for the most part, a centrifugal drift. Both people and industries moved out to the peripheries to locate and develop new resources, to build residences and

Table 3
Comparison of Houston's Population With Major U.S. Cities, 1990

CITY	POPULATION	ACRES	PERSONS PER ACRE
Houston, TX	1,631,643	358,024	4.6
Baltimore, MD	736,014	55,711	13.2
Chicago, IL	2,783,726	149,805	18.6
Detroit, MI	1,027,974	89,344	11.5
Los Angeles, CA	3,485,000	290,240	12.0
New York, NY	7,322,564	205,952	35.6
Philadelphia, PA	1,585,577	86,160	18.4
Phoenix, AZ	983,403	273,771	3.6
San Diego, CA	1,110,549	217,600	5.1

Source: City of Houston's Planning and Development Department, 1990.

schools, and to provide transportation improvements to service outlying suburban areas. Suburban population increases have occurred at the periphery of Harris County while most central city areas have declined in numbers.

According to data from the U. S. Census, the City of Houston experienced a modest overall 2.2 percent population growth rate between 1980

and 1990. This rate translates to an increase in population of less than 36,000 persons during the last decade. This modest growth rate is in contrast to what occurred outside the central city. The Primary Metropolitan Statistical Area (PMSA) and Harris County experienced significant growth: 21 percent and 17

percent, respectively. The pattern of slow growth, or no growth, within city limits coupled with strong growth in surrounding unincorporated areas is not exclusive to Houston. It is a trend that is happening in many major

Table 4
Comparison Of Houston's Population With Major Texas Cities, 1990

CITY	POPULATION	ACRES	PERSONS PER ACRE
Houston, TX	1,631,643	358,024	4.6
Austin, TX	450,830	118,547	3.8
Dallas, TX	1,006,877	241,856	4.2
El Paso, TX	527,194	158,336	3.3
Fort Worth, TX	447,619	189,129	2.4
San Antonio, TX	935,933	216,128	4.3

Source: City of Houston's Planning and Development Department, 1990.

cities in the United States and, if it continues, it will have a significant impact on transportation planning and community development or redevelopment.

Tables 3 and 4 provide data on population growth for Houston in comparison with selected cities in Texas and the nation. With a population size of 1.6 million people in 1990, Houston's physical size makes it one of the least densely populated cities in the nation, even though it has the highest population density of major Texas cities. Table 3 provides a comparison of Houston's population density with other major cities in the United

States, and Table 4 provides a comparison of Houston's population density with other major cities in Texas.

Within the city limits, people moved away from the eastern, inner city areas to the edges of the city limits. Fringe areas showed the largest increases in population, while inner city areas to the south declined in population. Much of Houston's 2.2 percent population growth rate occurred outside the IH 610 Loop in the northeast, west, extreme southeast, and southwest as did growth in developed acreage.

The direction of growth moved outward in a regular progression during the last several decades. This process of population deconcentration in a relative sense, i. e., outlying areas growing more rapidly than central cities, induced spatial-specific disconnections and public transportation problems. In the study, *Access 2010*, conducted by the Houston-Galveston Area Council of Governments (November, 1989), historical and future trends in demographic growth and the location of that growth support the contention that there has been a dramatic tilt in population growth in the Primary Metropolitan Statistical Area.

The data indicate that Harris and the seven adjacent counties of Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery and Waller comprise the tenth largest urban center in the United States. The metropolitan

area incorporates approximately 8,000 square miles, contains almost 3.6 million people and employs 1.7 million workers.

Table 5
County: Population And Employment

POPULATION			
	1980	1985	2010
Harris	2,409,544	2,723,888	3,717,000
Brazoria	169,587	188,953	300,000
Chambers	18,538	19,003	33,000
Fort Bend	130,846	187,855	356,000
Galveston	195,940	215,386	305,000
Liberty	47,088	62,392	95,000
Montgomery	128,487	164,941	317,000
Waller	19,798	23,757	45,000
TOTAL	3,119,828	3,586,175	5,168,000

EMPLOYMENT			
	1980	1985	2010
Harris	1,360,746	1,495,580	2,105,000
Brazoria	63,382	63,229	95,000
Chambers	6,695	7,134	12,000
Fort Bend	34,284	40,568	96,000
Galveston	68,069	74,033	92,000
Liberty	12,357	12,733	24,000
Montgomery	24,072	37,972	89,000
Waller	4,962	6,469	12,000
TOTAL	1,574,567	1,737,776	2,525,000

Source: HGAC (1992).

Redistribution of Employment Industries

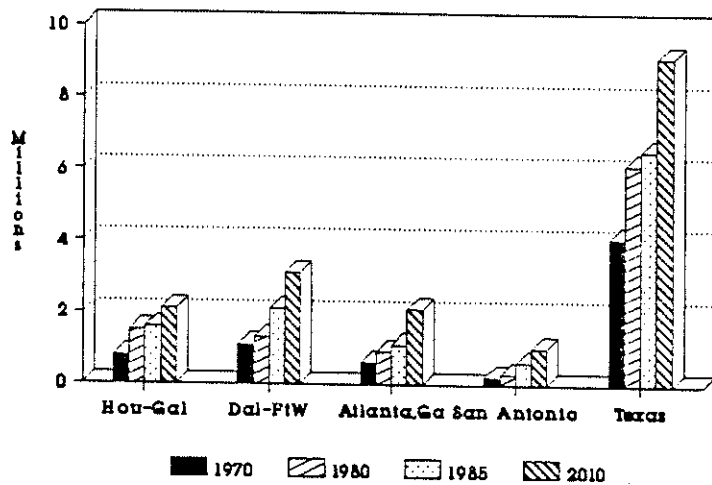
During the last twenty years, area business establishments have created more employment outside the IH 610 Loop and in Houston's Extra-Territorial Jurisdiction (ETJ). At the same time, according to a report by the Planning and Development Department, City of Houston (1992), the regional labor force has grown and diversified, adding women and minorities as an increasing percentage of its workers.

Table 5 reveals the county level totals of population and employment

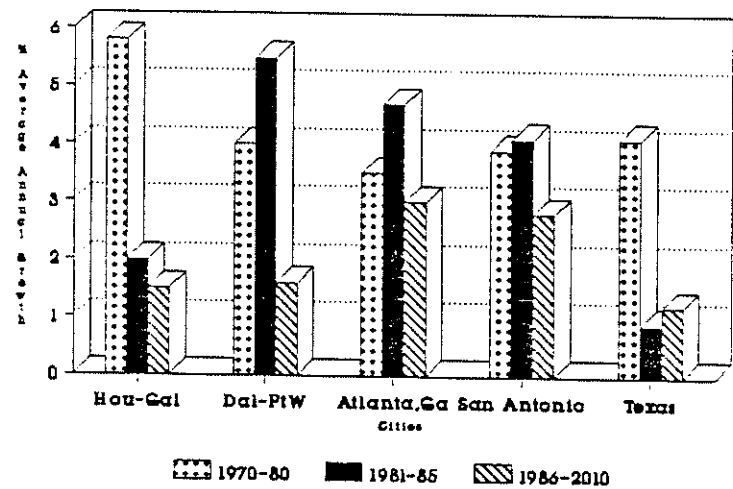
Employment Comparisons (1970-2010)

Figure 1

Employment Growth (in millions)

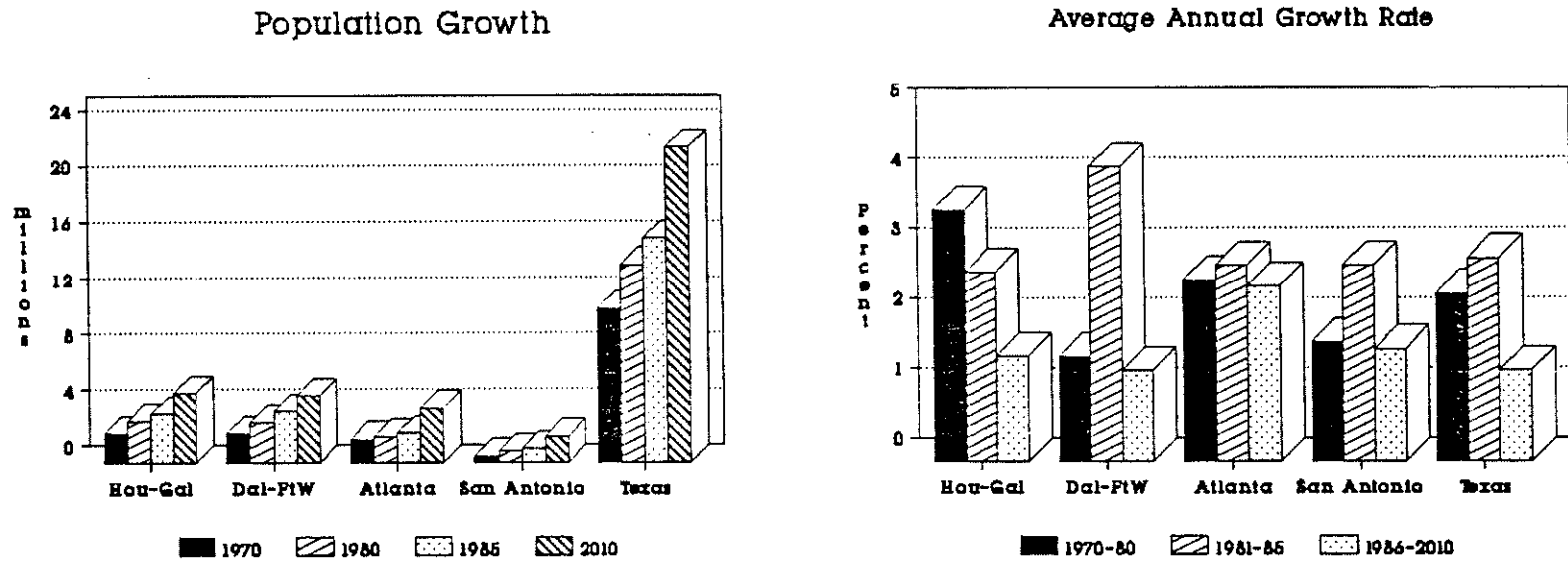


Employment Growth Rate



Population Growth Comparisons (1970-2010)

Figure 2



Source: Houston Galveston Area Council

for 1980, 1985, and 2010. These forecasts and economic trends were developed by HGAC (1992). Figures 1 and 2 show a comparison of growth trends in employment and population for Houston and several comparable metropolitan areas. The data clearly reveal that despite the economic downturn of the mid 1980's, employment and population are expected to more than double in the 40-year span from 1970 to 2010. It has been predicted that the Houston-Galveston region should have over 5 million people and 2.5 million jobs by the year 2010.

The annual growth rates in population and employment for the Houston area between 1970 and 1980 far exceeded other major metropolitan areas in Texas. Between 1980 and 1985, for example, the loss of the oil industry jobs is clearly reflected in the decline of both the eight-county area comprising the PMSA and the population of Texas. It is further projected that the rate of economic and demographic growth in the Houston area has and will continue to exceed that of Texas as a whole.

Facilitated by the out-migration of the population, industrial relocations have spilled over central city boundaries. The spill-over effects have occurred with increasing frequency, scattering to adjacent suburbs. The outward movement of old industries combined with new industries who have elected to locate in suburban areas created spatial-specific mismatches.

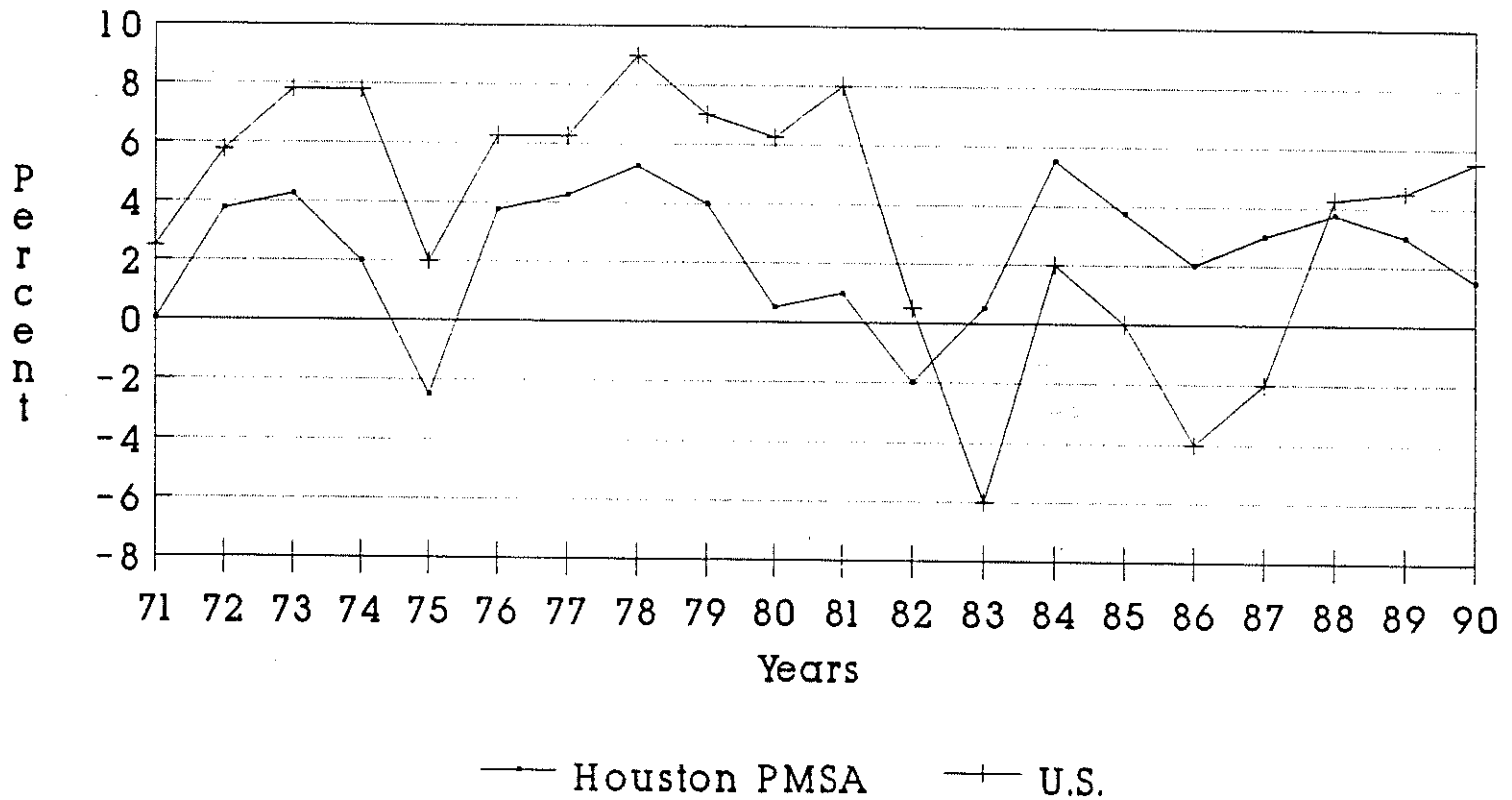
Data contained in the *Houston Sourcebook* indicate that the top 50 employers in Harris County for the first quarter of 1990 may be categorized as: Schools, Health Care, Retail, Computers, Petroleum-related and Miscellaneous services. These employers are located throughout the city, with the highest concentration found in the Texas Medical Center. At least four of these major employers are located in Houston's Extra Territorial Jurisdiction (ETJ). Between 1980 and 1988, the number of jobs inside IH 610 decreased by 10 percent, while the number of jobs outside IH Loop 610 but within Harris County increased by 22 percent. The greatest increase was 73 percent in northwest Harris County.

Suburban growth trends accompanied by employment relocation have created an economic dilemma for central city dwellers. Blake (1990) observed that "two fundamental yet conflicting transformations pervade the recent history and near-term prospects of older, larger cities. The first is functional. As these cities change from centers of production and distribution to centers of administration, information-exchange, and high-order service provisions," disconnections emerge. These disconnections are reflected in the lack of skill adaptation or appropriate training of central city residents in need of employment the most. Blake's study of "Inner City Minority Transit Needs in Accessing Suburban Employment Centers" also reveals that the second transformation is demographic. As the resident populations change from predominantly non-Hispanic White to predominantly Black, Hispanic and other minorities, these segments of the population are placed at a structural disadvantage in cities losing blue-collar and other entry level jobs (Blake, 1990: 5-6).

Accompanying the functional transformation of cities have been changes in both the composition and size

Annual Percent Change in Payroll Employment 1971-1990

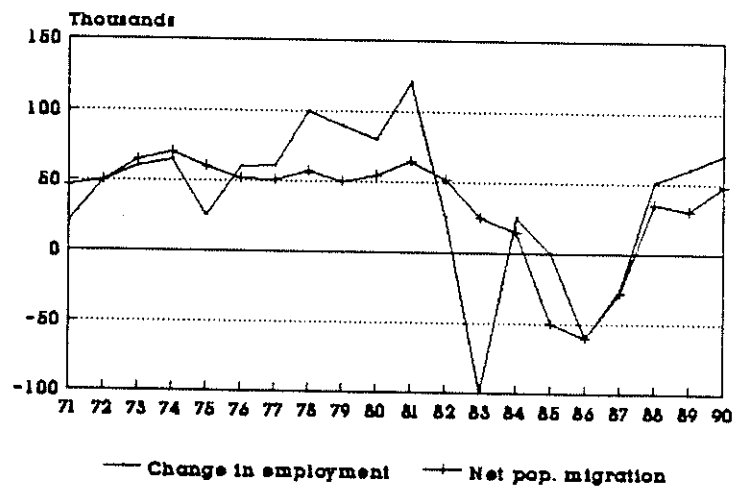
Figure 3



Source: Greater Houston Partnership
U.S. Dept. of Labor
Bureau of the Labor Statistics

Figure 4-A

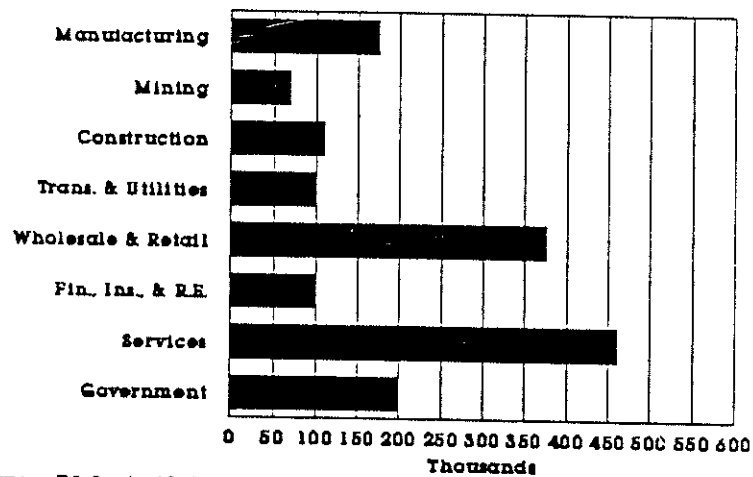
Annual Change In Employment
and Net Migration, 1971-90



Source: Greater Houston Partnership

Figure 4-B

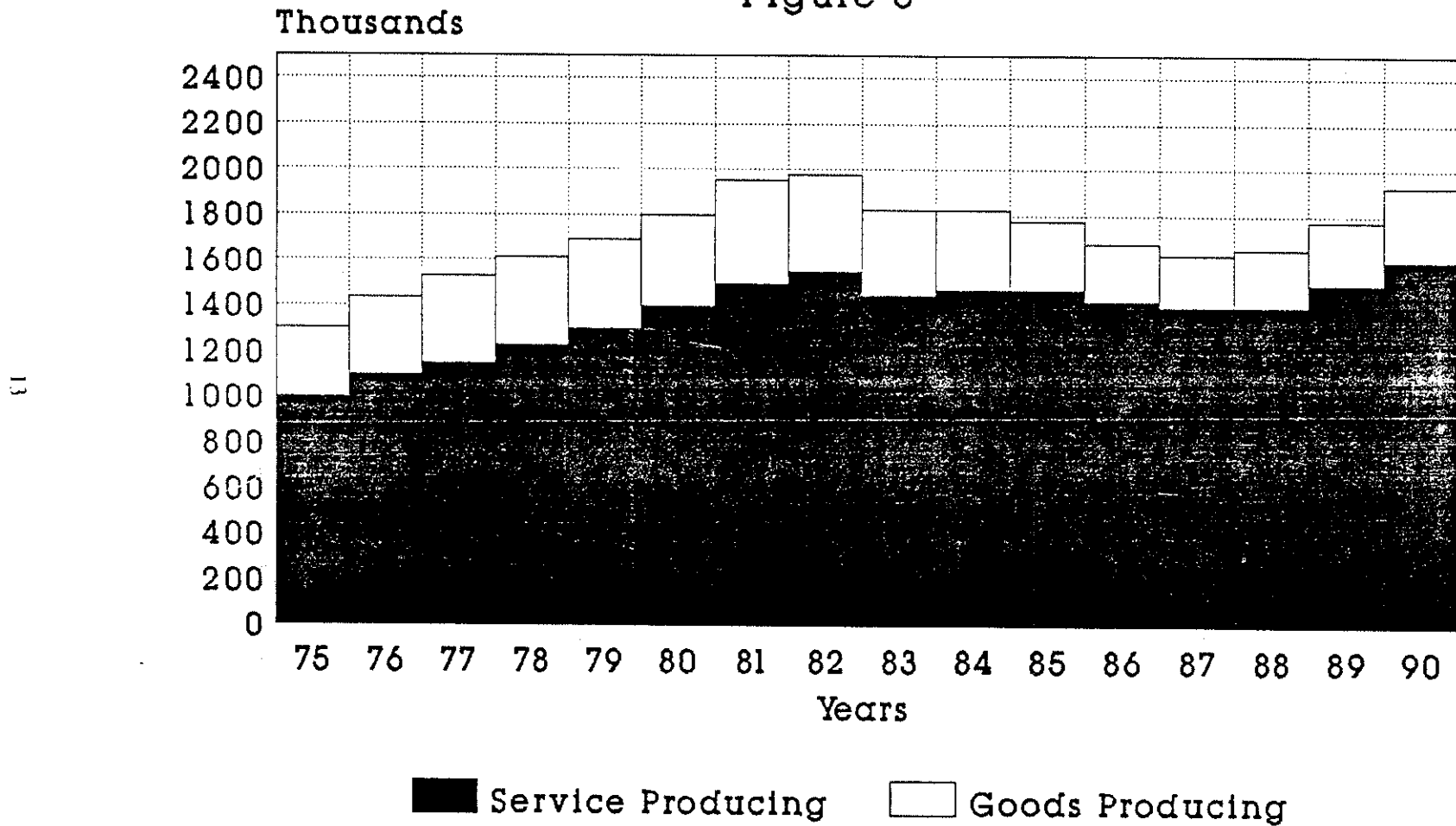
Employment by Industry
Houston PMSA, 1990



Source: U.S. Dept. of Labor
Bureau of Labor Statistics

Service vs. Goods-Producing Employment, Houston, 1975-1990

Figure 5



Source: Texas Employment Commission

of overall employment bases. An examination of Houston's job market reveals a similar trend. Employment is measured in terms of non-farm payroll employment, which excludes self-employed persons, proprietors and farmers. During the decade between 1970 and 1980 Houston's economy experienced large cyclical fluctuations in employment, as shown in Figures 3, 4A and 4B. Between 1975 and 1981, the Primary Metropolitan Statistical Area's (PMSA) employment growth of 53 percent was about three times the rate of the nation with approximately 18 percent. With the advent of the recession in the early 1980s, employment declined 6.2 percent during 1982 and 1983, compared to a national decline of 1.8 percent between 1981 and 1982.

Regional redistribution of employment opportunities also occurred during the last several decades. During the boom years of 1975 through 1982, employment grew rapidly in both the goods-producing (Mining, Construction, Manufacturing) and service-producing sectors (Services, Government, Transportation, Wholesale and Retail Trade, and Finance), as noted in Table 6. Between 1982 and 1990, however, goods-producing jobs declined by 27 percent, while employment in the service-producing sector rose by

Table 6
Employment By Industry, Houston PMSA
Non-agricultural Payroll (measured in 000's)

Industry	1982 Employment	1982% of Total	1990 Employment	1990 % of Total
Goods-producing	482.2	31	352	22
Manufacturing	230.0	15	173.9	11
Mining	109.6	7	68.4	4
Construction	142.6	9	109.7	7
Service-producing	1059.3	69	1244.5	78
Transportation & Utilities	108.7	7	109.6	7
Wholesale & Retail Trade	374.1	24	373.2	23
Finance, Insurance, Real Est.	99.0	6	102.3	6
Services	312.0	20	452.7	28
Government	165.5	11	206.7	13
Total	1,541.5	100	1596.5	100

Source: Texas Employment Commission

17 percent. As a result, the goods-producing share of total employment fell to 22 percent in 1990 from 31 percent in 1982. Figure 5 compares service-producing and goods-producing employment from 1975 to 1990.

Broader Disconnections

Shifts in employment opportunities from central cities to suburban areas and the corresponding decline in blue-collar and entry-level positions have given rise to "the great divide" between urban and suburban residents. It is a division according to race and ethnicity when the proportionate representation of Blacks and other minorities in urban areas is compared with their White counterparts. It is a division by class when the incomes of various groups living in urban and suburban areas are compared, and when poverty rate averages are noted. "The great divide" is clearly manifested in the extent to which certain segments of society have been disconnected from economic and employment opportunities.

These disconnections have been manifested in several ways. In a physical sense, certain groups have been disconnected from work. They may not live where there are sufficient jobs. That problem could be solved by providing public transit to transport them from the central city to suburban areas where the jobs are located.

Other kinds of disconnections are more problematic. Large numbers of central city workers, particularly minorities, are trapped in jobs that offer low pay, minimal or no fringe benefits and little chance for advancement. Solutions to these problems are more complicated, and require coordinated approaches and strategies. They may range from building bridges between entry-level jobs, educational institutions, and public and private sector partnerships. If employed, these strategies and approaches must be complemented by broader economic development policies.

The aforementioned information is designed to provide insight into the regional redistribution of employment opportunities and the differential socioeconomic impact of this outward movement on selected groups living in the central city. The next section of this report will analyze findings pertaining to demographic growth factors, employment needs, residential location, public transit accessibility and availability.

III. Major Findings of the Study

This section provides major findings on data collected from a series of surveys designed to examine issues pertaining to suburban employment and public transit accessibility. Relevant information on demographic characteristics of the survey population, economic demand and population growth patterns in the Primary Metropolitan Statistical Area (PMSA) which includes Harris County, North and West Houston, and related data are analyzed. Selected comparisons are made with other PMSA's, where appropriate.

Demographic Growth Factors

During the past two decades, Houston's workforce has become increasingly diverse. Women's share of the labor force grew to 44 percent in 1990 from 37 percent in 1970. In addition, changes in the racial and ethnic composition of the workforce reflected rapid growth in the minority population. Blacks and other ethnic groups increased to 23 percent of the labor force in 1990 from 21 percent in 1970 of the region's workforce. Hispanics increased to

Table 7

The Percentage Distribution Of The Population For Houston, By Ethnicity, 1980 and 1990

ETHNICITY	Percent of Totals	
	1980	1990
White	52.0	41.0
Black	27.0	27.0
Hispanic	18.0	28.0
Asian	2.0	4.0
Other	1.0	0.0

20 percent of the PMSA's workforce in 1990 compared to about 9 percent in 1970. Table 7 shows the distribution of the population by ethnicity for Houston. As indicated in Table 7, the Black population has

POPULATION ESTIMATES

Percent Increase by County

Figure 6-A

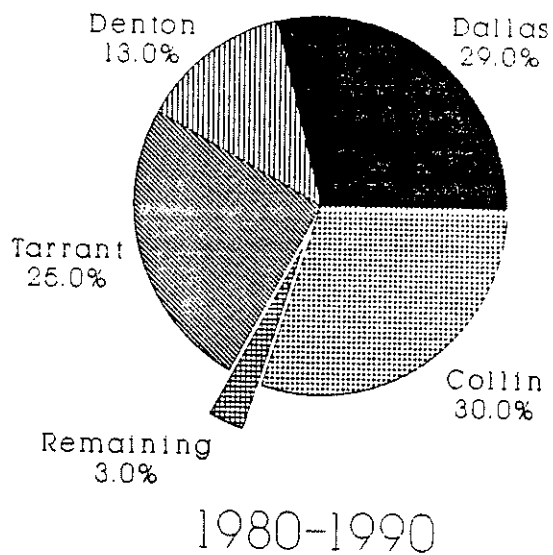
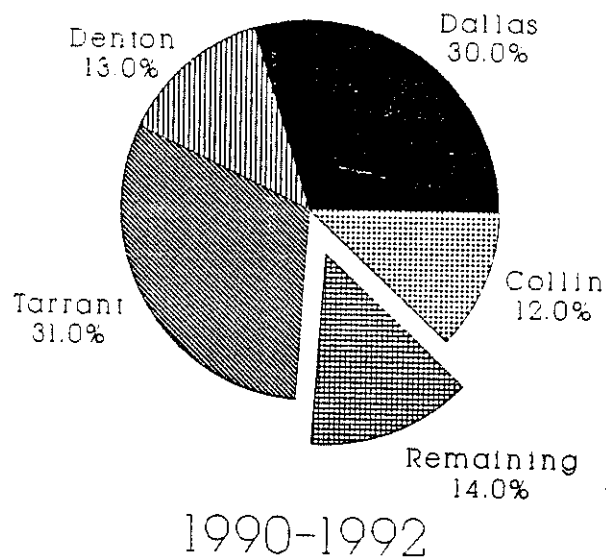
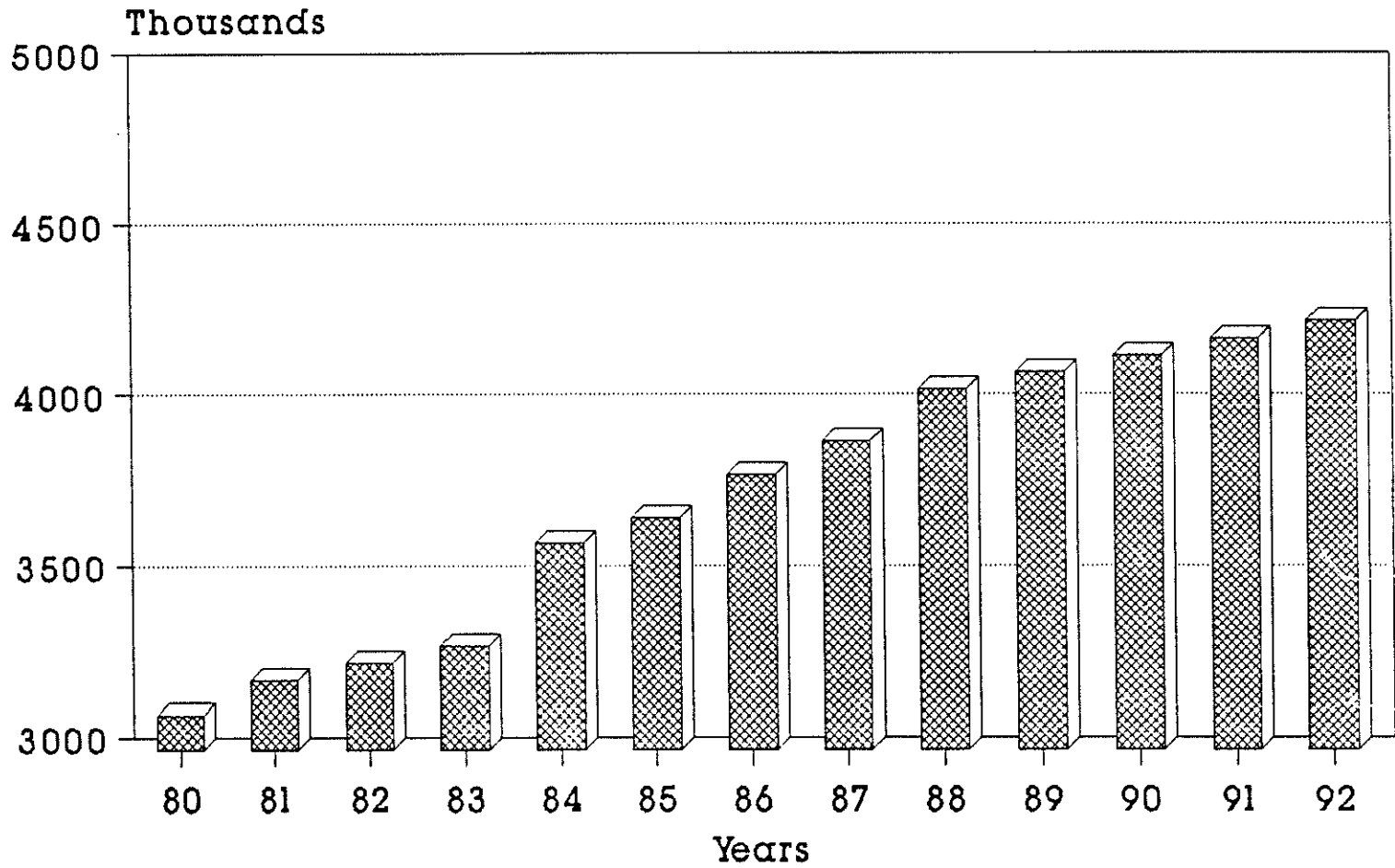


Figure 6-B



Population of NCTCOG Region (1980-1992)

Figure 7



remained relatively constant during the decade, 1980-1990; while the Hispanic population increased and the White population decreased considerably.

To further illustrate shifts in the location of the population, Table 8 compares the population distribution by ethnicity for North Houston, a major activity center included in the study and compares it with two Primary Sampling Units (PSU's) used in the survey. These data indicate that Houston has become a multi-ethnic and multi-cultural city. There is clear evidence to indicate that there were significant increases in the Hispanic and

the Asian population, a steady growth in the Black population, and a net loss in the White population. As a result, nonwhite groups represent an estimated 59 percent of Houston's population. When population representation is compared with suburban population growth, the data indicate Whites comprise the greater percentage, where 90.9 percent of the population in North Houston is White.

Table 8
Comparative Data On Selected Demographic Characteristics For A Selected Suburban Area And Primary Sampling Units (PSUs) For Study

ETHNICITY	PSUs		% Study Area #2
	% North Houston	% Study Area 1	
White	90.9	43.0	24
Black	5.2	29.0	49
Hispanic	9.5	25.0	24
Other	3.5	2.0	2

In a continuing analysis of suburban population and employment growth, the data indicate that population growth in the North Central Texas Region follows a similar trend as that for the Houston-Galveston Region.

Regional population growth reached 4,183,799 persons during the decade between 1980 and 1990. Population in the region grew by over 71,000 persons. Over half of the growth occurred in Tarrant County and Collin County. Dallas County grew by 9,210 persons while Denton County grew by 5,972. Table 9 shows the top ten cities showing the largest growth increase in 1991 for the North Central Texas Region which includes the Dallas-Fort Worth area. Figures 6 and 7 illustrate the percentage increase in population by county and for the entire region.

These data reveal that significant growth occurred in suburban rings around central cities in regions of Texas. Within Harris County, population and employment continue to increase in the outer sectors. The Far Southwest sector, with a forecasted population growth rate of 3.7 percent per year, and the Far Southwest sector, with a forecasted growth rate of 3.3 percent per year, will continue to account for very strong gains in population. The characteristic make-up of the growth will continue to be selective also.

The Central Business District (CBD) and other business establishments inside the IH 610 Loop of Houston, where transit dependent groups and minority groups reside, are areas where a smaller share of county employment can be found. Economic predictions suggest that the CBD and areas within Loop 610 are forecasted to have a combined net increase of an estimated 200,000 jobs in 25 years from 1985 to 2010. The

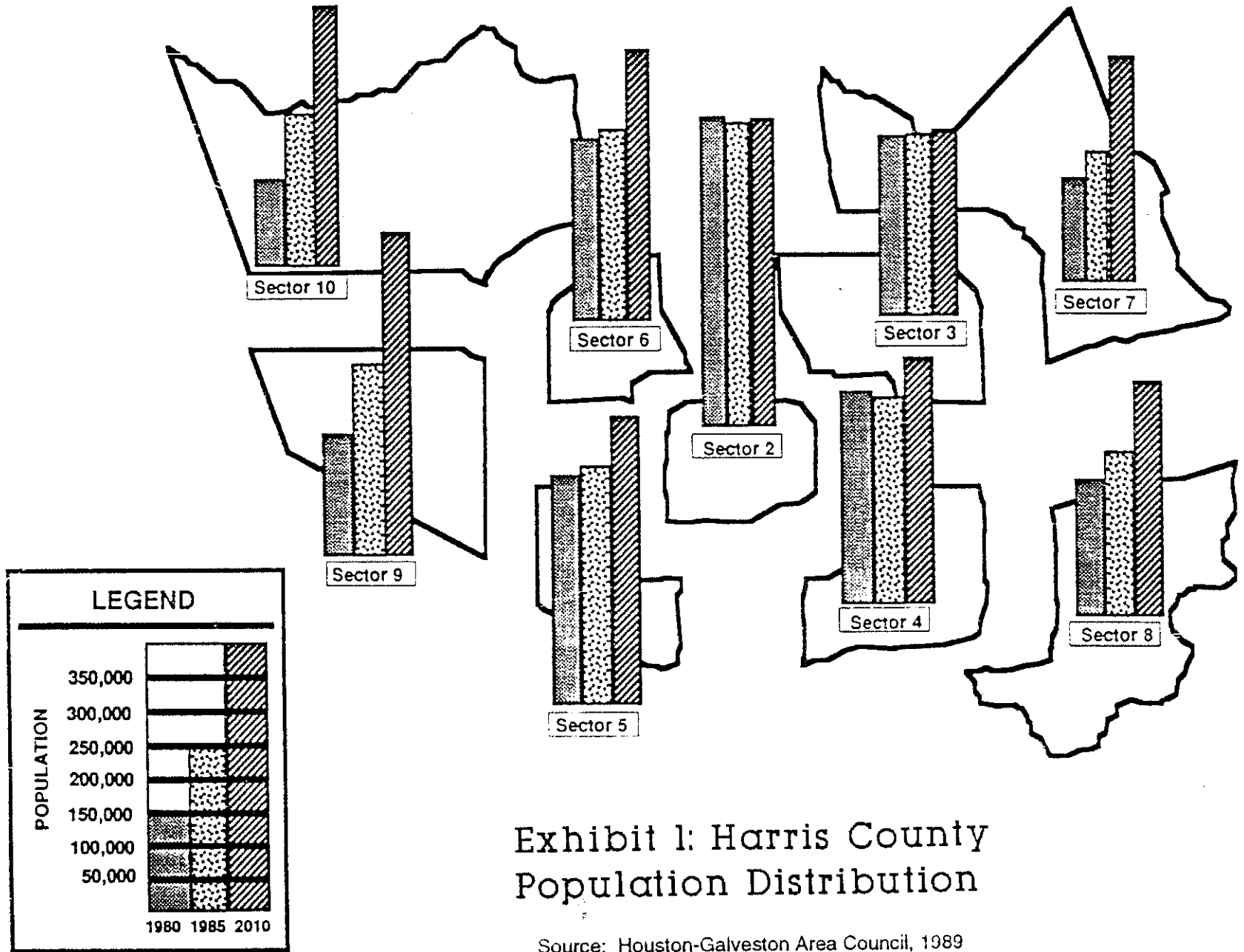


Exhibit 1: Harris County Population Distribution

Source: Houston-Galveston Area Council, 1989

Far Southwest and Far Northwest sectors of Harris County are forecasted to double in the number of jobs for the same period (See: Exhibits 1 and 2).

The projected growth patterns for population and employment will continue to contribute to a polycentric urban form that will more likely be comprised of many concentrations of activities throughout the Primary Metropolitan Statistical Area of the Gulf Coast region. As a result, the Central Business District (CBD) will continue to be one of many major activity centers that must be served by public transportation.

Access to suburban employment opportunities is made more complicated by virtue of the widely dispersed travel patterns found outside the CBD. The CBD is one of several important destinations in the region. To deal with the kind of spatial dispersion evolving from land use patterns in the region is a major challenge to public transit agencies with the responsibility for providing public transit access to suburban employment opportunities.

Another indicator of the movement of the population to outlying areas is growth in school enrollment. Suburban school districts experienced growth in enrollment during the 1984-85 school year through 1990-91. The Cypress Fairbanks Independent School District increased 27.5 percent; Aldine ISD increased 26.1 percent, while the Houston Independent School District reported a minimal increase of less than one percent growth.

Individuals caught in the tide of the urban or suburban transition represent a peculiar composite of what Kain (1969: 111) referred to as the "economics of discrimination." The factors which contribute to the secondary pool of the labor market include: the economic condition of minorities with limited education and skills; labor market discrimination; housing market discrimination; attitudes; power politics and policy alternatives. These factors are interrelated.

To explore the problem addressed in this research further, answers were sought to several questions: What employment opportunities are available in suburban areas? Are there blockages to regional mobility and employment?

Suburban Employment Demand

To determine employment demand in two major suburban activity centers, data were obtained from surveys of respondents residing in Houston's central city and inside the IH 610 Loop. The Primary Sampling Units for the survey were described in the section on "Data Collection Procedure." Secondary data sources included information collected by surveys conducted by the North Houston Association and the West Houston Association in cooperation with the Houston Metropolitan Transit Authority of Harris County. Comparative data on employment demand were obtained from a survey conducted by the Regional Data Center of the North Central Texas Council of Governments (1992). Telephone surveys were used to identify possible major employers in the regions. Other sources used were: U. S. Department of Commerce, *The Dallas Business*

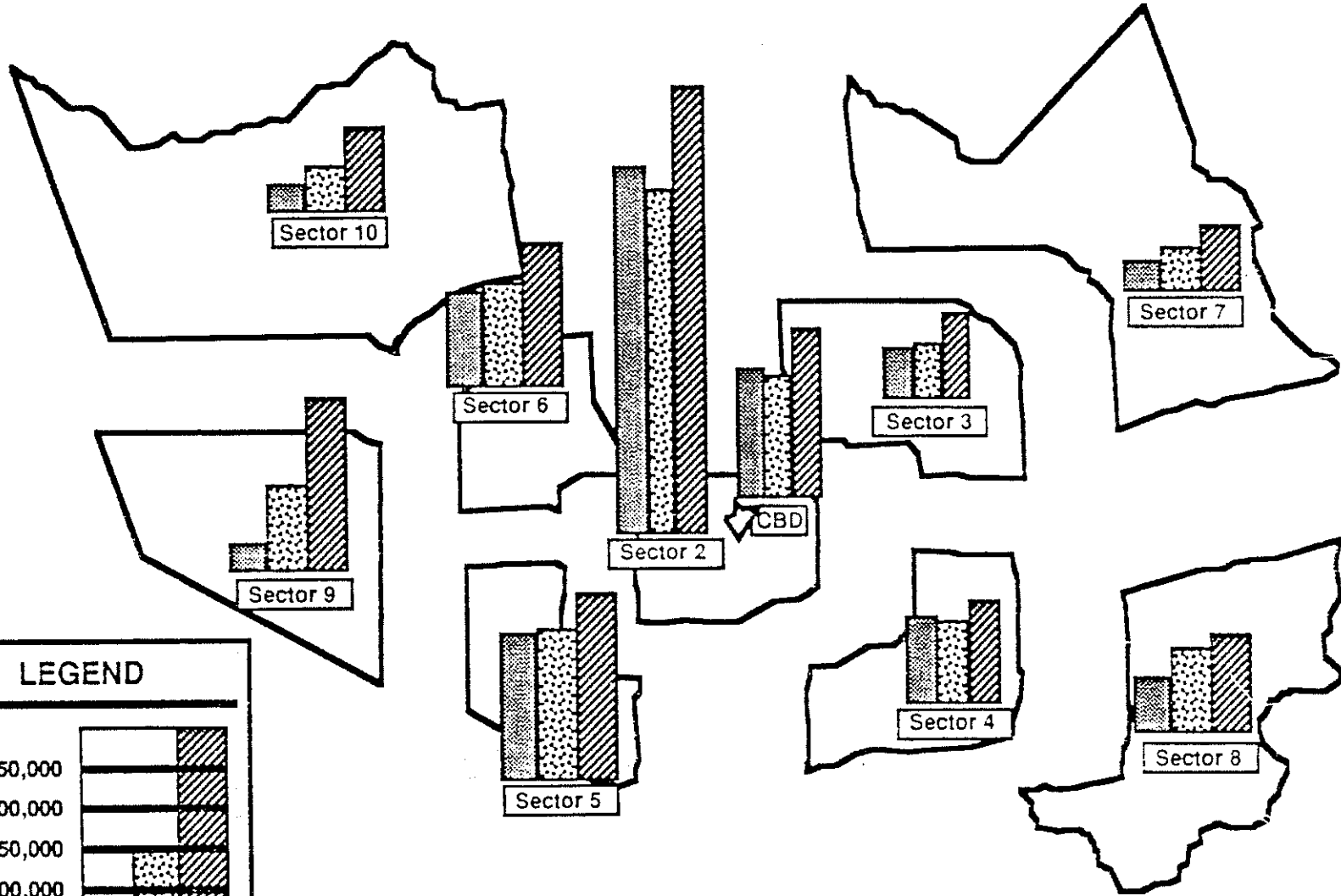
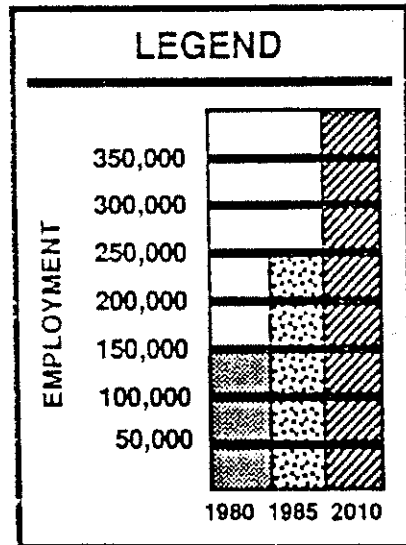


Exhibit 2: Harris County Employment Distribution

Source: Houston-Galveston Area Council, 1989

Table 9-A

Top Ten Cities Showing Largest Growth Increase in North Central Texas, 1991	
Plano	5,345
Irving	3,646
Arlington	2,015
Dallas	2,102
Flower Mound	1,685
Carrollton	1,651
Mesquite	1,618
Allen	1,587
Rowlett	1,426
Lewisville	1,358

Source: North Central Texas Council of Governments

Journal; traffic survey zone studies in the region; and selected studies on the Houston-Galveston region by the Comprehensive Planning and Development Department for the City of Houston, 1992.

Data from these sources reveal that urban and suburban development patterns in Texas cities are characterized by a high degree of spatial dispersion. Regional comparisons of major employer industries in the metropolitan areas of Houston and Dallas were made.

A regional comparison of employment demand and population growth suggests that the continued suburbanization of jobs in the

absence of a viable regional public transportation system has created an imbalance in the number of jobs available to residents

in the central city.

This imbalance is

rendered more seri-

ous when there is lim-

ited access to jobs

found in suburban

areas. A survey by

the North Central

Texas Council of

Governments pro-

duced relatively de-

tailed data on local

establishments em-

ploying 400 or more full- and part-time workers at specific locations within the nine county metropolitan North

Central Texas region.

Table 9-B

City of Dallas Top Ten Major Employer Industries

Rank	Industry Group	SIC	Employment	Establishments
1	Health Services	80	26,380	15
2	Electronic/Electrical Equipment	36	19,325	5
3	Government-General	90	14,978	8
4	Depository Institutions	60	11,602	8
5	Transportation Equipment	37	9,850	1
6	Oil and Gas Extraction	13	9,100	9
7	Educational Services	82	7,750	4
8	General Merchandise Stores	53	7,710	7
9	U. S. Postal Services	43	7,363	2
10	Communications	48	5,240	4

Source: North Central Texas Council of Governments

The findings of the study indicate that the 322 major employment establishments in the Dallas-Fort Worth region account for 432,925 employees. This represents 22.1 percent of the total regional employment of 1,962,152 derived from Bureau of Labor Statistics (BLS) data. Among the major employers, 291,203 persons are employed in businesses or entities which represent major employers of the top ten industry groups, their Standard Industrial Classification Code, the regional employment numbers for these industry groups, and the number of major employer 's workers, and the percentage captured are listed in Table 9A and 9B.

The industry groups represent the diverse economic make-up of the Dallas-Fort Worth area. The largest industry group, Transportation Equipment, employs only 12.3 percent of the workers among the 322 establishments. At the regional level this diversity is greater, with the total number employed in SIC 37 accounting for less than 2.7 percent of metropolitan employment. Many of the top ten industries represent enterprises that have dominated the local economy for decades while others, such as Health Services and Transportation by Air, are becoming recognized as major players due to the impact they now have on the economy of the North Central Texas region. Tables 10-12 provide a breakdown on the top ten cities for major employers and the number of establishments found in each city. These tables also reflect the employment concentration or dispersion levels by industry group which will impact the region's socioeconomic structure in such areas as land use, transportation, and income distribution.

Table 10
City of Fort Worth Top Ten Major Employer Industries

Rank	Industry Group	SIC	Employment	Number of Establishments
1	Transportation Equipment	37	22,488	4
2	Transportation By Air	45	14,801	4
3	Government-General	90	14,753	5
4	Health Services	80	12,882	9
5	Food and Kindred Products	20	4,370	6
6	U.S. Postal Services	43	3,421	1
7	Educational Services	82	3,182	3
8	Electronic/Electrical Equipment	36	2,800	2
9	Chemicals and Allied Products	28	2,100	1
10	Railroad Transportation	40	1,600	2

Table 11
Top Ten Cities For Major Employers

Rank	City	Employment	Number Of Establishments
1	Dallas	164,308	123
2	Fort Worth	93,605	53
3	Irving	29,046	29
4	Richardson	20,960	16
5	Dallas/Fort Worth Airport	16,769	8
6	Arlington	15,200	12
7	Plano	14,714	9
8	Denton	10,534	6
9	Garland	10,182	10
10	Farmers Branch	8,804	11

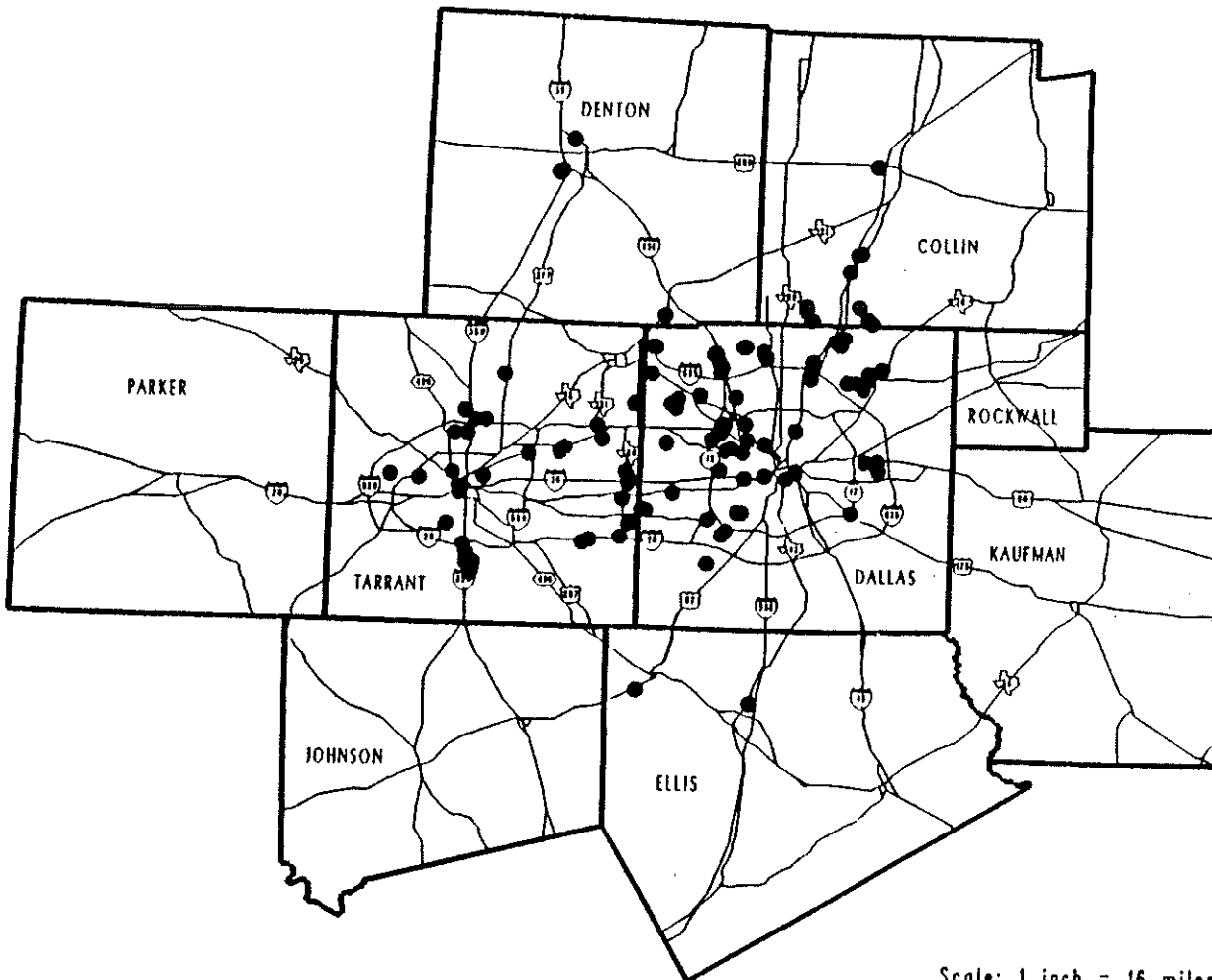
Source: North Central Texas Council of Governments

Map 1

Dallas/Fort Worth CMSA

Major Employers

Industrial Establishments




Industrial Establishments:
 Manufacturing
 Warehouse
 Distribution



Scale: 1 inch = 16 miles

* Major Employers include all establishments of 400 or more workers.
 1:100,000 USGS DLG Data
 Major Employers of North Central Texas
 Map compiled by the North Central Texas Council of Governments, 1992.
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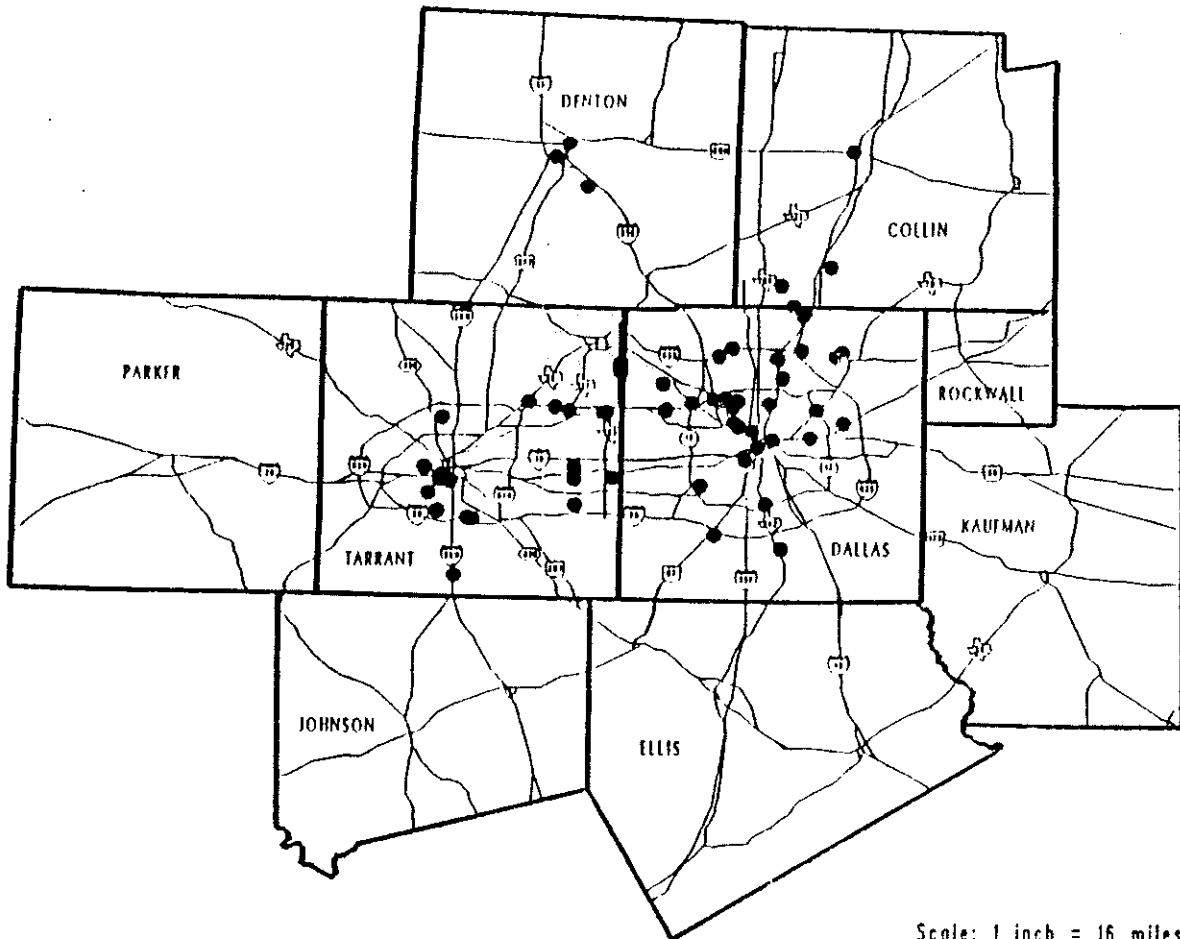
North Central Texas Council of Governments

 Regional Data Center
 (817) 640-3300

Map 2

Dallas/Fort Worth CMSA

Major Employers

Institutional Establishments



Institutional Establishments:
 Education
 Hospital
 Airport Facilities



Scale: 1 inch = 16 miles

* Major Employers include all establishments of 400 or more workers.
 1:100,000 USGS DLG Data
 Major Employers of North Central Texas
 Map compiled by the North Central Texas Council of Governments, 1992.
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North Central Texas Council of Governments



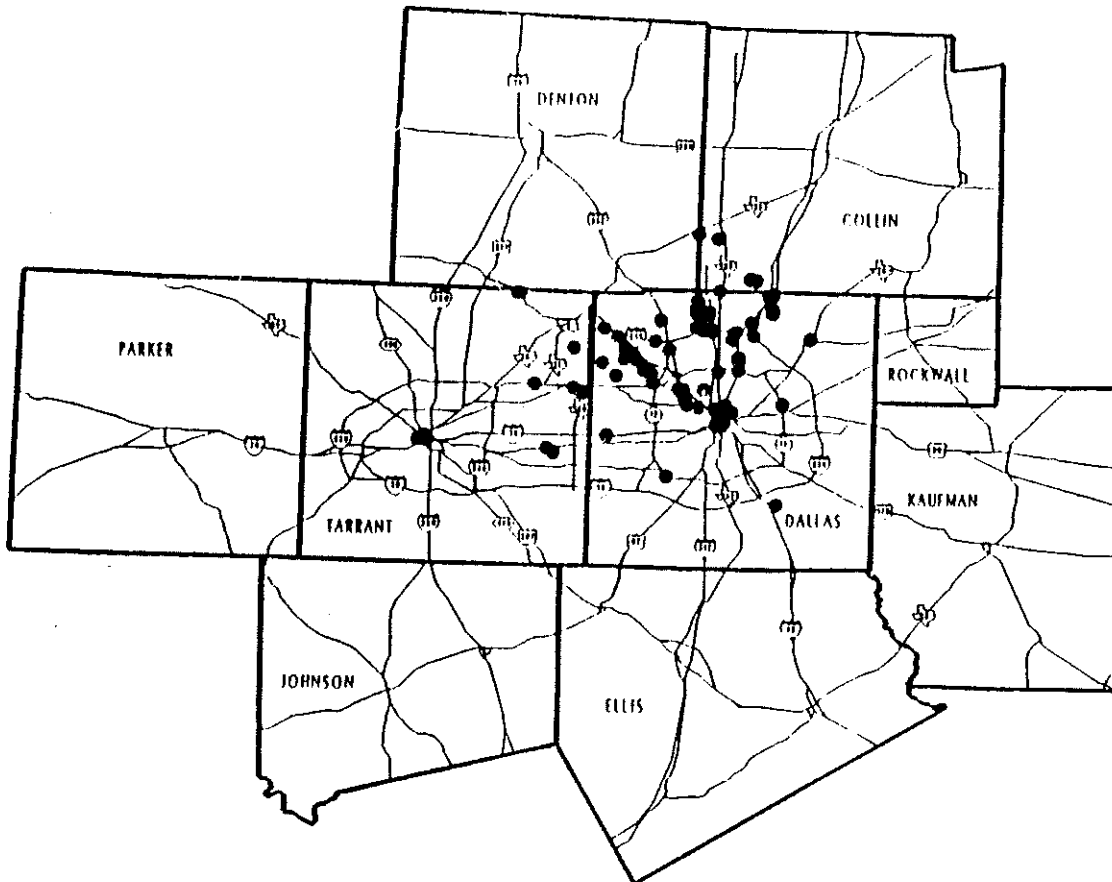
Regional Data Center
 (817) 640-3300

Map 3

Dallas/Fort Worth CMSA

Major Employers

Office Establishments



Scale: 1 inch = 16 miles

* Major Employers include all establishments of 400 or more workers.
 1:100,000 USGS DIG Data
Major Employers of North Central Texas
 Map compiled by the North Central Texas Council of Governments, 1992.
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Regional Data Center
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Table 12
Top Ten Major Employer Industries
and Regional Comparisons

Industry Group	SIC	Regional Employment	Major Employers Workers	Percentage Captured
Transportation Equipment	37	68,868	53,048	77.0
Electrical/Electronic Machinery	36	74,618	49,269	66.0
Health Services	80	129,631	47,906	37.0
Government - General *	90	90,140	32,838	36.4
Transportation By Air	45	43,560	31,978	73.4
Educational Services	82	134,472	31,391	23.3
Communications	48	30,033	15,706	52.3
Industrial/Commercial Machinery	35	32,546	14,377	44.2
Depository Institutions	60	21,452	14,102	65.7
Business Services	73	108,097	12,597	11.7

Source: North Central Texas Council of Governments

Among the North Central Texas region's cities, Dallas and Fort Worth dominate the economy as demonstrated by the number of workers employed within the city limits. Of the region's 322 major employers, 123 establishments employing 164,308 workers are located in Dallas while in Fort Worth there are 53 establishments employing 93,605.

By comparison, two of the largest Primary Metropolitan Statistical Areas (PMSA) in Texas reveal similar patterns and trends relative to spatial dispersion of the population and employment. Harris County and adjoining suburban areas continue to experience increases in employment and population while the Central Business District and businesses inside Loop 610 are forecasted to have a smaller share of county employment. Data from an employer survey show significant shifts in employment and population for the Houston-Galveston region and the North Central Texas region.

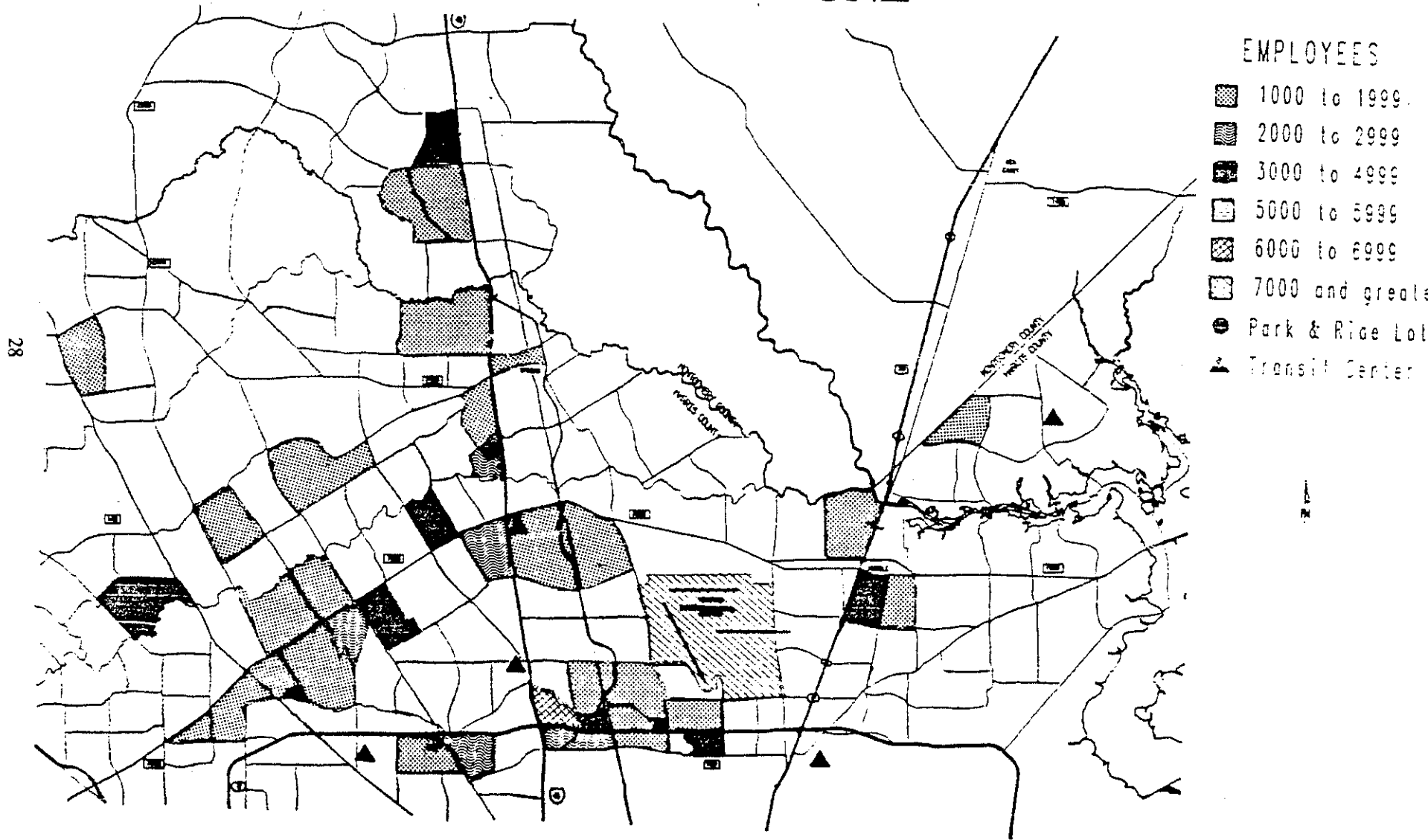
Even though the two largest metropolitan areas in Texas command a productive economic mix of industry groups, the distribution of major employers throughout the respective regions displays both concentration and specialization. In the North Central Texas region, major establishments tend to be concentrated in central and northern Dallas, the northern suburbs surrounding Dallas, the Mid-Cities, and Fort Worth. Missing are major employment centers in southern and eastern Dallas and in western Tarrant/eastern Parker counties. This distribution is displayed in the regional map of employers. Map 1 shows major industrial establishments in the Dallas/Fort Worth Consolidated Metropolitan Statistical Area (CMSA); while Map 2 and Map 3 reveal a distribution of major employers by institutional and office establishments.

Activity Centers and Employment

Activity centers serve as the focus for employment opportunities. As population growth becomes increasingly more dispersed, suburban areas have become major activity centers for retail, commercial, and shopping development. Major sports centers, recreational complexes and exposition areas located inside Loop 610 and in outer sectors of the city serve as major activity centers even if not on a regular, daily basis. Activity centers attract a variety of trips, ranging from work to shopping, to recreation. Map 4 and Map 5 show employment for North and West Houston by serial zone. The distribution of employment sites in Houston is reflected in Map 5-A.

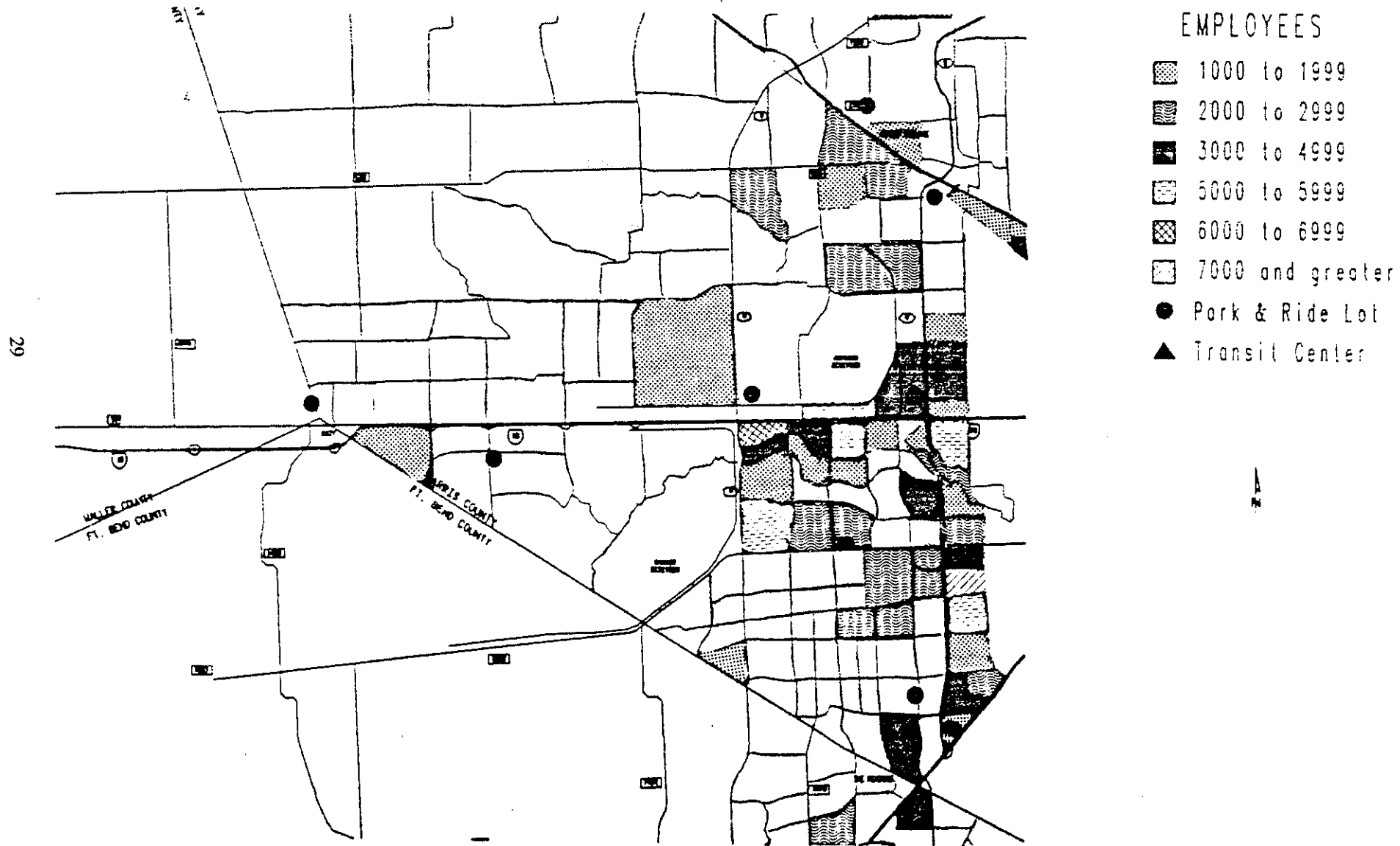
MAP 4

NORTH HOUSTON EMPLOYMENT BY SERIAL ZONE



MAP 5

WEST HOUSTON EMPLOYMENT BY SERIAL ZONE



Houston's major activity centers act as community "downtowns." These areas are mainly commercial/retail centers, although some are intense centers of office and public/institutional development. Dense commercial/retail developments characterize the land along much of Houston's extensive freeway system, particularly around the IH-610 Loop and nearby thoroughfares.

Suburban Houston is characterized by a low-density pattern of development and a collection of activity centers with major concentrations of employment and retail activity. These activity centers reflect the urbanized development and rapid growth that occurred in major sectors during the past several decades.

The location of employment opportunities for the Houston-Galveston area include the Central Business District (CBD), the Texas Medical Center, Greenway Plaza and Post Oak areas, which provided employment to thousands of people in the city. An estimated 200,000 people work in the CBD; about 60,000 in the Texas Medical Center area, with similar numbers in Greenway Plaza and Post Oak. Employment is expected to increase by 84 percent by 1995. Additionally, the Greenway Plaza area is experiencing relatively rapid growth in residential development. Also, a major sports complex, The Summit, is in the general area.

The fastest growing activity center for the past decade or so has been the Post Oak area, located seven miles from downtown Houston in the South Westpark corridor at West Loop. The prediction is that by 1995 employment in the Post Oak area is expected to be 100,000, according to a report by *The Houston -Galveston Metropolitan Plan, 1986*.

Major suburban activity developments are planned for 1993. The Woodlands Corporation and Hobart Development recently unveiled plans for a new regional mall of commercial, retail and recreational development. Located in an area envisioned as a kind of super Main Street for The Woodlands, the development will comprise an admixture of large and small shops with office buildings and other recreational/cultural/social amenities. In addition to this development, the March, 1993 *At Work* publication of Greater Houston Partnership listed several Houston-area Relocation and Expansion Projects, most of which were located outside Loop 610.

The expanded operations of the 24 business establishments listed added new jobs inside and outside Houston's extraterritorial jurisdictions.

To further illustrate suburban development and expansion, reference is made to another retailer's growth plan which exited the inner city in 1993. Ventures Stores unveiled a suburban strategy for its move into the Houston market (*Houston Chronicle*, March 17, 1993). This commercial chain indicated that it would open six discount stores in July, 1993. The stores will create an estimated 900 jobs. All will be located outside Loop 610.

Comprehensive Strategies

To reconnect central city residents to the mainstream economy will require increasing access to job opportunities. This will entail improving regional mobility and rebuilding neighborhoods and commercial areas from the inside. The depressed conditions of large numbers of residents in Houston's central city require more than mere transportation access to jobs outside central city areas. It requires a comprehensive strategy of community-based development with increasing emphasis on private sector and free-market solutions. City and state governments, foundations, banks, religious institutions, universities, and hospitals should become partners with community-based groups in helping to revitalize economically and socially distressed areas in central cities.

Suburban Employment Opportunities

Two suburban activity centers were used as sample study areas in an attempt to examine employment opportunities. North Houston is a classic example of a suburban employment center. It is characterized by mixed development located along major transportation corridors, specifically IH 45 North, US 59 North, SH 249, the Sam Houston Tollway, Beltway 8, and the Hardy Toll Road. This area is typified by low-density development, free parking, and other suburban amenities.

The area of West Houston is remarkably similar to North Houston in both size and the demographic make-up of the population. This area includes the western portion of Harris County and parts of Waller and Fort Bend counties. The area is bisected by Interstate Highway 10 (IH 10) West. Along IH 10 is the Energy Corridor, a concentration of 12 million square feet of office space. In this same corridor is found a major concentration of regional and neighborhood retail centers along the IH 10 West location.

A demographic profile of residents living in North Houston reveals that about 44.8 percent of the residents are in the 25 to 54 age group compared to 63.8 percent of West Houston residents found in the 25 to 44 age groups which is slightly higher than the Harris County average of 60.2 percent. An estimated one-fourth of residents in North Houston are college graduates with the median number of school years completed at 12.9 compared to 44 percent in West Houston. Twenty-five percent of Houston's population have four or more years of college which is comparable to the percentage for West Houston.

Significant trends and conditions emerge from the results of the analysis of population characteristics, urban/suburban growth, and the economy. Key findings include the following:

- People, new development and jobs are moving away from the inner city and beyond the city limits;
- The demographic makeup of the population of Houston is changing. The society is more heterogeneous, resulting from an increasing number of minority groups and women. The regional labor force has grown more diversified and spatially dispersed.

- The results from surveys of North Houston and West Houston —principal suburban activity centers in the region — indicate that service-oriented employers in north and northwest Houston who hire many non-skilled laborers such as janitors, cafeteria workers, or unskilled maintenance personnel expressed concern about impediments to their ability to hire and retain workers who are unable to use public transportation efficiently.
- Based on interviews with employers in North Houston and West Houston, there is evidence to suggest that transit dependent and semi-transit dependent service workers represent a fertile market for non-traditional transit services.
- The trip-making needs of low-skilled workers are not being adequately met by the existing public transit system in Houston.

Urban Commuting Patterns

Using a random sample of residents living in two study areas inside the IH 610 Loop which comprises Houston's central city, the employment and commuting patterns from a residential perspective were examined. A questionnaire was used to elicit responses from respondents regarding demographic characteristics and travel patterns of users of transportation services. The corresponding census tracts used were based on boundaries delineated by the demographic and land use profile of Houston in June, 1992. A random sample of the population for the survey were selected from census tracts described earlier in this study..

Several variables were used to elicit responses from the survey population. These were: respondent origin, home address, destination, location of destination, automobile ownership, gender, race, household size, household income, occupation, length of stay in Houston and Harris County, public transit access to suburban employment opportunities, current commuting habits, and potential alternative commuting choices. The rider survey consisted of 2,641 bus riders living in the sample study areas.

The commuting patterns of urban residents are geographically diverse. This diversity in travel is inherent in the process of decentralization that has occurred in urban areas. The finding of previous scholars suggest that several factors have contributed to the pattern of spatial dispersion, including metropolitan freeway construction as a primary inducement to the out-migration of people and jobs into clusters and corridors. Clusters usually develop as regional shopping centers and corridors develop along freeways. Travel patterns in metropolitan areas are symbolic of the ebb and flow of the commuters. Each day there is a flow of workers living outside the CBD commuting into the central city supplemented by a margin of workers living and working in the central city. The ebb and flow of these respective groups sustain a level of congestion that contribute to an extension of peak periods (Baerwald, 1982; Spielberg, 1982; Ganz, 1968; and Westcott, 1979).

Trends in origin-destination (O-D) mixes of work trips in urban areas reveal how travel patterns are dominated by workers living and working in the central city, augmented by a reverse flow of workers living outside and commuting to work inside the IH 610 Loop in Houston. Ford and Lomax examine commuting

Table 13
Trends in Suburban Residences Employment Locations and
Modal Breakdowns for Large Texas Cities, 1960-1980.

SMSA	Suburban Residents	Suburban Resident/Workers	Transportation Mode Private		
			Private	Public	Other
Houston	105,047	52,269	131,927	3,994	15,789
San Antonio	48,925	33,608	31,518	563	42,910
Dallas/Ft. Worth	151,955	87,805	192,242	4992	36,260
Totals	305,927	173,682	355,687	9,549	94,959

SMSA	Suburban Residents	Suburban Resident/Workers	Transportation Mode Private		
			Private	Public	Other
Houston	609,305	262,142	819,845	4,677	46,925
San Antonio	134,808	44,713	152,006	1,540	25,975
Dallas/Ft. Worth	834,473	425,844	1,182,119	6,013	72,185
Totals	1,518,316	732,699	2,153,970	12,230	145,085

patterns in Texas urban areas for 1960 and 1980. Table 13 shows trends in suburban residences, employment locations and modal breakdowns for Houston, Dallas-Fort Worth, and San Antonio. Aggregate data indicate an increase in suburban residents of over 400 percent during this period. The corresponding increase in suburban residents who also work in the suburbs for the same period was slightly over 300 percent. Table 14 provides data

Table 14.
Changes in Commuting Patterns Within and Between Central City and Other Locations, 1970-80

SMSA	Percent of Central City Riders Commuting						Percent of Residents Living Outside of Central City Commuting					
	Inside Central City		To Outside of Central City		To Outside of SMSA		To Central City ^a		Outside Central City ^a		To Outside of SMSA	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Atlanta	69.2	73.3	18.4	14.6	12.4	12.1	36.2	26.9	62.7	68.3	1.1	4.8
Dallas	81.2	74.9	1.1	18.7	7.7	6.4	41.7	30.9	54.7	60.1	3.6	9.0
Denver	78.3	75.5	14.9	16.4	6.8	8.1	41.2	38.6	58.7	61.0	0.1	0.4
Houston	78.4	77.5	7.4	8.2	14.2	14.3	40.4	43.8	59.5	54.0	0.1	2.2
Los Angeles	63.5	63.8	22.9	24.2	13.6	12.0	16.3	19.4	76.0	79.8	7.7	0.8
Orange County	44.5	40.9	29.0	34.8	26.5	24.3	19.9	19.2	65.0	69.3	15.1	11.5
Phoenix	78.6	74.5	13.0	14.9	8.4	10.6	26.8	26.4	73.2	72.9	.0	0.7
San Diego	78.2	73.1	14.0	12.7	7.8	14.2	29.5	30.2	70.4	69.4	0.1	0.4
San Francisco	75.6	73.4	11.1	13.2	13.3	13.4	25.8	28.7	67.6	66.0	6.6	5.3
San Jose	46.5	42.6	36.2	41.5	17.3	15.9	15.7	8.2	84.2	91.5	0.1	8.5
Seattle	80.8	77.4	12.6	15.3	6.6	7.3	41.4	36.1	58.2	60.8	0.4	3.1
Tampa	73.3	75.2	16.3	18.9	10.4	5.9	32.3	29.6	67.4	66.9	0.3	3.5
12 SMSA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Average	70.7	68.5	17.2	9.5	12.1	12.0	30.4	27.3	66.4	68.5	3.2	4.2
U.S. ^c	80.7	71.8	15.2	14.5	4.1	13.7	32.8	28.0	59.4	55.8	7.8	16.2

^aOutside of the Central City but within the SMSA.

^bNonweighted average of the 12 SMSAs.

^cAll U. S. SMSA

Source: Certero, R., *Suburban Gridlock*, N. J.: Center for Urban Policy Research, Rutgers University, 1986.

Table 15
Modal Breakdowns of Commuter Trips, 1970-80

SMSA	Private Vehicle			Public Transportation			Other ^b		
	1970	1980	% Change	1970	1980	% Change	1970	1980	% Change
Atlanta	84.6	88.3	+3.7	9.4	7.6	-1.8	6.0	4.1	-1.9
Dallas	88.0	91.8	+3.8	5.2	3.4	-1.8	6.8	4.8	-2.0
Denver	85.2	85.5	+0.3	4.4	6.1	+1.7	10.4	8.4	-2.0
Houston	86.9	91.9	+5.0	5.4	3.0	-2.4	7.7	5.1	-2.4
Los Angeles	85.9	85.5	-0.4	5.5	7.0	+1.5	8.6	7.5	-1.1
Orange County	92.5	90.9	-1.6	0.3	2.1	+1.8	7.2	7.0	-0.2
Phoenix	88.9	89.1	+0.2	1.2	2.0	+0.8	9.9	8.9	-1.0
San Diego	75.8	81.2	+5.4	4.2	3.3	-0.9	20.0	15.5	-4.5
San Francisco	73.5	73.7	+0.2	15.2	16.4	+1.2	11.3	9.9	-1.4
San Jose	88.7	89.0	-0.3	2.3	3.1	+0.8	9.0	7.9	-1.1
Seattle	83.5	82.1	-1.4	7.1	9.6	+2.5	9.4	8.3	-1.1
Tampa	87.6	90.4	+2.8	3.1	1.8	-1.3	9.3	7.8	-1.5
12 SMSA	-----	-----	-----	-----	-----	-----	-----	-----	-----
Average ^c	84.8	86.2	+1.4	5.5	5.8	+0.3	9.7	7.9	-1.8
U. S. ^d	77.7	84.1	+6.4	8.9	6.4	-2.5	9.4	7.9	-1.2

^aIncludes bus, rail transit, railroads, and taxicab modes.

^bIncludes bicycle, walk, and other modes as residents who work at home.

^cNonweighted average of the 12 SMSAs.

^dAll U. S. SMSA.

Source: Cervero, R. *Suburban Gridlock*. N. J.: Center for Urban Policy Research, Rutgers University, 1986.

on changing commuting patterns over the decade, 1970-1980 while Table 15 reveals modal breakdown of commuter trips. A comparison of twelve Primary Metropolitan Statistical Areas shows that the shares of trips destined to suburbs, reverse commutes and suburb-to-suburb journeys, increased between 1970 and 1980. Exceptions were found in Atlanta and Tampa where commuting shares within central cities increased (Cervero, 1986).

Using these findings as a point of departure, origin and destination data were collected

Table 16
Home-Based Origins and Home-Based Work Trips of Sample Population
(N = 2,641)

Origins (by Census Tract)	All Work Trips	Work Trips by Area					
		Central City n	Central City %	Metropolitan Area n	Metropolitan Area %	Suburbs n	Suburbs %
300.24	651	521	24.6	111	24.7	20	25.3
304.01	0	0	0.0	0	0.0	0	0.0
304.20	255	204	9.6	43	9.6	8	10.1
305.01	183	146	7.0	31	7.0	5	6.3
305.02	269	215	10.1	46	10.2	8	10.1
306.00	326	261	12.4	55	12.2	10	12.6
307.01	134	107	5.1	23	5.1	4	5.0
307.02	226	181	8.5	38	8.5	7	8.8
308.00	296	237	11.2	50	11.1	9	11.4
316.01	0	0	0.0	0	0.0	0	0.0
316.02	301	241	11.4	51	11.4	9	11.4
Totals	2,641	2,113	80	449	17.0	79	3.0

Source: METRO's 1990 Transit Rider Origin-Destination Survey

from 2,641 respondents in Houston's central city. The data indicate that 2,113 or 80 percent of all work trips were made in the central city; 449 or 17 percent indicated that they were employed in the metropolitan area; while 79 or less than three percent revealed that they had jobs located in the suburbs. These findings were confirmed in a study on public transit and suburban employment opportunities by Edward Owens (1991). Table 16 contains the results of the survey on home-based origins and home-based work trips by census tract. Most of the respondents from these census tracts live and work in the central city.

The rider survey is reflective of employed individuals, many of whom work in the study areas. The sample is representative of mostly minority groups who reside in areas near the Central Business District, the Main Street Historic District, Midtown, and the Theatre District. Large blocks of public and institutional uses are also found in the study areas. Two of the city's largest universities are located in the southwestern section of the sample study areas. These universities, combined with the Port of Houston and the Ship Channel, are major employment centers.

Of the total number of employed workers 16 years of age and over in Houston, 82 percent are private wage earners, 6.3 percent, self-employed, 11.1 percent government workers, and the remaining persons are unpaid family workers. More than 30 percent of the persons 16 years of age and over are not in the labor force. When labor force status is examined according to gender, 60.4 percent of all females work; 78.6 percent of all males in this age range are in the labor force. These individuals work and live in the central city. Only about one-fourth of the public transit riders included in the survey indicated that they worked outside the central city. These data are consistent with information for the general population in Harris County.

According to data from the 1990 census, a little less than 75 percent of the workers living in the Primary

Table 17
Workers 16 Years and Over By Place Of Work Harris County, 1990

Item	Number	Percent
<i>Living in MSA/PMSA</i>		
<i>Worked in MSA/PMSA</i>		
Central City	1,011,146	74.5
Remainder	311,685	23.0
<i>Worked Outside MSA/PMSA of Residence:</i>		
Central City	12,215	0.9
Remainder	14,318	1.1
Worked Outside Any MSA/PMSA	6,832	0.5
Total Workers, 16 Years and over	1,356,196	100.0

Source: U. S. Census, 1990

Metropolitan Statistical Area revealed that they worked in the central city, with about 23 percent indicating otherwise. Tables 17 shows a breakdown for workers 16 years of age and over by place of work.

Travel Patterns and Public Transit Accessibility

The changing distribution of employment opportunities from central city areas to the suburbs has been especially detrimental to large numbers of unemployed residents, particularly members of minority groups. As population, industry, and commercial activities relocated to major activity centers, the flux of daily movement increased in direct proportion to the changing spatial orientation of metropolitan regions. The separation of work from place of residence has lengthened work trip distance. This increase in time works against central city residents seeking blue collar employment opportunities in suburbia.

Suburban employment is both remote and relatively dispersed. Most suburban activity centers where job opportunities are available are poorly served by public transportation. Central city residents indicate that it is difficult, if not impossible, to find work and maintain employment without public

transportation. For those with access to private transportation, the problem involves the time and cost of commuting from the central city to suburban employment on a daily basis. An analysis of the method of getting to and from work in Harris County indicate that 89.8 percent of workers 16 years of age and over travel to work by car, truck, or van. A little over 10 percent indicated that they used some form of public transportation. Table 18 indicates mode of travel of workers using transportation to and from work in 1990.

A further examination of the data reveals that the mean travel time to work is over 25 minutes. Travel time to work for a little less than half of the more than 1.3 million employed persons in Harris County exceeds the mean travel time of 25.8. The mean travel time for the journey to work of persons living in Houston is 24.7 minutes. Over 48 percent of the workers indicated that it took from 25 minutes up to an hour or more for the journey to work. Table 19 contains data from the 1990 Census on travel time to work for employed persons in Harris County.

A profile of the journey to work for Houston residents indicates that 71.7 percent of all workers used private vehicles to drive to work alone; 15.5 percent used carpooling; about 6.5 percent utilized public transportation modes; while 1.3 percent used other means, with five percent walking or working at home.

Table 18
Workers By Means of Transportation To
Work (16 Years and Over), Harris County, 1990

Mode of Travel	Number	Percent
Car, Truck, or Van:	(1,217,75)	(89.8)
Drive Alone	1,021,841	75.5
Carpool/other	195,934	24.5
Public Transportation:	(138,421)	(10.2)
Bus or Trolley Bus	60,319	43.6
Streetcar or Trolley Car	124	0.1
Subway or _____	269	0.2
Railroad	54	0.01
Ferry Boat	18	1.1
Taxicab	1,563	1.8
Motorcycle	2,516	1.8
Bicycle	3,810	2.8
Walked	31,984	23.1
Other Means	10,302	7.4
Worked at Home	27,462	19.8
Total	1,356,196	100.0

Source U. S. Census, 1990

To augment data collected in the rider survey, additional information was obtained from the findings of employers surveys conducted by the Metropolitan Transit Authority of Harris County. Selected data were used from an Employer Survey by the North Central Texas Council of Governments to further test the efficacy of the assumption that the relocation of employment opportunities in suburban areas combined with the lack of public transit accessibility appear to adversely impact residents in the central city.

Results from the survey indicate that unemployed persons in Houston are further entrapped by their limited skills. Lack of higher education means that unemployed persons are more likely to be in search of entry level positions. The lack of access to public transportation restricts them to a geographical confinement of job search spaces in areas proximate to places of residences.

Table 19
Workers By Travel Time To Work Harris County, 1990

Travel Time	Number of Workers	Percent
Less than 4 minutes	27,200	2.0
5-9 minutes	102,529	7.5
10 -14 minutes	158,990	11.7
15 -19 minutes	208,833	15.4
20 -24 minutes	203,074	15.0
25 -29 minutes	78,574	5.8
30 - 34 minutes	242,041	17.9
35 - 39 minutes	41,056	3.0
40 - 44 minutes	50,704	3.7
45 - 59 minutes	127,887	9.5
60 - 89 minutes	65,766	4.9
90 or more	22,280	1.6
Worked at Home	27,462	2.0
Mean Travel Time To Work	-----	25.8
Total	1,353,196	100.0

Source: U. S. Census, 1990

The unemployment rate for central city residents of Houston ranged from an average of over 8 percent up to almost ten percent for males and females 16 years of age and over. More than 39 percent of the females in Houston and more than 21 percent of the males 16 years of age and over are not in the labor force. On the whole, black unemployment has been estimated to be two and one-half to three times that of the general population of Houston. Given this assessment, the unemployment rate among Blacks in general hovers at about 25 percent, particularly in low income areas of Houston's inner city. Many of these individuals have joined the ranks of the "homeless." When a random sample of unemployed persons in Houston were asked about their labor force status in 1992, most indicated that they could not afford the growing cost of commuting by automobile to "blue-collar" jobs dispersed throughout the suburban rings around the city. Over 80 percent of the respondents to the survey listed "lack of public transportation" as the reason for not seeking employment in suburban areas.

Suburban entry level gains in employment have generally offset central city losses in recent decades. The suburbanization of low wage office work and other blue collar jobs decreases the workforce chances of those in need of employment the most. White and blue collar suburban job opportunities are filled by individuals living in suburban areas(Nelson, 1986).

Ethnic Distribution Houston, 1980, 1990

Figure 8

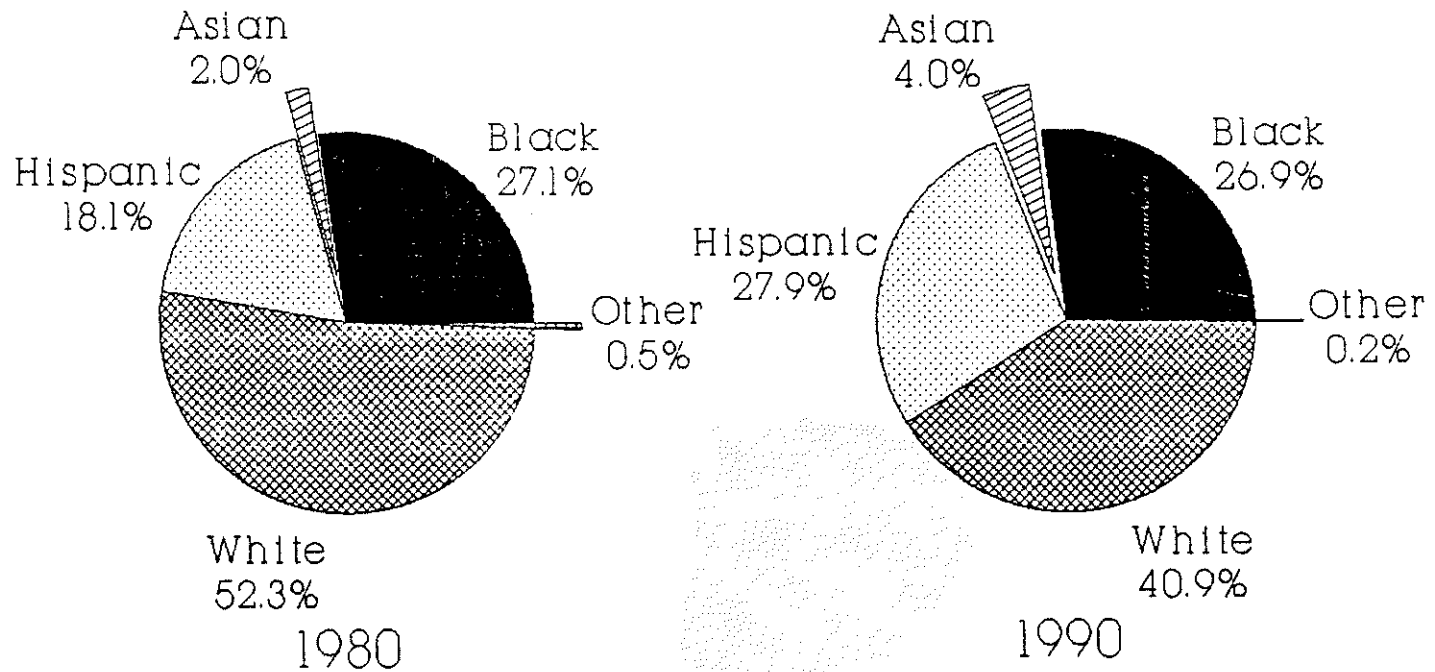
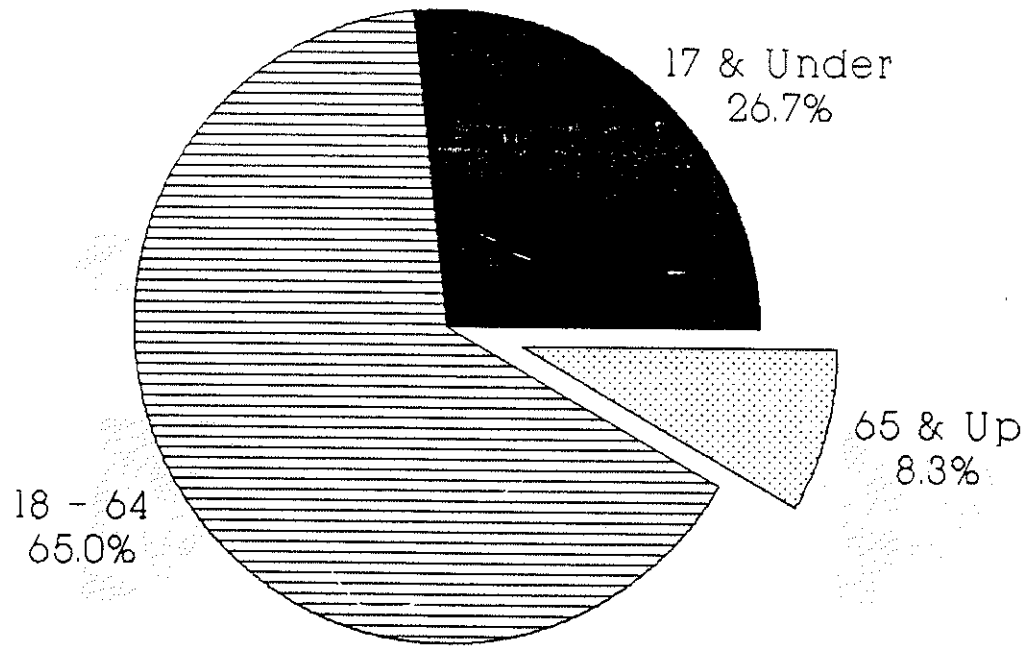


Figure 9
Houston's Age Distribution
in a Median Age of 30.4 Years



Disconnections: Public Transit Accessibility and Suburban Employment

Several related types of dynamics have given rise to disconnections between employment opportunities and the labor force. The first is the nation's changing racial and ethnic mix fueled by phenomenal growth in Hispanic and Asian groups. In the last decade there were significant increases in Hispanic and Asian populations, a steady growth in the Black population of Houston, and a net loss in the White population. As a result, Houston's population is almost 60 percent Black, Hispanic, Asian, and other minority groups. Figure 8 shows the ethnic distribution of the population in Houston.

Minority groups, including women, will make up a majority of the workforce for the next several decades. They will be largely concentrated in urban areas of the nation. As these groups become a larger source of the regional labor force, it will be extremely critical to the future of the state's economy that they be educated or retrained to meet the demands of an increasingly global society. Current data provide ample evidence that among the unemployed are individuals who do not have the necessary educational requisites to fill "high order" positions found inside and outside the central cities of Primary Metropolitan Statistical Areas (PMSA's). A "mismatch" exists between the skills of persons seeking employment and the job descriptions and requirements of business and industry.

The second compositional change over the next several decades will be the substantial aging of the population. The graying of America induces the need for retraining in order to equip an increasingly aging population for the highly competitive, technical economy. Houston's age distribution of the population results in a median age of 30.4 years for 1990 compared to a median age of 26 in 1970.

To enhance an understanding of "age distribution" as a dynamic phenomenon impacting employment, the population of Houston was divided into three categories: school age (17 years of age and under); work force (18-64); and mature Houstonians (65 and over). From 1980 to 1990, the total number of persons "17 and under" in Houston decreased by three percent. This age group now comprises 26 percent of the city's population. Despite overall decreases in this population, Asian, Hispanic, and other populations showed marked increases in this category. Figure 9 illustrates the age distribution of residents in Houston.

The workforce (persons 18-64 years of age) is significant because it represents most of the people in the workforce. The education and skills of this group dictate the quality and quantity of products and services in the Houston region. In 1990, persons between the age of 18 and 64 comprised slightly less than 65 percent (1.1 million) of Houston's total population, a 2.6 percent increase from 1980.

During the decade between 1980 and 1990, Houston experienced steady growth in the population of persons 65 years of age and over. Growth in this age group was below the national average. Nationally, this age group in 1990 was 12 percent (or 31.2 million) of the total population. Houston's elderly population showed

an increase of 8.3 percent in 1990 compared to 6.9 percent in 1980. Despite the differential between the growth increase at the national level and Houston's increase in elderly workers, the mature Houstonians still comprise the largest segment of the population and the percentage of persons 65 and over will continue to increase over the next thirty years.

Table 20-A
Household and Housing Unit Changes, 1980-1990

Study Area	1990	1980	% Change	1990	Units 1980	% Change
1	17,971	12,963	39	22,970	17,103	34
2	45,171	41,257	9	51,680	45,112	15
3	54,500	62,164	-13	64,112	68,948	7
4	35,445	41,337	-14	41,703	45,487	8
5	52,702	67,002	21	65,248	75,916	14
6	33,261	34,828	-4	40,934	40,713	1
7	73,225	64,454	14	84,240	73,126	15
8	95,390	73,153	30	114,567	84,241	36
9	54,161	52,008	4	61,660	56,383	9
10	44,322	44,450	0	51,494	50,745	1
11	2,135	4,473	-52	2,941	5,645	48
12	33,640	23,956	40	36,759	26,329	40
13	19,209	15,229	26	22,215	16,102	38
14	26,571	31,622	16	31,464	34,276	8
15	29,518	34,345	14	34,893	38,042	8
City	61,7231	60,3721	2	726,850	67,8168	7

Source: U. S. Dept. of Commerce, Bureau of the Census.

Table 20-B

Study Area 11 has the highest vacancy rate, but Study Area 8 has the largest number of vacant housing units.

S.A.	Number of Vacant Units	Vacancy Rate
1	4,998	22%
2	6,510	13%
3	9,656	15%
4	6,213	15%
5	12,609	19%
6	7,673	19%
7	11,015	13%
8	19,147	17%
9	7,499	12%
10	7,099	14%
11	806	27%
12	3,199	8%
13	3,006	13%
14	4,893	16%
15	5,375	15%
TOTAL	109,620	15%

Source: U. S. Dept. of Commerce, Bureau of the Census.

The third major demographic change is declining household size concurrent with increases in the number of households. Growth in the number of housing units according to previous researchers is as important as growth in the population. Population changes are often reflected in changes in the number of housing units and vacancy rates. From 1980 to 1990, Houston's population increased by 35,903 persons and housing units increased by 48,681 units. The western section of the city gained in population and housing units, while the north and east lost population and housing units. Houston had a housing occupancy rate of from 85 to 90 percent. Table 20A, 20B and 20C show household and housing unit changes for 1980 and 1990. Data in the table illustrate an occupancy shift to

Table 20-C
Study Area Population Figures

Area	1990	1980	% Chg.
1	45,992	33,192	39
2	115,361	110,597	4
3	156,160	175,120	-11
4	115,324	137,819	-16
5	171,738	204,352	-16
6	96,384	97,105	-1
7	152,231	140,645	8
8	229,451	159,588	44
9	130,013	123,198	6
10	85,626	88,342	-3
11	11,796	11,677	1
12	88,667	68,003	30
13	65,502	52,236	25
14	81,884	106,811	-23
15	85,521	87,062	-2
City	1,631,650	1,595,747	2

Source: U. S. Dept. of Commerce, Bureau of the Census

the west. The five areas with the highest vacancy rates (above 16 percent) are in the north and east, west and southwest and downtown, all of which have a majority of rental units. Growth in the number of households in West Houston is as important as growth in the population. Increases in households are often translated into additional demands for both public and private transportation.

Several areas identified in the "Demographic and Land Use Profile for the City of Houston" in 1992, (Areas 5 and 11), correspond to the sample study areas used in this survey, and are described in the section on methodology for the study.

Disconnected from Work. Kasarda's (1988) discussion of population and employment change in the United

States introduces the notion of a discordant distribution of labor qualifications vis-a'-vis qualifications required for available jobs at a point in time. As previously indicated, this disconnection is referred to as "mismatch" which has both nonspatial (nationwide) and spatial-specific (community) aspects. The nonspatial aspect results from transformation in the overall economy from industrial to post-industrial and the corresponding shrinking demand for traditional blue collar labor. Spatial-specific mismatches emerge where transformation in local employment bases occur at a faster pace than their local labor can adapt to through longer-distance commuting, retraining, and relocation (Kasarda, 1988: 131-132).

When the concept of "mismatch" is applied to the respondents in this study, there is clear evidence that the third change to be considered in examining suburban employment and public transit accessibility relates to high rates of unemployment among teenagers and the prevalence of poverty among an urban population segment. These problems are indicators of disconnections from the labor force and society. Teenagers in general have an unemployment rate three times the adult rate. Individuals 17 years of age and under experienced a three percent decrease in population between 1980 and 1990, but now comprises 26 percent of the population of the City of Houston. Those in the 16-17 age category will be entering the labor force upon graduation from high school or they will join the corps of dropouts from urban and suburban schools. Those who opt for the latter are at risk of becoming permanently disconnected from satisfying jobs and careers.

Unemployment is not evenly distributed across the population. The estimated current rate of unemployment among Black teenagers is 40 percent which is three times the rate of Whites which has been estimated to be 15 percent in Houston. Far more Hispanic teenagers are looking for work than can find jobs. This high

minority unemployment rate reflects, at least in part, the fact that minorities are often concentrated in areas where there are fewer jobs. Also, it reflects the fact that higher proportions of minority youth leave the public schools with limited skills. And, in part, the rates reflect various kinds of discrimination and lack of access to job information and contacts.

The broader disconnections are revealed in spatial-specific mismatches between residences and suburban employment bases. Experts have advanced a number of explanations for youth unemployment. They have attributed it to a decline in the skills of youth, to the influence of the minimum wage, to shifts in occupational openings and to the fact that young people are more likely to be affected by poor economic conditions. Young people in the inner city are disconnected from work, particularly those between the ages of 18 and 26 years of age. There are explanations for this disconnection also. One of them is physical: they do not live where there are sufficient jobs and they do not have access to private or public transportation (See: *Reconnecting Youth, 1985*).

Structural Impediments and Transit Access

In addition to the aforementioned factors that tend to adversely impact minorities, there is a structural impediment faced by residents of the central city. It is their increased distance from current blue collar and other entry level jobs. As industries like Compaq, Continental, Conoco, Amoco, Exxon, Friendswood Development and other companies and stores disperse to the suburbs, exurbs, and metropolitan peripheries like West Houston, Clear Lake, North Houston, FM 1960, and The Woodlands, racial discrimination and /or inadequate incomes have prevented inner city residents from moving with their traditional sources of employment. Table 21 shows the results of a North and West Houston mobility study and current projected employment in selected industries. Currently, the number of employees at these industries ranges from a low of 150 at Friendswood to 7,000 at Compaq, with projected increases in employment for the next three to five years of a low of 15 percent for Star Enterprise to upwards of 130 percent.

Transportation-related problems or current conditions vary from work site to work site. With Conoco, in-bound access is a problem while peak hour congestion appears to be the biggest problem for Compaq, according to a recent survey commissioned by Houston METRO (May, 1992). Employers in North and West Houston are not concerned about mobility problems. They are concerned about the "inability to hire and retain certain workers who do not have access to public transportation."

A similar pattern of spatial dispersion of jobs is characteristic of the North Central Texas region. Data from an employer survey show the distribution of major employers throughout the North Central Texas region.

Unemployment and Poverty: Key Disconnectors

The most critical indicator of disconnection is poverty. Some central city former workers have become

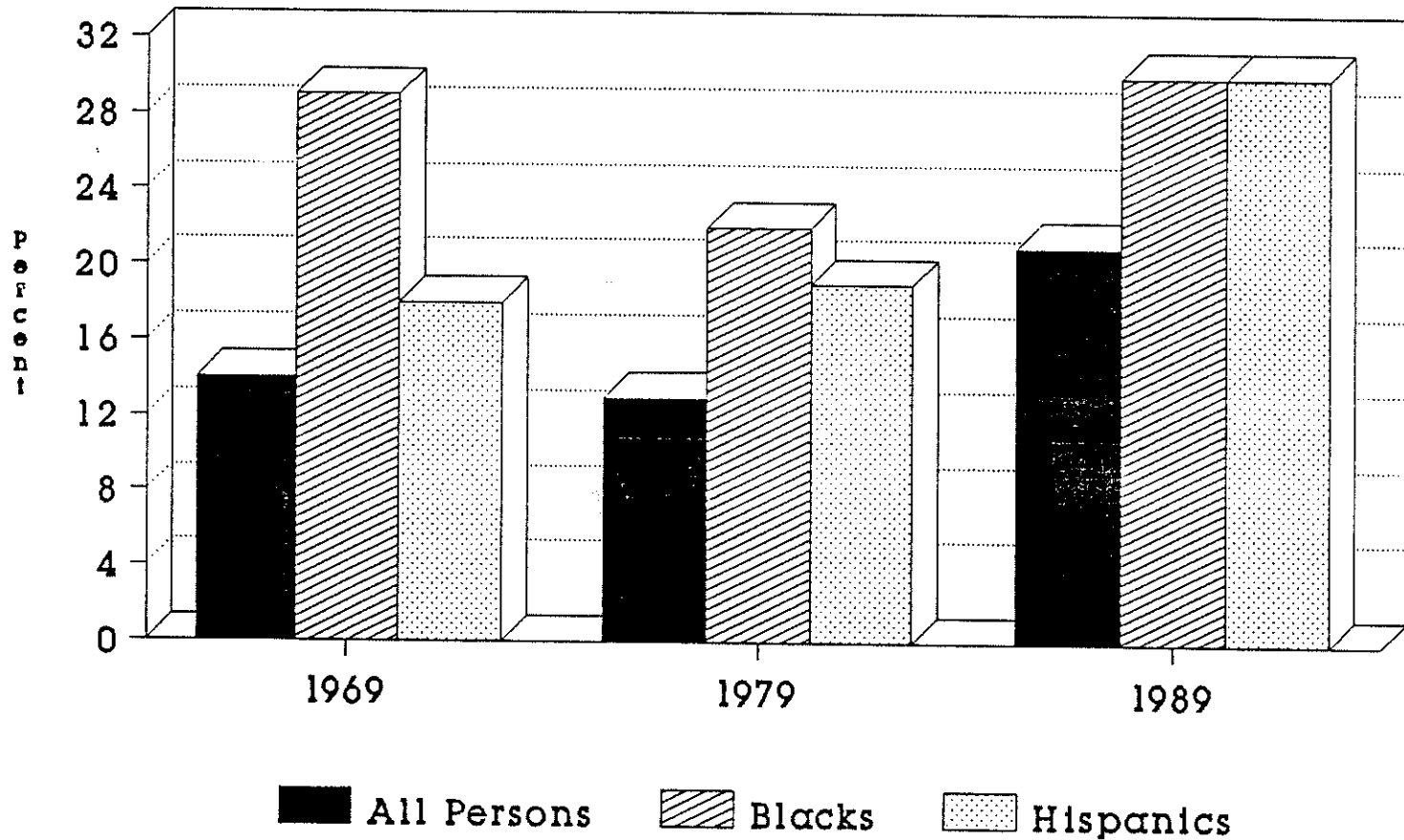
Table 21
North And West Houston Mobility Study Employer Interview Summary

Company	Current	Employment Last 3 to 5	Next 3 to 5	Traffic/Transportation Conditions	Carpool/Vanpool Experience	Incentive Strategies	Employer Involvement
Compaq	7,000	130% Increase	130% Increase	<ol style="list-style-type: none"> 1. Peak hour congestion on SH249 2. Limited factory labor market due to limited transit routes 3. Traffic/Transportation is not seen as a problem 	None	Not interested in any company sponsorship	Employer is not responsible for getting to worksite
Continental	5,000	100% Increase	50% Increase	<ol style="list-style-type: none"> 1. Inadequate Transit 2. Inter-office circulation is problem at Gateway 3. Recruiting, clerical and food service workers is a problem because of transportation 	Limited Vanpool Operations in Denver	<ol style="list-style-type: none"> 1. Denver issues passes 2. Somewhat interested in incentive 	Support employer involvement if conditions warrant
Star Enterprises Texaco	500	100% Increase	15% Increase	<ol style="list-style-type: none"> 1. Commuting is not a problem, reverse peak direction 2. Traffic congestion is not a problem 	<ol style="list-style-type: none"> 1. They do cappool matching 40 to 50 riders 2. Texaco leases vans - employees contract program is experiencing difficulty 	Somewhat interested in incentives	Support employer involvement if conditions warrant
Copaca	2,700	12-15% Increase	Stay about the same	<ol style="list-style-type: none"> 1. Inbound access is a problem 2. Parking shortage 3. Commute is not a problem 	<ol style="list-style-type: none"> 1. Employees live close to work, do not carpool 2. Vanpools at former location in Greenway Plaza 	Somewhat interested in incentives	Support employer involvement if conditions warrant
Astroco	2,500	Increase	Stay about the same	<ol style="list-style-type: none"> 1. Congestion is not a concern 2. Transit services not heavily utilized 3. Traffic congestion is not a problem 	Do have privately operated vans with preferred parking	Not currently interested in incentives	Support employer involvement if conditions warrant
Exxon (Greenspoint)	1,200	Increase 10%	About same	<ol style="list-style-type: none"> 1. Good exiting access 2. Sam Houston has improved traffic 3. Traffic congestion is not a problem 	<ol style="list-style-type: none"> 1. Exxon has never supported vanpools 2. Sells discounted passes 	Not currently interested in incentives	Support employer involvement if conditions warrant
Plymouthwood	150	Increase 5%	About same	<ol style="list-style-type: none"> 1. Good existing access 2. Sam Houston has improved traffic 3. Traffic congestion is a minor problem 	No current experience	Very interested in incentive strategies	Interested in company involvement
Metro National	2,200	100% Increase	100% Increase	<ol style="list-style-type: none"> 1. Traffic congestion is a minor problem 2. Prospective tenants have listed congestion as a reason for not leasing 3. METRO national paid for new traffic signals 			

Source: Turner, Collic & Braden, Suburban Activity Study, 1990

Percent of Poverty Rates, Houston 1969, 1979, 1989

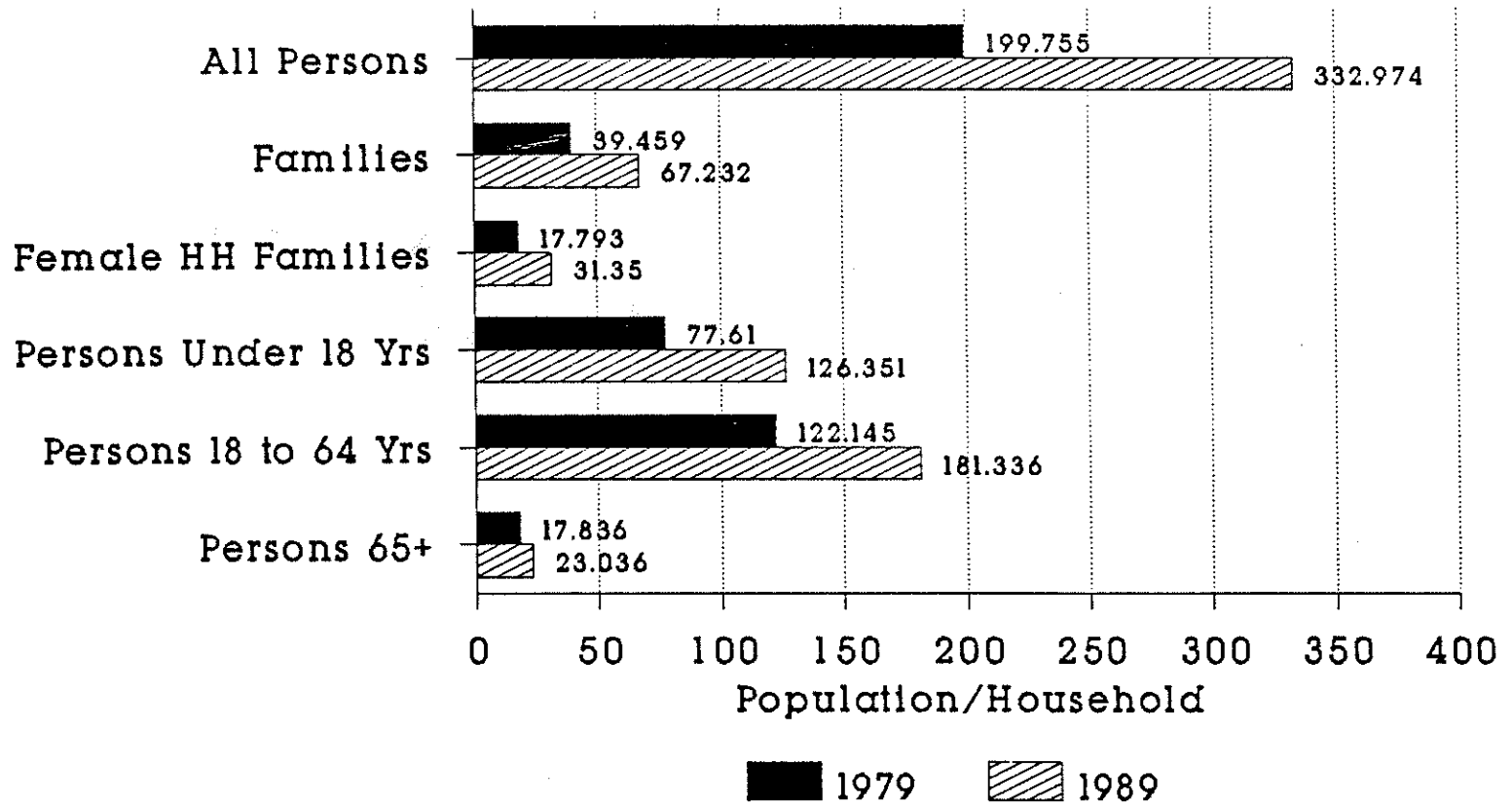
Figure 10



Source: U.S. Dept. of Commerce
Bureau of the Census, 1990

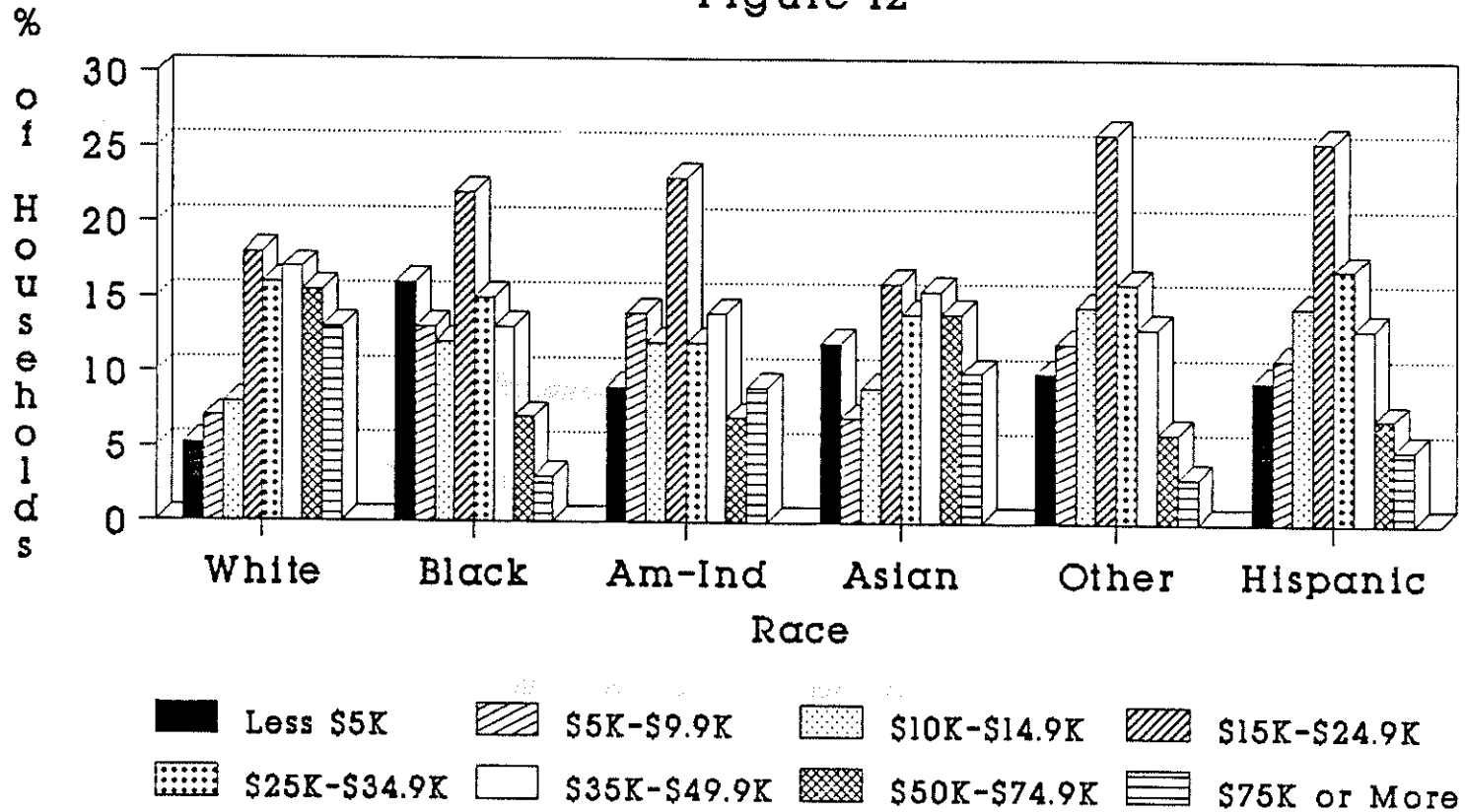
Income Below Poverty Level

Figure 11



Household Income in 1989 by Race and Ethnicity (As Percent of Total for Each Race)

Figure 12



Hispanic Category Represents
Ethnicity

permanently disconnected from mainstream employment opportunities. The dispersed nature of job growth sites makes public transportation from inner city neighborhoods to suburban areas difficult, if not impossible. Public transit *inaccessibility* restricts a vast majority of residents from working in peripheral areas. To access even these job opportunities inner city workers would be required to commute by private automobiles. Their mobility is inhibited because of the impoverished state of many families with incomes below the poverty level.

Poverty rates for the Blacks, Hispanics, the elderly and children remained well above that for all Houstonians. The 1980 census indicated that 22 percent of all Houston Blacks and 18 percent of all Houston Hispanics lived in poverty. The 1990 census reported that over 21 percent of all Houstonians lived in poverty, compared to 13 percent for the nation. Of Houston's older population (age 65 and over), 17 percent lived in poverty. The City's poverty rate for Blacks was over 30 percent which equaled the national rate for this group, while poverty among the City's White population was only 12 percent. The Hispanic rate of 30 percent for Houstonians exceed the national average for this group. Figure 10 shows comparative poverty rates for Houston by race for selected decades. Figure 11 outlines poverty thresholds used by the Census Bureau; while Figure 12 compares household income by race and ethnicity.

IV. Summary Implications and Guidelines for Policy

The foregoing analysis suggests that the suburban mobility problem is complex and multifaceted. The findings of the study suggest that there are critical issues associated with suburban growth and development. These issues range from transportation and urban development, to economic, social, political, and environmental phenomena. The focus of this section will be on the broader implications of the study's findings and some proposed guidelines for policy development by agencies concerned with public transit access and suburban mobility.

A. Implications of the Findings

The mobility implications of suburban growth and development are profound and far-reaching when viewed from the perspective of changing demographics and emerging technology. The data from the study suggest that the mobility challenges facing metropolitan regions are immense. Cervero (1986: 214) noted that "years of explosive and unconstrained growth have flooded the rims of our cities with cars, trucks ..." and other modes of transportation they are ill-equipped to handle. To aggravate the problem, census data suggest that regional, state, and metropolitan patterns of employment and population growth will likely continue to the year 2010.

The urban fringes of large metropolitan areas were powerful magnets in the uneven growth and distribution

of the population and employment sites. This uneven development is reflected in suburban activity centers that are generally located beyond the boundaries of the central city, and urban fringes which have also been the recipients of corporate giants seeking more attractive environments and parking spaces. With these attractions have come some unexpected consequences.

Around a cadre of suburban office parks and suburban activity centers, congestion has increased considerably since their development. This is particularly characteristic of areas like Greenway Plaza and the Post Oak area in Houston. The Parkway Center in Dallas, for instance, is the largest and most congested megacenter in the Primary Metropolitan Statistical Area (PMSA) of North Central Texas. The cities of Dallas, Addison, and Farmers Branch began the effort of coordinating development and developing transportation responses to address mobility problems in the area several years ago. Similar economic development and employment activities are taking place in other large metropolitan areas. To the extent that transportation planners and developers are unable to coordinate their responses, the suburban mobility dilemma will become even more severe.

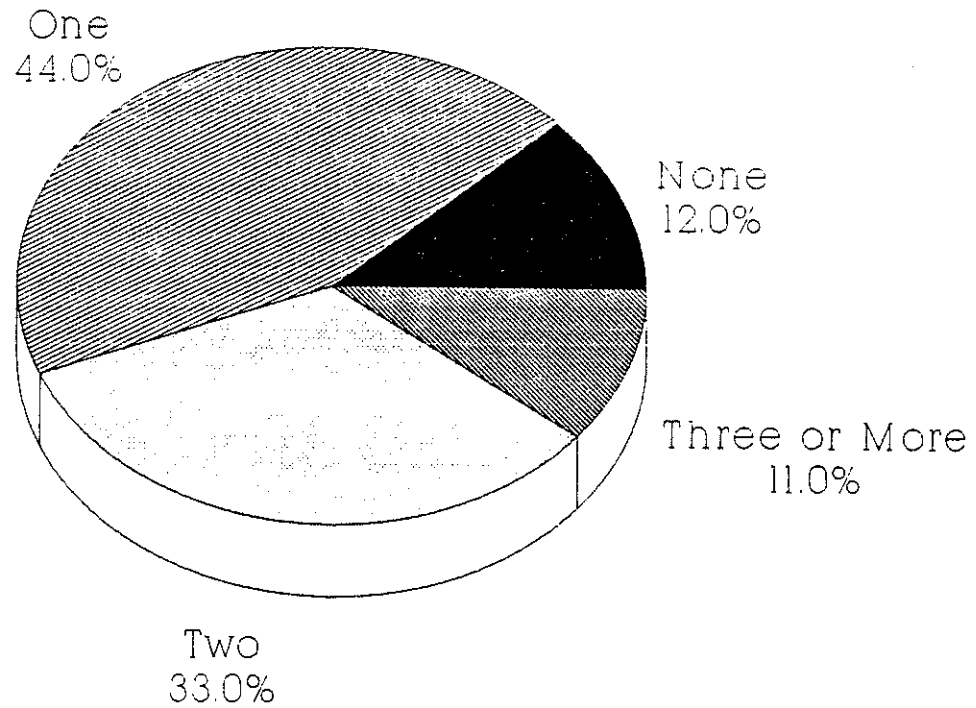
There are no "quick fixes" to the transportation and employment problems of central city residents. This study has outlined a number of mismatches and/or disconnections that appear to magnify problems of the transit dependents. Residents living in the central city are faced with a series of blockages when seeking access to job opportunities. Among these are: residential location in relation to job sites; lack of access to public transportation; prohibitive costs associated with owning and operating automobiles, and the concept of mismatch and/or disconnection that renders them incapable of holding jobs by virtue of inappropriate skills to match the requirements of a highly technical economy.

Minority and/or youth groups are at a structural disadvantage in cities losing blue-collar and other entry-level jobs because they lack the appropriate skills to participate in the new urban growth industries. This group and their older counterparts are especially impacted by the lack of public transit access. The problem of access is exacerbated by the lack of resources on the part of the poor and disadvantaged. Automobile ownership by residents living in core areas of cities is a luxury few can legitimately afford. The combined costs of owning, insuring, maintaining, and operating automobiles for those living in central cities are substantially higher than elsewhere. Respondents in the survey revealed that their "areas have been redlined by insurance companies because of high crime rates" and what they perceived to be "a real" discrimination (based on the area in which they reside) rather than income class.

Recent data indicate that an automobile was available to 87.7 percent of the households in Houston in 1990. Only one vehicle was available to 43.9 percent of the city's households, while 43.8 percent had two or more. For the most part, these individuals are current participants in the labor force. Over 12 percent of the households did not own automobiles. This latter group must rely on public transportation or other means to seek

Figure 13

Percentage of Vehicles Available Per Households



employment or travel to work. Figure 13 provides data on the number of vehicles available per household in Houston for 1990.

Survey results revealed that some automobile owners experience difficulty in commuting to work outside the central city. The difficulty involves time spent during the journey to work. The time spent in commuting to and from work poses hardships on those living outside of Houston's Extra-Territorial Jurisdiction (ETJ). This confines lesser-educated groups to areas of employment decline. It was further revealed that the existing public transportation system fails to meet the needs of transit dependent groups in search of employment in suburban activity centers. Traditional transit routes do not provide effective service for "carless" central city residents. These unmet needs extend beyond the journey-to-work to restrictions on access to social, cultural and recreational opportunities often found outside the central city. Blake (1989: 19) observed that "this is not a simple transportation problem with simple solutions. It is a complicated societal problem that will be resolved only with a coordinated effort..."

Major findings of the study include the following:

- Demographic and societal changes will continue to have a significant impact on the planning requirements for a viable transportation systems network for metropolitan areas throughout Texas and the nation. Increased labor force participation by minorities and women will induce changes in the number and types of trip demands on the transportation system and on future service requirements.
- The forecasted growth in population and employment for the Primary Metropolitan Statistical Area, including Houston and Harris County, indicated that there will be even greater travel demands as suburban rings around central cities continue to develop. Based on 2010 demographic forecasts by the Houston-Galveston Area Council of Governments and data from the North Central Texas Council of Governments, the average length of most trips is expected to grow because of the increasing size of the urbanized portion of the region and the increased number of travel opportunities.
- Demand for transit usage as measured by actual ridership continues to increase. A significant portion of this increase is expected outside the Houston CBD. The Metropolitan Transit Authority of Harris County (METRO) will have to develop and implement a truly multimodal transportation system with the capability to serve the central city and suburban areas alike. This system must be comprehensive enough to serve persons working in major employment centers outside the central city, with provisions for access by central city residents.
- According to published reports, METRO's service innovations include more than Park and Ride programs. Transit centers have been developed to integrate local transit routes outside the CBD. It is important to note, however, that such service remains inadequate unless those routes extend to major activity centers in North and West Houston and other outlying areas so that central city residents will have access to blue-collar and entry-level jobs.
- A critical finding of the study related to changing educational requirements and the qualifications of job

seekers. Spatial-specific mismatches have emerged from the transformation that occurred in the local employment base in Houston. The decline in retail trade, wholesale trade, and traditional blue-collar industries in the Primary Metropolitan Statistical Area of Houston and Harris County and the North Central Texas Region has been rapid. The growth of information-processing industries occurred at a faster pace than training and retraining of the local labor force. The rapidity of this transformation created an economic lag that adversely impacted central city residents, especially minorities and the poor.

- The approach to developing flexible public transit service delivery must be comprehensive in scope. People are being disconnected from the economic mainstream. Not all of these disconnections can be attributed to the lack of public transit access. Problems associated with unemployment are linked to several factors, including the decline in the quality of education and training provided by secondary schools, lack of access to public transportation, changing job requirements, racial discrimination, industrial restructuring, and shifts in the location of the region's employment growth.

Solutions to these problems are more complicated. By necessity, they will involve building bridges between employers and educational institutions where programs are developed to reconnect young people, minorities and the poor who have been disconnected from the mainstream of the economy.

- The findings of previous scholars were reaffirmed in this study. The uneven growth and redistribution created by the regional dispersal of jobs and housing produced major problems. The increasing popularity of suburban areas as major activity centers has contributed to inequities in the ability of certain population segments' abilities to access different economic, social, and cultural opportunities. For the nation's underclass (e.g., those without a car, the physically disabled), the scattering of workplaces, shopping malls, and recreational centers along the suburban fringes has physically isolated the transit dependent. This isolation inhibits their movement into society's mainstream.

The lack of public transit availability and accessibility closes the window of opportunity to basic opportunities and services if the individuals are too poor, too young, or too infirm (Cervero, 1986: 219). Central among these is access to job opportunities outside the immediate areas where they reside. The suburbanization of workplaces is believed to contribute to the high jobless rate among central city minority groups. In the study areas used in this study, including case study sites in peripheral and suburban areas in Houston as well as the Dallas-Fort Worth area, there were no reverse-direction or cross-town transit runs connecting core neighborhoods with outlying business parks and office centers during peak periods. Park-and-Ride service is provided, for example, by Houston METRO, but this service is restricted to suburban commuters, with early morning and evening runs from city-to-suburb or vice versa.

The Challenge of Responsive Reshaping

In a comprehensive examination of suburban gridlock, Cervero (1986: 221) advises that "it is important for both public and private suburban interests not to lose sight of the distributional consequences of the action they take. In the battle to stamp out suburban congestion, it is easy to focus all energies and resources on making a transportation system operate efficiently while ignoring who gains and who loses in the process." He further

suggests that “increasing the opportunities for the nation’s poor and disadvantaged to access...suburban employment and commercial centers deserves priority attention at all levels of government..”

The real challenge is for the urban economy to generate more jobs for men and women and to find new ways to improve the match between workers and jobs. This will require, in addition to other strategies, an upgrading of the urban skills base. There is need to reconstitute viable career tracks within and across industries in the face of an apparent weakening of internal labor markets in the primary sector. The challenge is significant because of the relationship between transportation and economic development and production.

Public transportation systems must assume responsibility for dynamically shaping and reshaping its service delivery in response to changing economic demands, residential location and dispersion. As the future of the transportation industry becomes tied even more to economic development and productivity, it is essential that public transportation systems reshape their service delivery patterns to remove barriers to suburban employment opportunities and public transit availability to transport individuals to such locations.

Conserving Our Transportation Energy. The notion of “responsive reshaping” can be applied to efforts to save energy and protect the quality of the environment. Energy is consumed in five main sectors of the economy: Industrial, transportation, commercial, residential, and loss in electricity generation. Although transportation does not represent the largest single category of energy consumption, it is an extremely important one. According to a National Statement on Transportation Policy (1990), “transportation accounts for more than a quarter of total national energy consumption and close to two-thirds of the petroleum used in the United States each year.” The process of responsive reshaping imposes the need for extending access and mobility improvements to all Americans in the most energy efficient, cost-effective way.

Reducing traffic congestion in urban and suburban areas through traffic management techniques and capacity enhancements will further advance the goal of saving energy. The findings of this study suggest the need for a demonstration project on “Conserving Transportation Energy.” This project would utilize more energy-efficient transport modes to provide service to a selected group of central city residents for the journey-to-work; for trips to recreational, medical, social and cultural activities. Some studies have shown that it requires four times as much energy to get a person from home to work by car as by bus. The utilization of a public transit mode would contribute to a reduction in energy consumption.

In response to significant findings of the study, it is proposed that transportation must become one of the prime targets for citizen action in energy conservation. This study proposes a two-pronged strategy for testing the efficacy of an innovative program to improve access to public transit and to expand opportunities for central city residents to work in suburban areas. It recommends the use of a fuel-efficient vehicle to transport workers from home to work. This will necessitate the utilization of a vehicle which uses alternative fuel similar to one

currently being tested by Houston METRO.

Energy Savings. A reduction in residential use of single occupancy vehicles and an alteration in the travel habits of urban and suburban residents will result in substantial savings in energy use. Innovative ways are needed to reduce congestion on freeways which can be particularly helpful in reducing energy consumption. The demonstration project envisioned for application of the findings of this study will further advance the goal of saving energy.

Recommendations and Guidelines for Policy

Several recurring themes are found in this work and the findings of previous scholars. All concur that “...there is need to build a solid institutional foundation for effectively responding to the impending suburban mobility crisis” and ways to conserve our transportation energy. Barriers to the notion of responsive reshaping of institutional structures to deal with the issue of accessibility to suburbia have been outlined in numerous state-of-the-art studies (Cervero, 1986; Birch, 1970; Kasarda, 1988; Washington and Stokes, 1988; Nwokolo, 1990; Dowall, 1984). Central among the numerous institutional blockages are difficulties in delineating lines of authority relative to transportation planning and implementation, the absence of regional cooperation in some metropolitan areas hinders efforts to balance jobs and housing, and jammed communications channels between central cities and suburban municipalities, and political/geographical biases that flow in both directions (Cervero, 1986).

In formulating policies to improve public transit accessibility to suburban areas, it is not sufficient merely to know where growth takes place. It is equally important to know what must be done to deal with the suburban mobility issue. Because of the complex and evolving nature of the suburban mobility problem, the findings of the study are not amenable to conclusions. Instead, a simple agenda is proposed. In the framework of a changing economy, broad policy directions with flexible guidelines are recommended for consideration in efforts to deal with the issue of metropolitan-wide mobility.

Special attention and possibly major policy changes are required to address the problem of “central city residential immobility.” Although the study will not attempt to define precisely a public transit service delivery model, it is recommended that public transit systems, including Houston METRO, consider the following:

- Give serious consideration to extending public transit service to peripheral and suburban areas by utilizing a range of two-directional alternative mode options to provide access to suburban activity centers. To test the efficacy of these alternative solutions, public transit systems should launch demonstration projects involving the public and private sector to determine energy savings and the overall cost effectiveness of the project.
- There is need for a commitment to improving mobility on a metropolitan-wide basis in the entire region.

Marketing principles and creative public-private initiatives should be employed in efforts to open windows of opportunities for employment and to provide access to social, cultural, and recreational activities outside the central city.

- To augment innovative and creative public transit service delivery, it is recommended that a more “public intervention” alternative be considered. Consistent with ideas advanced by Cervero (1986), there is also need for assertive government intervention to guide the locational choices of individuals and firms within the larger public interest in order to stem the tide of residential and business dispersion. To this end, the study recommends that consideration be given to a broad environmental rehabilitation approach to the problem of suburban immobility.

The environmental rehabilitation approach would be multifaceted in its application. It will depend on two components: (1) improvements to the central city through municipal programs; and (2) improvements to individual parcels of land by the owners of such property. These measures would be designed to underscore the need to rehabilitate and stabilize areas in the central city and the periphery.

The importance of neighborhood rehabilitation rests with its capability to serve as the tool for preserving and stabilizing declining urban neighborhoods and preventing further deterioration of them. The term residential rehabilitation ranges in meaning from minor repair and maintenance to major restoration and change. The concept would require the preparation of a goal-directed *plan for neighborhood revitalization*.

The broad basis of a total environmental rehabilitation program is reflected in the following conceptual framework:

A program of environmental rehabilitation and neighborhood improvement is aimed at the rejuvenation of existing housing to make it more practicable and healthy for the inhabitants. It is aimed at stimulating an aura of confidence within which private enterprise is encouraged to invest. It is aimed at raising the standards of transportation facilities and services which contribute to improved mobility in urban and suburban areas and to a satisfactory residential environment. And it is aimed at redressing the balance of community life by catering to large families as well as small, and to families with substantial incomes as well as to those with middle and low incomes.

The various proposals broadly fall within two classifications: (1) Those proposals that essentially deal with municipal improvements to the City of Houston and improved mobility throughout the Primary Metropolitan Statistical Area, including public transit access to suburban activity centers; and (2) those proposals that essentially rely upon individual initiative from the property owners in central city communities.

An environmental rehabilitation and neighborhood improvement program, like all complex programs, has a highly interrelated sequence of staging, of public and private initiative and involvement with all transportation providers in the region, including the plan preparation and implementation of the program. From a conceptual

viewpoint, a successful program to address the issues of public transit accessibility and traffic congestion would require:

- Community involvement and public participation.
- A definitive, comprehensive, coordinated municipal improvement program to provide a real confidence.
- Property standards to safeguard municipal and property-owner investment.
- Sufficient number or scale of incentives to encourage individual property-owner investment or enable those owners currently unable to invest to do so.
- A means by which condemned or severely substandard housing can be developed.

In summary, the aforementioned strategies combined with others show great potential in reference to efforts to effectively deal with the issue of suburban mobility and accessibility. Previous scholars have articulated agendas to safeguard suburban mobility. This study's findings advocate comprehensive strategies for dealing with the issues involved. Experts in the transportation field are almost unanimous in denouncing abundant, free parking as a major impediment to ridesharing, transit, and other commute alternatives with the potential for easing traffic congestion. This study endorses parking reforms as one means only for addressing the suburban mobility problem.

Another measure which should be considered is that of "active employer and developer participation," a notion advanced by Cervero (1986: 226-230). The Metropolitan Transit Authority of Harris County, employers and developers must play a key role in planning and implementing strategies to ease congestion and increase public transit access to suburban activity centers. As the principal transportation planning authority in the region, Houston METRO should serve as the lead agency in coordinating actions to improve the efficiency of regional transportation services.

It is also important to make a concerted effort to regulate travel demand, rather than expand roadway capacity. Other traffic management strategies, site design, model trip reduction ordinances, mixed-use suburban projects, employer-sponsored van pool programs and funding incentives which have proven to be successful should continue to be initiated.

The findings of the study suggest broad implications for energy conservation if attention is given to reducing traffic congestion in urban and suburban areas. Continued reliance on automobiles will result in a deterioration of the quality of life. Traffic congestion is simultaneously a source of pollution, of economic inefficiency and of losses in human welfare and amenity.

The analysis further indicates the need to develop and implement appropriate policies to reduce vehicular

pollution, reduce urban congestion, and promote clean fuel and engine technologies. Every effort should be made to create incentives for using public transportation.

Summarizing, it is practically impossible to determine cause and effect when assessing shifts in economic activity and population. Since trends in population expansion are closely aligned with employment growth in selected sectors of the region, many of the guidelines presented will require building responsive institutional structures for effectively responding to the suburban mobility. If left unattended, the problems of the central city will slide into suburbia — almost by default. The transportation problems of urban areas today can become nightmares for suburban areas tomorrow.

The proposed guidelines for policy formulation should form the basis for a demonstration project that will be comprehensive enough in scope to address the mobility problems of public transit dependents. Ideas are also proposed to address the growing transportation needs of suburban areas. Concepts and strategies have been proposed for the Primary Metropolitan Statistical Area (PMSA) of Harris and surrounding counties. All that is required now is the determination and the will to proceed.

References

- Baerwald, T. J., "Land Use Change in Suburban Clusters and Corridors," *Transportation Research Record* 861. Transportation Research Board, Washington, D. C., 1982.
- Bassand, Michel, *Urbanization: Appropriation of Space and Culture*. New York: The Graduate School and University Center, City University of New York, 1990.
- Birch, David L., *The Economic Future of City and Suburb*. New York: The Committee for Economic Development, 1970.
- Blake, Stephen E., *Inner city Minority Transit Needs in Accessing Suburban Employment Centers*. Washington, D. C., USDOT, September, 1990.
- Boskoff, Alvin, *The Sociology of Urban Regions*. New York: Appleton-Century-Crofts, 1970.
- Canora: A Program For Neighbourhood Improvement*, City of Edmonton Planning Department, Rehabilitation and Redevelopment Branch, March, 1972.
- Cervero, Robert, *Suburban Gridlock*. New Jersey, Center for Urban Policy Research, Rutgers University, 1986.
- Clark, S. D., *The Suburban Society*. Toronto: University of Toronto Press, 1966.
- Demographic and Land Use Profile*, Planning and Development Department, City of Houston, June, 1992.
- Donaldson, S., *The Suburban Myth*. New York: Columbia University Press, 1969.
- Downs, Anthony, *Opening Up the Suburbs*. Washington: The Brookings Institute, 1973.
- Dunphy, Robert, "Urban Traffic Congestion: A National Crisis?" *Urban Land*, 44, 10 (1985), 2-7.B
- Ford, P. B. and T. J. Lomax, *Commuting Patterns in Texas Urban Areas*, 1193-1F, Texas Transportation Institute, College Station, Texas .
- Ganz, A., "Emerging Patterns of Urban Growth and Travel," *Highway Research Record No. 229*, Highway Research Board, 1968, pp. 21-37.
- Hawley, Amos, *Urban Society: An Ecological Approach*. New York: The Ronald Press, 1971.
- Houston-Galveston Area Council of Governments, *Access 2010: The Houston-Galveston Area Metropolitan Transportation Plan*, November, 1989.
- Kain, John F. (Ed.), *Race and Poverty: The Economics of Discrimination*. Englewoods Cliffs, New Jersey: Prentice-Hall, Inc., 1969.
- Kain, John F., *Housing Markets and Racial Discrimination: A Microeconomic Analysis*. New York: Columbia University Press, 1975.
- Kasarda, John D., *Population and Employment Change in the United States: Past, Present, and Future*. Washington, D. C.: National Research Council, Transportation Research Board, 1988.
- Lake, Robert W., *The New Suburbanites: Race and Housing in the Suburbs*. New Jersey: Center for Urban Policy Research, Rutgers University, 1981.

- Ledé, Naomi W., *The Impact of Changing Demographic Trends on Transportation Planning*. Washington, D. C.: A Study Funded by a Grant from the Office of University Research and Special Programs Division, U. S. Department of Transportation to the Southwest Region University Transportation Center, 1993.
- Lewis, David L., Daniel Hara, and Joseph Revis, *The Role of the Public Infrastructure in the 21st Century*. Washington, D. C.: National Research Council, Transportation Research Board, 1988.
- Nelson, M. D., D. Brand, and M. Mandel, "Use and Consequences of Timed Transfers on U. S. Transit Properties," *Transportation Research Record 798*, *Transportation Research Board*, Washington, D. C., 1981. North Central Texas Council of Governments, *Major Employers of Central Texas*. Regional Data Center, 1992.
- Nwokolo, Benedict, *Redesigning Local Transportation Service for Improved Suburban Mobility: The Problem of Accessibility for the Elderly and Low Income Residents*. Washington, D. C.: U. S. Department of Transportation, Urban Mass Transportation Administration, May, 1990.
- Orski, C. Kenneth, "Suburban Mobility: The Coming Transportation Crisis?" *Transportation Quarterly*, 39, 2 (1985), 283-296.
- Owens, Edward, *An Analysis of the Availability and Public Transit Accessibility of Suburban Employment Opportunities*. A Master's Thesis, Presented to the Faculty of the Graduate School, Texas Southern University for the Degree, Master of Science in Transportation Planning and Management, 1991.
- Reconnecting Youth: The Next Stage of Reform*. A Report From the Business Advisory Commission of the Education Commission of the United States, October, 1985.
- Reichert, James P. "Wanted: National Policy on Suburban Transit," *Transit Journal*, 5, 3 (1979), 37-42.
- Rice Center, *Houston's Major Activity Centers and Worker Travel Behavior*, A Study of Downtown, Greenway, City Post Oak, and the Energy Corridor, Houston, Texas, 1987.
- Spielberg, F. and S. Andrie, "The Implications of Demographic Changes on Transportation Policy," *Journal of the American Planning Association*, Summer, 1982, pp. 301-314.
- Texas Department of Transportation, *1991 Texas Transit Statistics*, Washington, D. C.: Federal Transportation Administration, 1992.
- Turner, Collie & Braden, *Suburban Mobility Study Report for Two Major Suburban Activity Centers in Houston, Texas*, May, 1992.
- U. S. Department of Transportation, *Moving America: New Directions, New Opportunities*. Washington, D. C. Statement of National Transportation Policy, Strategies for Action, February, 1990.
- U. S. Census, "Social and Demographic Characteristics of Texas." Arlington: Regional Data Center, North Central Texas Council of Governments, 1990.
- Washington, Earl and Robert W. Stokes, *Planning Guidelines for Suburban Transit Services*. Washington, D. C.: Office of Planning, USDOT, August, 1988.
- Westcott, D. N., "Employment and Commuting Patterns: A Residential Analysis," *Monthly Labor Review*, 102, No. 7, July, 1979.

Appendices

**50 LARGEST EMPLOYERS
HARRIS COUNTY — FIRST QUARTER 1992
(Listed Alphabetically)**

Top 10 Employers

Firm or Agency

Brown & Root Companies
Continental Airlines
Exxon Corporation
Harris County
Houston Independent School District

Firm or Agency

City of Houston
Shell Oil Company
U.S. Postal Service
U.T. Cancer Center (M.D. Anderson)
University of Houston

Next 40 Employers

Firm or Agency

Aldine Independent School District
Alief Independent School District
Amoco Production Company
Appletree Markets
Baylor College of Medicine

Chevron Corporation
Compaq Computer Corp.
Conoco
Cypress-Fairbanks Independent School District
Fiesta Super Mart, Inc.

Foley's (May Department Stores)
Harris County Hospital District
Hermann Hospital
Houston Community College System
Houston Lighting & Power Co.

ISS Servisystems
Katy Independent School District
M. W. Kellogg Co.
Klein Independent School District
The Kroger Co.

Firm or Agency

Memorial Hospital System
The Methodist Hospital
Metropolitan Transit Authority
NASA/LBJ Space Center
National Convenience Stores

P R M, Inc.
Pasadena Independent School District
Randall's Food Markets, Inc.
St. Luke's Episcopal Hospital
Sears, Roebuck and Co.

Sisters of Charity (St. Joseph's Hospital)
Southwestern Bell Telephone
Spring Branch Independent School District
Spring Independent School District
Texaco, Inc.

Texas Children's Hospital
Texas Commerce Bank
V.A. Hospital
Wal-Mart Stores, Inc.
Walgreen Drug Stores

SOURCE: Texas Employment Commission: ES-250 Descending Order List, Q1/92

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HOUSTON AREA FORTUNE 500 COMPANIES 1991

Rank		Company	Sales
1991	1990		(\$000,000)
15	14	Shell Oil	\$22,201.0
27	26	Tenneco	14,035.0
49	51	Coastal	9,602.1
86	82	Cooper Industries	6,162.6
94	76	Lyondell Petrochemical	5,757.0
145	136	Compaq Computer	3,271.4
159	173	Baker Hughes	2,911.9
168	192	Pennzoil	2,685.1
189	190	Maxxam	2,317.3
323	290	Union Texas Petroleum Holdings	1,069.3
377	--	NL Industries	841.5
402	443	Mitchell Energy (The Woodlands)	791.3
417	416	Imperial Holly (Sugar Land)	717.6
425	466	Baroid	708.1
426	417	Vista Chemical	705.4
446	465	Stewart & Stevenson Services	645.8
472	447	Quanex	588.9
491	--	Sterling Chemicals	542.7

SOURCE: *Fortune*, April 20, 1992

HOUSTON AREA FORTUNE SERVICE 500 COMPANIES 1991

Rank		Service Companies	Sales
1991	1990		(\$000,000)
3	2	Enron	\$13,522.1
11	12	SYSCO	8,149.7
37	38	Browning-Ferris Industries	3,196.9
			Assets
			(\$000,000)
		Banking	
57	45	First City Bancorporation of Texas	\$9,943.5
		Financial	
15	14	American General	\$36,105.0
		Insurance	
21	19	Variable Annuity Life	\$14,766.5
		Transportation	
			(\$000,000)
10	10	Continental Airlines Holdings	\$5,551.0
29	29	Exxon Pipeline	788.2
48	--	Seagull Energy	250.0
		Utilities	
			(\$000,000)
22	20	Houston Industries	\$12,028.8
40	38	Panhandle Eastern	6,176.5

SOURCE: *Fortune*, June 1, 1992

**MOTOR VEHICLE REGISTRATIONS IN HARRIS COUNTY*
1950-1991**

Year	Total Vehicle Registrations	Passenger Cars	Trucks	All Other Vehicles
		*** New Series ***		
1991	2,159,102	1,539,758	509,328	110,016
1990	2,183,505	1,542,026	504,994	136,485
1989	2,116,139	1,487,522	479,862	148,755
1988	2,102,796	1,492,087	474,981	135,728
1987	2,053,957	1,458,311	457,123	138,523
1986	2,079,163	1,442,749	492,005	144,409
		*** Old Series ***		
1986	2,218,937	1,510,631	521,056	187,250
1985	2,176,769	1,457,965	500,443	218,361
1984	2,215,625	1,480,784	476,370	258,471
1983	2,239,042	1,492,676	446,953	299,413
1982	2,209,989	1,475,866	427,615	306,508
1981	2,088,314	1,393,302	393,137	301,875
1980*	1,950,652	1,301,958	363,578	285,116
1979*	1,897,184	1,271,323	345,921	279,940
1978*	1,834,960	1,241,930	329,367	263,663
1977	1,771,776	1,211,639	311,678	248,459
1976	1,634,942	1,149,362	274,003	211,577
1975	1,521,245	1,075,996	241,578	203,671
1974	1,420,914	1,006,986	222,513	191,415
1973	1,353,483	967,828	208,057	177,598
1972	1,269,892	917,646	188,391	163,855
1971	1,181,242	865,162	172,648	143,432
1970	1,098,985	813,904	160,181	124,900
1969	1,035,346	777,255	149,282	108,809
1968	972,343	738,400	136,916	97,027
1967	909,570	695,008	124,052	90,510
1966	861,700	664,865	114,832	82,003
1965	811,552	631,215	105,105	75,232
1964	751,509	588,311	100,081	63,117
1963	710,043	555,914	91,888	62,241
1962	665,990	522,332	84,416	59,242
1961	615,947	489,547	78,638	47,762
1960	601,813	473,503	75,415	52,895
1959	576,018	452,955	73,424	49,639
1958	547,863	432,166	70,022	45,675
1957	535,583	425,444	68,863	41,276
1956	483,391	385,299	63,158	34,934
1955	469,967	372,650	65,585	31,732
1954	418,156	330,635	60,113	27,408
1953	380,822	299,615	56,072	25,135
1952	343,038	267,749	51,768	23,521
1951	333,462	260,731	51,066	21,665
1950	306,870	242,208	44,808	19,854

*Data prior to 1986 (Old Series) appear to be overcounts; data for 1978-1980 are estimates.
SOURCE: Office of the Tax Assessor-Collector, Harris County

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KEY ENERGY ACTIVITY AND PRICE INDICATORS

Active Domestic Rotary Rigs

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
1980	2,671	2,613	2,658	2,682	2,797	2,850	2,953	3,045	3,099	3,148	3,220	3,286	2,919
1981	3,386	3,502	3,595	3,728	3,816	3,926	3,998	4,131	4,241	4,351	4,436	4,520	3,969
1982	4,436	4,160	3,816	3,460	3,178	2,908	2,746	2,620	2,483	2,401	2,500	2,696	3,117
1983	2,622	2,192	2,003	1,846	1,926	1,979	2,039	2,156	2,252	2,382	2,572	2,780	2,229
1984	2,666	2,423	2,245	2,120	2,277	2,363	2,388	2,417	2,420	2,492	2,629	2,713	2,429
1985	2,452	2,188	1,955	1,877	1,865	1,858	1,909	1,931	1,930	1,879	1,912	1,950	1,976
1986	1,810	1,444	1,139	906	781	705	686	730	725	820	899	963	967
1987	900	818	772	754	763	788	901	1,003	1,101	1,124	1,152	1,162	936
1988	1,076	976	951	920	891	897	912	930	927	923	918	924	936
1989	841	762	753	771	754	795	832	886	955	984	1,041	1,065	869
1990	998	911	905	935	961	999	1,010	987	1,042	1,073	1,137	1,136	1,010
1991	1,068	984	925	854	819	867	844	803	775	795	808	796	860
1992	710	669	648	642	638	621	676	686	717	803	882	926	722
1993	824	684											

SOURCE: Baker Hughes Incorporated

Crude Oil Spot Price West Texas Intermediate (Average, \$/Bbl)

1983	30.86	29.20	28.83	30.58	30.03	31.11	31.68	31.89	31.20	30.40	29.85	29.23	30.41
1984	29.89	30.15	30.75	30.58	30.54	29.88	28.72	29.26	29.30	28.60	28.07	26.61	29.36
1985	25.79	27.36	28.38	28.60	27.74	27.17	27.30	27.79	28.35	29.64	30.92	26.97	28.00
1986	22.64	15.23	12.54	12.95	15.36	13.29	11.49	15.32	14.89	14.90	15.07	16.23	14.99
1987	18.70	17.65	18.41	18.67	19.45	20.10	21.37	20.20	19.58	19.78	18.75	17.17	19.15
1988	17.15	16.50	16.36	17.83	17.47	16.32	15.68	15.51	14.79	13.73	14.10	16.58	16.00
1989	17.92	17.94	19.46	20.86	20.01	20.02	19.82	18.57	19.52	20.14	19.89	21.10	19.60
1990	22.74	22.11	20.39	18.43	18.50	16.75	18.44	27.38	33.34	35.95	32.43	27.36	24.45
1991	24.91	20.47	19.84	20.87	21.22	20.26	21.43	21.68	21.91	23.25	22.53	19.46	21.49
1992	18.82	19.05	18.91	20.23	21.00	22.37	21.74	21.35	21.86	21.71	20.32	19.41	20.57
1993	19.12	20.09											

SOURCE: Platt's Oilgram News

Natural Gas Wellhead Spot Price (Gulf Coast Average, \$/mcf)

1985	2.83	2.86	2.65	2.63	2.60	2.56	2.46	2.44	2.30	2.19	2.14	2.15	2.48
1986	2.05	2.03	1.92	1.63	1.49	1.48	1.42	1.34	1.36	1.37	1.38	1.35	1.57
1987	1.47	1.52	1.49	1.43	1.42	1.40	1.35	1.31	1.30	1.34	1.47	1.71	1.43
1988	1.97	1.84	1.60	1.38	1.32	1.36	1.39	1.49	1.64	1.65	1.77	1.92	1.61
1989	1.83	1.56	1.39	1.45	1.56	1.57	1.52	1.50	1.41	1.42	1.55	1.86	1.55
1990	2.20	1.50	1.31	1.31	1.31	1.33	1.32	1.28	1.39	1.61	1.87	2.04	1.55
1991	1.65	1.26	1.30	1.21	1.18	1.17	1.02	1.22	1.31	1.62	1.72	1.69	1.36
1992	1.51	1.11	1.19	1.32	1.43	1.46	1.55	1.82	2.10	2.18	2.19	2.11	1.66
1993	1.85	1.71											

SOURCE: Platt's Oilgram News

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