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SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER

**A Residential-Employment Matrix
for Evaluating Public Transit
Service Delivery:
Implications for Public Policy and Energy
Conservation**

by

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ABSTRACT

This research proposes to evaluate alternative methods currently employed to improve accessibility to dispersed employment centers. Previous studies provide insight into the nature of service configuration pattern, institutional arrangements for increasing service effectiveness, and the design and utilization of appropriate marketing strategies and practices to meet customer needs and improve public transit service delivery. Between 1970-1980 the growth in suburban areas mushroomed as a result of sprawling development patterns induced by an automobile-oriented transportation infrastructure. This suburban growth has resulted in the creation of more densely developed minihubs in many metropolitan areas. Such clustering of development has produced a viable base on which to develop a network of suburban transit routes.

The study examines the feasibility of service configuration patterns that focus on a residential-employment linkage and how to achieve a variety of service objectives: serving existing riders at less cost; improving service to strategic market segments, such as urban and/or elderly riders; and attracting new markets at the least incremental cost. The methodologies employed provide a mix of bus, van and car-pool service and a system of "reverse commuting" for central city residents through existing suburban services. The overall objective is to evaluate public transit service delivery models and determine the efficacy for providing better service to diverse markets.

EXECUTIVE SUMMARY

With the dramatic transition in job location and availability, there is a significant need for accessing suburban areas for employment. Public transportation providers need to be trendsetters in establishing travel opportunities that take into consideration trip reduction and congestion management, while simultaneously providing alternatives for inner city residents, specifically minorities, to access job position in suburban areas.

The major purpose of this research was to evaluate alternative methods of transportation currently in use, to determine their applicability for improving accessibility to employment opportunities and to examine several models believed to have the potential for improving public transit access to jobs. The research objectives focus on evaluating public transit service delivery models and determining their efficacy for providing better service for diverse markets. The study objectives were to: 1) Document existing service market configuration and service delivery models (State -of the-Art Document); 2) Assess the relevancy of service delivery models and analyze organizational innovations and service configurations and marketing; and 3) Develop plans and strategies, based on accurate comprehensive data, to provide alternative service delivery models for improving public transit access and use.

Data were obtained by conducting a field enumeration. The assessment instrument was designed with two primary emphasis: 1) to obtain responses key to determining present travel patterns and 2) to get attitudinal responses toward potential transportation alternatives, specifically as related to public transit systems. The survey was administered door-to-door to residents in the Houston, Third Ward area. The interviews were conducted by transportation studies planning and management graduate students. The surveyors went to over 650 homes from which they obtained thirty-seven percent

response rate. Following survey completion the data was coded and input into an advanced statistical software package to perform data analysis.

Data analysis of the questions designed to determine present journey-to-work patterns yielded the following findings:

- ◆ The majority (45%) of the survey respondents travel to work via driving alone and a personal vehicle;
- ◆ Thirty-three percent responded that their means of transportation to work is by bus;
- ◆ The majority of respondents travel between five and ten miles to work;
- ◆ Almost 15% of the unemployed respondents, excluding those retired, reported lack of transportation as the reason for their unemployment; and
- ◆ Twenty-five percent of the survey participants presently commute to the suburbs for employment, where 68% of them drive alone, 20% of them utilize bus service and 12% of them carpool.

In analyzing the data obtained from the questions geared to determine attitudinal perceptions toward travel alternatives, the following findings were key:

- ◆ Fifty-nine percent (59%) responded they would be responsive to traveling to the suburbs for work, if transportation was provided;
- ◆ Eighty-five percent (85%) responded that they were willing to spend up to but not more than \$20 a week to get to work; and
- ◆ The majority of people willing to travel to the suburbs for employment would prefer travel via carpooling/vanpooling as oppose to riding the bus.

Based on the data collected, the Center for Transportation Training and Research (CTTR) has formulated a demonstration project to incorporate the data findings into a model of transportation believed to improve service delivery for diverse markets, particularly, accessibility to employment opportunities in suburban areas. The methodologies to be employed provide a mix of bus, van and car-pool services. The purpose is to establish transportation means that increase inner city residents accessibility to suburban jobs by

utilizing present transportation models while simultaneously creating new and improved alternatives.

These new alternatives will result in energy savings, as well. For example the energy savings by eliminating 10 single occupant trips for an eleven miles one way (22 mile round) trip would save 1.3 million BTUs (5983 BTUs are utilized for each vehicle mile per Oak Ridge National Laboratories). This estimate could be conservative since more than 23% of the respondents travel in excess of 16 miles to work.

CHAPTER 1

INTRODUCTION

A report published by the Transportation Research Board (1987) indicates that because of one principal hub, the central business district (CBD), transit properties generally have viewed the widely dispersed travel patterns typical of suburban sprawl as an unfavorable market for public transit. However, recent growth in suburban employment has spawned the development of large regional office and retail complexes. This recent boom has resulted in the creation of more densely developed minihubs in many metropolitan areas, creating the potential for providing a viable base on which to develop a network of suburban transit routes.

At present, many large urban centers are in at least one of two fundamental transitions:

- 1) A *Functional* transformation--these cities are experiencing a change from centers of production and distribution to centers of administration and information exchange; and/or
- 2) A *Demographic* transformation-- where the resident populations are changing from predominately White to predominately Black, Hispanic and other minorities. Distinctive of the functional transformation have been changes in both the composition and size of their overall employment bases.

Simultaneous with the changing economic development patterns, is a state of transition considered to be suburban sprawl. (Mushroomed growth in suburban areas as a result of sprawling development patterns induced by an automobile-oriented transportation infrastructure.) Suburban population, in most metropolitan areas, has experienced phenomenal growth in every region of the country. According to Lave (1988), the

population in the ten largest urban areas decreased over 35 percent, while population in the ten largest suburban areas rose by more than 60 percent. Accompanying the suburban sprawl, there has been documented increase in the number of blue collar jobs shifting from inner city to the suburbs.

As a result of the changing economic development patterns and suburban sprawl, the location and availability of jobs for the general population has been impacted. Residential migration accounts for many of the larger employment centers found in the suburbs. In addition to the new employment centers, many of the other fundamentals of living are located in suburban areas (i.e. shopping centers, grocery stores, banking centers, dry cleaning services and child care facilities, etc.)

According to Blake (1989) during the past forty years, nearly two out of every three new jobs created have been in the suburbs of metropolitan areas, and most are not accessible by public transportation. Consequently, many inner city residents are now faced with a great challenge of how to follow these new jobs. This issue is a particular problem for lower income minorities. Accordant with the demographic transformation described earlier, lower income minorities now make a great portion of urban city populations. Many inner city residents do not have as an advantage the ability to relocate to suburban areas. Due to obvious economic restrictions, the residents are also dependent on public transit for their means of transportation. This employment based sprawl/transformation has created a precarious situation for public transit.

PROBLEM STATEMENT

This research was designed to address issues associated with disadvantaged urban minorities caught in the web of change. The problem to be addressed is how to increase mobility options of the urban disadvantaged to maximize access to employment. Thus, alternative service delivery models designed to improve public transit accessibility must be evaluated to determine their overall effectiveness.

BACKGROUND AND OVERVIEW OF RELATED LITERATURE

Previous studies tend to provide insight into the nature of service configuration patterns, institutional arrangements for increasing service effectiveness, and the design and utilization of appropriate marketing strategies and practices to meet customer needs and improve public transit service delivery. Land-use development patterns of recent decades have produced a difficult market for the traditional central-city-focused transit service provider.

Nowlan and Stewart (1991) analyzed the relationship between the residential and employment locations of workers living in a public housing project. His findings indicate two generalizations: (1) low income workers find employment in almost all areas where public transportation is available, and (2) families living in substandard housing will move to good low rent housing, even though they must travel farther to work. Several scholars examined the length of the journey-to-work by studying the socioeconomic characteristics of workers such as occupation, income, sex, and size of family. It was concluded that the length of work-trips depended on occupation and sex of workers. Furthermore, the high income occupation workers had a longer journey-to-work than the low income occupation workers. Looking at the wage and salary workers, the higher income employees travel further than do the lower income employees.

However, Williams, Whittle, Fulter and Lapuz (1983) have shown a great variety of reasons for travel distances among different social groups. Travel distances vary because of the occupational group's distribution. Furthermore, the distribution of local jobs was probably an important explanatory factor in different commuting behaviors. In addition, family income proved to be the most significant of the socioeconomic factors. Gordon, Richardson and Jun (1991), suggested that income shares a high degree of collinearity with all the other socioeconomic variables considered. A high income family would be more likely to have more than one car, higher educational attainments and so forth. Furthermore, Richardson stated that the knowledge of family income associations provides sufficient and necessary conditions for explanation and prediction. This becomes quite meaningful, in a cost reduction sense, for analysts. In fact, through analytical study, it is possible to use family income to generate other socioeconomic variables. This would substantially reduce the costs of data collection and processing.

An examination of the findings of previous studies also reveals certain common themes central to the analyses and evaluation of service delivery models and approaches. Issues enumerated include those models that focus on ridership increases, improved service effectiveness, and organizational change (Schneider and Smith, 1981; Newman, et. al, 1983; Blake, 1990). Existing findings indicate that concern about rising industry costs and reluctance to increase public subsidies have caused public transit operators to consider alternative service arrangements as one of the means for increasing the efficiency, and thus reducing the cost for service. The usual strategies of attempting to reduce deficits through fare increases of service cutbacks are second-best alternatives, given the industry's primary mission of providing affordable and adequate service (TRB, 1987).

According to Krueckeberg and Silvers (1991), the model is not a new theory nor is it an optimum plan for a community, however, it is an additional tool that allows the planner

relatively easily, to strengthen, sharpen, and streamline the work. In using different models, land use projections are converted into planning variables, i.e. number of households, number of retail and non-retail employers, etc., used to compute trip productions and attractions for traffic analysis zones. The model simulates future locational decisions of land uses and activities allowing the projection and study of probability to be developed. Therefore, there was a need to use a model to allocate all of the uses in any given time period, since it would then recycle and begin a new time period by reading the data for the new time period.

Boyce (1980) feels as though the use of models provides efficient algorithms for solving the urban trip assignment problem. Models can be extended to incorporate the trip distribution component with several variable demand functions, which interpret the zone-to-zone trip variable in the context of urban location models. The result of the analysis is synthesized from the mathematical framework based on the network equilibrium problem.

Brown and Weiner (1989), focus on the issues and problems that arose in the preparation of the data after using the model. In the interest of time and cost, several planners decided not to collect original data for the model calibration and to therefore rely on recent studies and available data from other agencies.

Giuliano stated that the transportation systems role in fostering growth and affecting land use structure has been of great interest to planners. The historical record demonstrates that land use changes and transportation investments go hand in hand. Several factors must be considered when examining land use and transportation changes, distinguished from growth, level of intensity of the transportation investment, the level of analysis and the longevity and durability of urban structure.

Land use must be distinguished from growth. Many scholars find this to be difficult since most of the land use changes observed in conjunction with transportation improvements are manifestations of economic growth. The emphasis is on the form these land use changes take rather than on the economic implications of these changes. The form of land use of a commercial development can occur as a garden office development as well as a multistory skyscraper. *The level of analysis is* a factor that shows to have very limited impact, however, that significant changes might take place in the vicinity of the new system. A new freeway segment that carries a third of the daily workers per day is hardly perceptible from a regional perspective. *The longevity and durability of urban structure is* a factor that deals with the residential and commercial structures that make up the urban landscape which are valuable and long-lived investments. Furthermore, the location of the transportation investment is important, whereas, the potential rate of change in reference to land-use is much lower in developed areas than in undeveloped areas.

Unfortunately, Kelley and Williamson (1984) were not able to relate their analysis to the land use and transportation patterns in the cities they studied, since their model operated at an aggregate level. Given the small percentage of total income allocated to transportation energy expenditures in the average household, even large increases in energy costs failed to provide significant incentive for households to relocate within the metropolitan area. Because many issues are still unresolved relative to the most desirable options for improving service efficiency and providing adequate services for urban and suburban residents, there is need to evaluate service delivery models to determine their applicability to multihub service configuration patterns.

PURPOSE AND OBJECTIVES

The major purpose of this research was to evaluate alternative methods of transportation currently in use to determine their applicability for improving accessibility to employment opportunities and to examine several models believed to have the potential for improving public transit access to jobs.

One service delivery model involves suburban employers and developers taking the lead in opening new routes for outbound city commuters who need workers. Another model provides a mix of bus, van, and car-pool service.

A series of service delivery models designed to provide "reverse commuting" for central city residents through the use of existing suburban services were evaluated during this study. A set of criteria was developed for the selection of sites that were to be part of the study effort. Mandatory items included: demographics, socioeconomic variables, transit availability, residential and employment locations. Data were collected on the following:

- Demographics- evaluation of demographic breakdown of area.
- Socioeconomic- where area could sustain economic growth over the short term thus providing marketing conditions to support reverse commuting efforts,
- Transit Availability- ability of transit agencies to satisfy the reverse commute,
- Residential Location vs. Employment- develop a technique for evaluating each alternative in terms of tangible and intangible costs and benefits and aggregate where possible,

- Travel needs, private sector and minority involvement-the study employed a multi-stage process for estimating residential and employment patterns. A simulation will assume that future basic employment will occur in areas/zones of the study sites.

The research objectives focus on evaluating public transit service delivery models and determining their efficacy for providing better service for diverse markets. The study objectives include the following:

- Objective #1** Document existing service market configurations and service delivery models. (State-of-the-Art Document).
- Objective #2** Assess the relevancy of service delivery models and analyze organizational innovations and service configurations and marketing.
- Objective #3** Develop plans and strategies based on accurate comprehensive data and assess alternative service delivery models for improving public transit access and use.

CHAPTER 2

STUDY DESIGN AND METHODOLOGY

The instrument of investigation for this pilot study was a 27 question survey. The survey was designed with two primary emphases : 1) to obtain responses key to determining *present travel patterns* and 2) to get attitudinal responses toward *potential transportation alternatives*, specifically as related to public transit systems.

Each of the survey questions could be categorized into one of three areas. The first category of questions sought answers to questions on the socio-economic status of the respondents; the second, on present journey to work travel patterns and third on attitudes to potential travel to work alternatives.

The survey was administered door-to-door to residents in the Third Ward area of Houston. The interviewers were graduate students in the Transportation Planning and Management program at Texas Southern University. The study supervisors were Research Associates with Center for Transportation Training and Research. Prior to actual field enumeration, the interviewers were trained and coached in preparation for the survey. During this time, the survey was pre-tested and revised to insure that only questions capable of eliciting significant response to address the research issues were presented to the survey participants.

The survey was administered over a period of two weeks between the hours of 10 am and 4 pm, 4 days a week and from 9 am to 5 pm on two separate Saturdays and one Sunday.

The surveys were administered on the weekends in an effort to get sufficient population representation from individuals who may work from 8am to 5pm, Monday thru Friday.

The residents were randomly selected according to a pre-established method which insured a broad representation of residents. Only responses from residents over the age of 16 were applicable. The initial questions of the surveys were used to establish respondent eligibility.

The surveyors went to over 650 homes in the Third Ward area to obtain survey responses. However, there was no answer at 55% of the homes and 10% of the residents refused to respond. As a result the survey yielded a 37% response rate with a final n of 241.

Upon completion of survey administration, the data were carefully coded and input into Minitab (an advanced statistical software package) to perform data analysis. This permitted us to cross tabulate social, economic and attitudinal variables. For the purpose of the study, the analysis of the attitudinal responses were cross comparisons with a number of other variables, particularly those concerning socio-economic status (i.e., age, education, occupation, salary) and with present travel patterns. **See Appendices** for a copy of survey instrument.

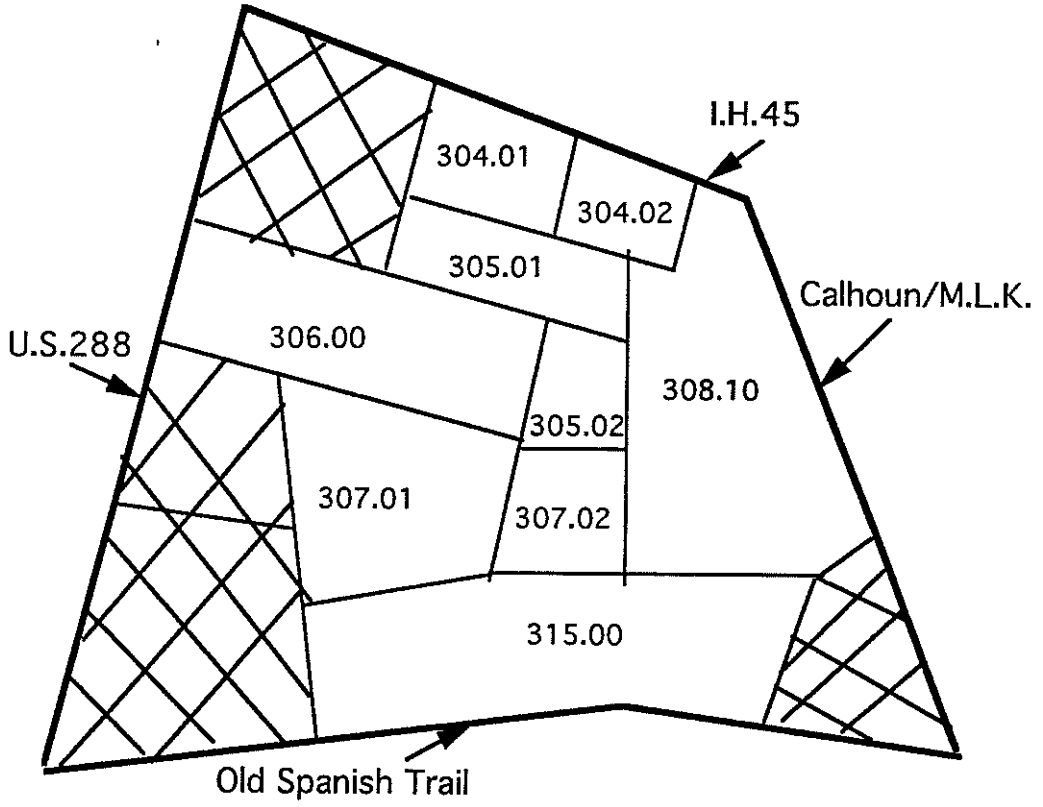
THIRD WARD AREA DESCRIPTION

This study focused on the Third Ward area which is located in the Houston Metropolitan area. The Third Ward community is defined by the City of Houston Planning and Development Department to include 9 Census Tracts: 304.01, 304.02, 305.01, 305.02, 306.00, 307.01, 307.02, 308.10 and 315.00. (See map 1). The Central Business District is census tract 121. The combination of these Census Tracts comprise 5.68 square miles or 3637 acres of land. Third Ward encompasses numerous old inner city neighborhoods and is bounded by I-45 (north), Old Spanish Trail-OST (south), Martin Luther King Boulevard/Calhoun (east) and U.S. 59N/288 (west). (See map 2).

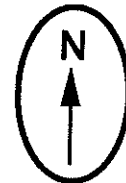
Third Ward has been a part of central Houston for more than a hundred years. Third Ward was initially designated as one of six wards established as part of the City of Houston's original ward system. Third Ward is predominantly residential, but also encompasses commercial and service establishments and two higher education institutional facilities. This mixture deems the community as potentially rich in socio-cultural and economic development. Third Ward is the home of two of the most renowned universities in the state of Texas: Texas Southern University, one of the oldest and largest Historically Black Colleges and Universities and the University of Houston (central campus) one of the state and country's more competitive universities. (Petersons, 1993). Third Ward is in proximity to the Central Business District and the Texas Medical Center. Other attributes of the community are MacGregor and Herman Parks and zoo, several schools in Houston Independent School District, Riverside Clinic and Hospital and numerous other service and community centers.

Typical of most central city neighborhoods around the country, Third Ward has been victim to gradual deterioration, specifically as related to the physical environment. Third Ward has a population of 29,485 which indicates a 35 percent decrease from 1980

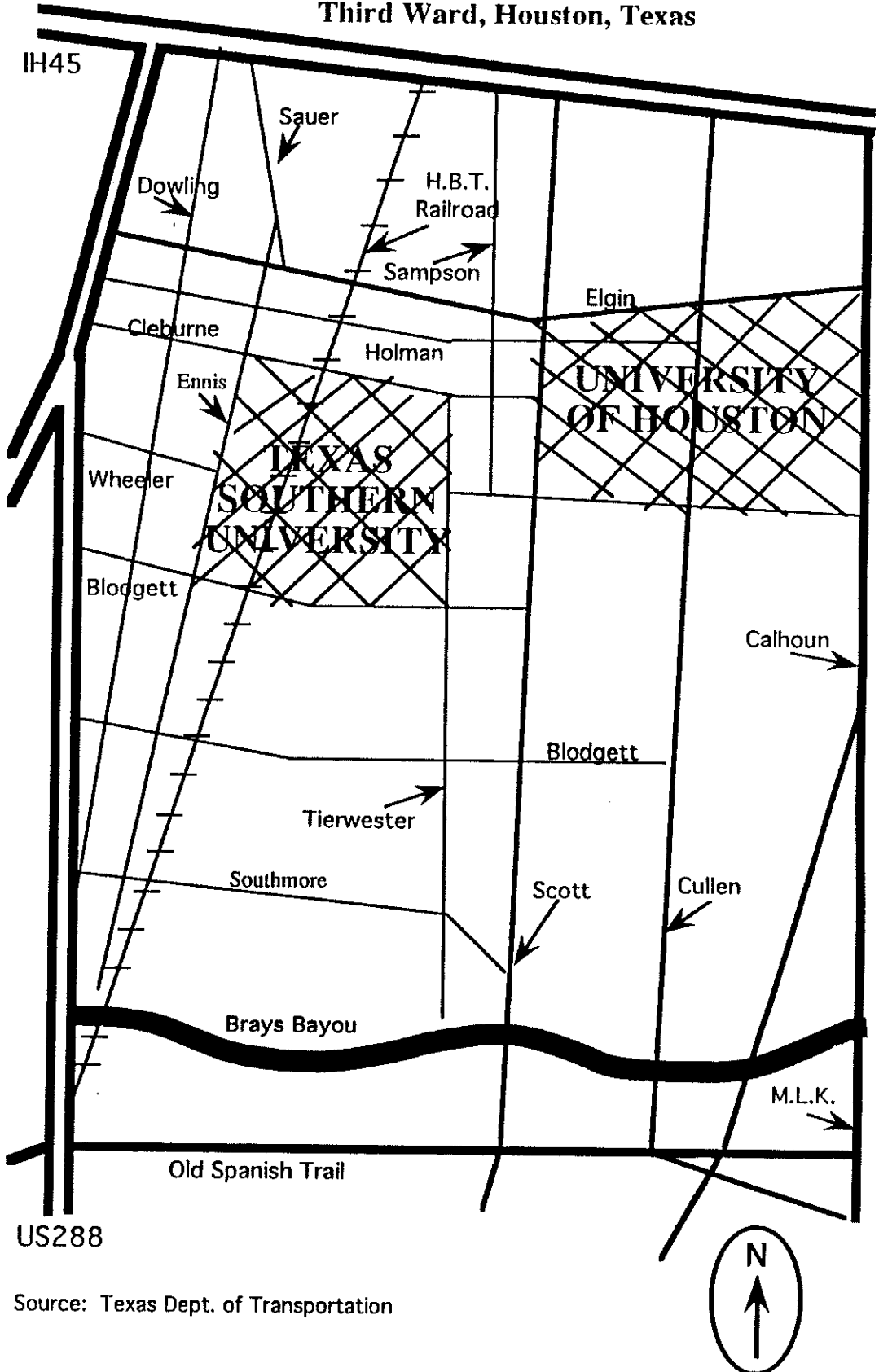
Map 1
Census Tract Representation of Third
Ward, Houston, Texas



Source: City of Houston, 1993



Map 2
Third Ward, Houston, Texas



Source: Texas Dept. of Transportation

(45,638). (City of Houston Planning Department). This marked decrease in population is a direct indication of the decline of area vitality. Over the years the area has experienced a "*demographic transition*" from mostly white, blue-collar residents to a predominantly black, lower income population. However, there are still numerous higher income households, mostly located just north and south of Brays Bayou which is in the southern part of the Third Ward area.

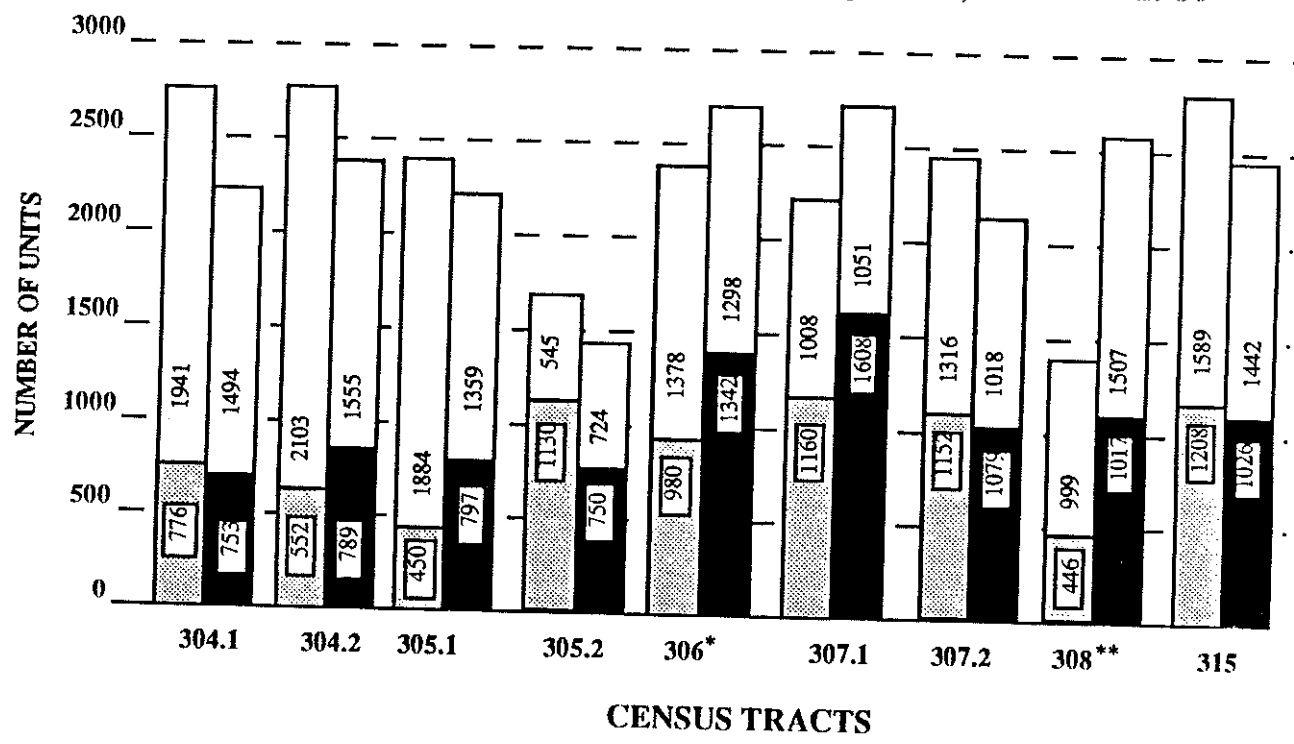
The evident urban decay in services and facilities can be attributed to numerous factors. Over the years, there has been a high degree of neglect and abandonment of the homes and commercial establishments in the area. This abandonment directly affects the vitality and quality of life of the area residents. Resident are provoked to relocate which inturn produces a socio-economic cycle of abandonment and deterioration leaving the community in a state of flux and instability. Additionally, the community has experienced a high crime rate (typical of any metropolitan area), and a decline in housing stock.

Socio-economic Support for Reverse Commuting

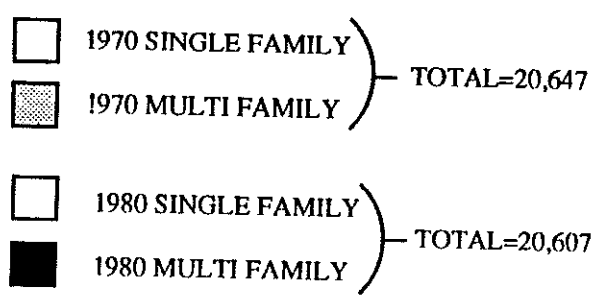
Despite the steadily decreasing population and increasing commercial and service abandonment, the Third Ward area is far from total degeneration. There is some evidence that suggests that the Third Ward area may be in the early stages of revitalization. The contributors to this potential revitalization include: 1) the fact that the area is in proximity to the CBD and the expanding medical center complex, two of Houston's major employment centers, 2) the accessibility to other areas of commerce and industry via the bordering freeways, 3) the proximity to higher education facilities and 4) the rising concern for environmental protection and improvement emphasizing fuel conservation and pollution control. Other factors include the fact that despite the decline

in total housing units, the number of multi-family units increased by about 16 percent from 1970 to 1980 (see fig 1). (HGAC, 1983)

Figure 1
Comparison of Multi and Single Family Units, 1970 and 1980



* Represents only 80% of Census Tract 306
 ** Represents only 70% of Census Tract 308



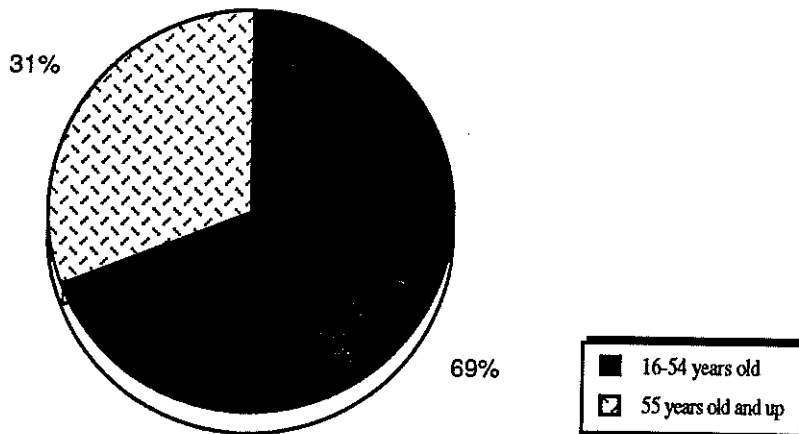
Source: 1970 and 1980 Census

CHAPTER 3

SAMPLE POPULATION DEMOGRAPHICS

For the purpose of this survey, CTTR randomly sampled from the core Census Tracts: 305.01, 305.02, 306, 307.01 and 307.02. (See map-3). These tracts comprise a total population of 15,439, 53% of the total Third Ward population. Of the surveyed households, 94% of the respondents are African-American, 2% Hispanic, 1% White, and 3% other. Most respondents are typical working age, between 16-54 (69%). However the age group 55 and above proved to be the largest single category. (figure 2) (See Survey Q.#3) The collected data indicates that there are more females (58%) than males residing in the area. Forty-seven percent of the population is married, 41% single and the remaining 12% are divorced. (For the purpose of this study widowed individuals were considered married.)

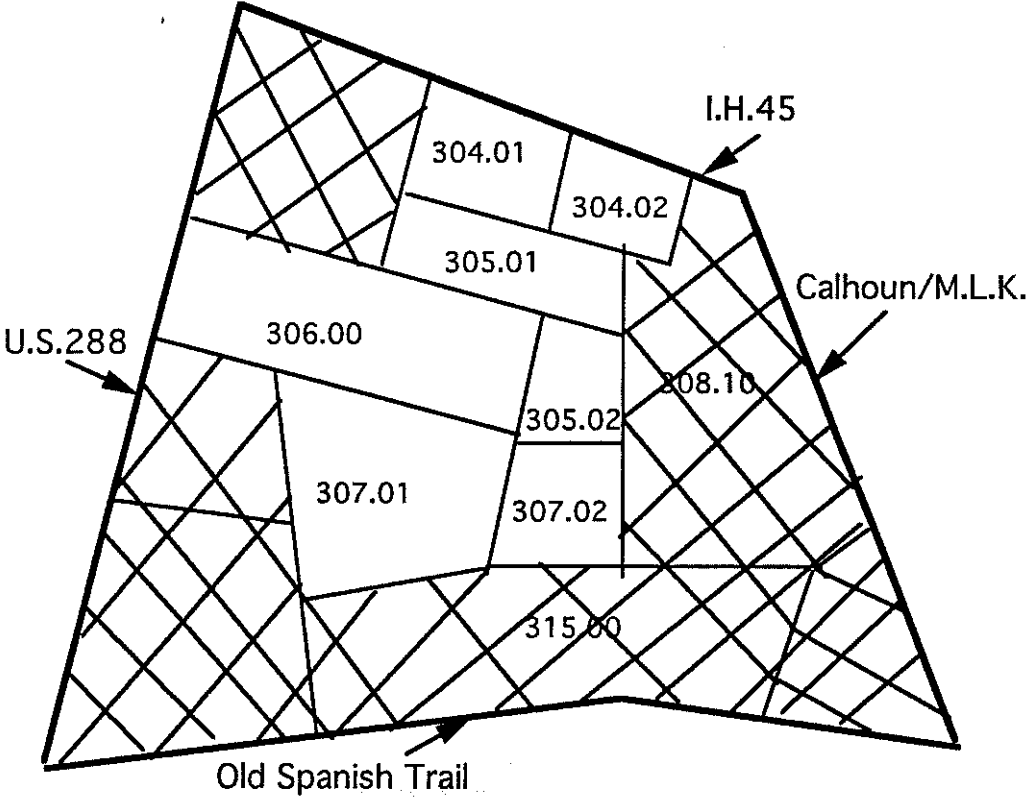
Figure 2. Age of Survey Respondents, Third Ward, Houston, Tx.



Source: CTTR, Texas Southern University, 1993

Data collected indicate that a large portion (31%) of the residents have lived in the Third Ward community 11 or more years with a high correlation between these residents

Map 3
Census Tract Representation of Survey
Area-Third Ward, Houston, Texas

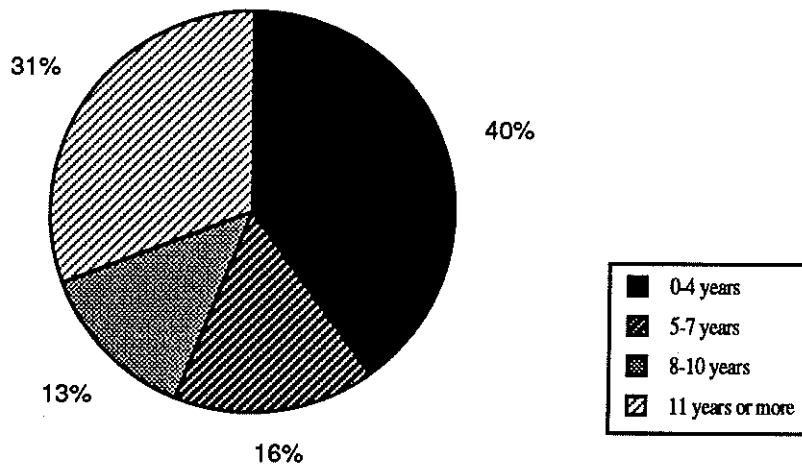


Source: City of Houston, 1993



and the residents 55+ years old. However, the largest portion of the residents (38%) have lived in the community four years or less which is highly correlated with residents in the age group of 16-25. (See figure 3) Looking at the specifics of the area, these findings suggest that residential distribution could be represented by a hyperbole that reflects the extremes that many of the younger residents are probably students at one of the area universities that have not lived in the community long.

Figure 3. Length of Residence, Third Ward, Houston, Tx.

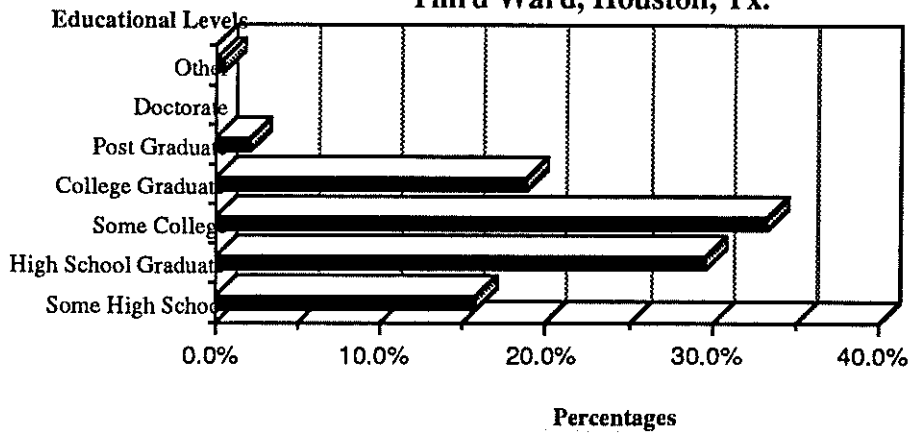


Source: CTRR, Texas Southern University, 1993

Education

Analysis of the data relative to educational attainment indicates that the completed levels of education varied. The greatest portion of the population, 33% responded that their highest level of education completed was *some college*. Twenty-nine percent responded that their highest level of education completed was *high school graduation*. Nineteen percent of the respondents said that they were *college graduates* with a significantly smaller portion (less than 3%) continuing on to *post graduate* and *doctorate work*. Sixteen percent responded that they had *completed some high school* but had not graduated. (see figure 4)

Figure 4.
Education Levels,
Third Ward, Houston, Tx.

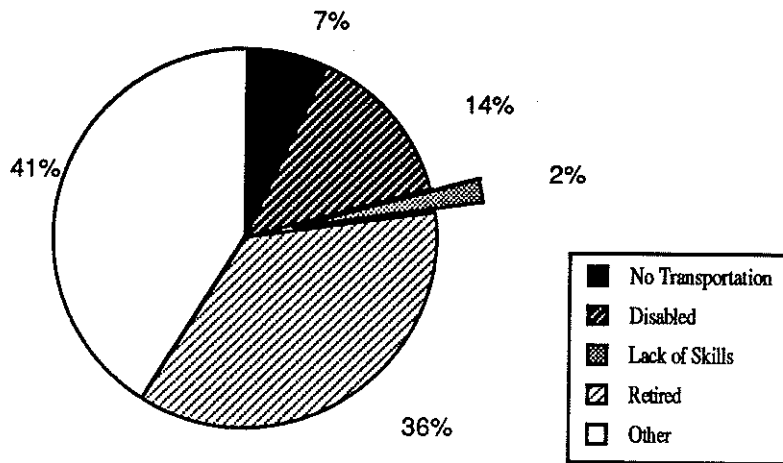


Source: CTTR, Texas Southern University, 1993

Employment

Only 42% of the respondents said they are employed. Illustrated in figure 5, are the varied reasons for unemployment, however, the majority (41%) of the unemployed population is a result of retirement. Other reasons for unemployment included 14% responding due to physical or mental *disability*, 7% as a result of *no transportation*, 2% because of *lack of skills*. A large pool of unemployed residents responded *other* without elaboration (36%).

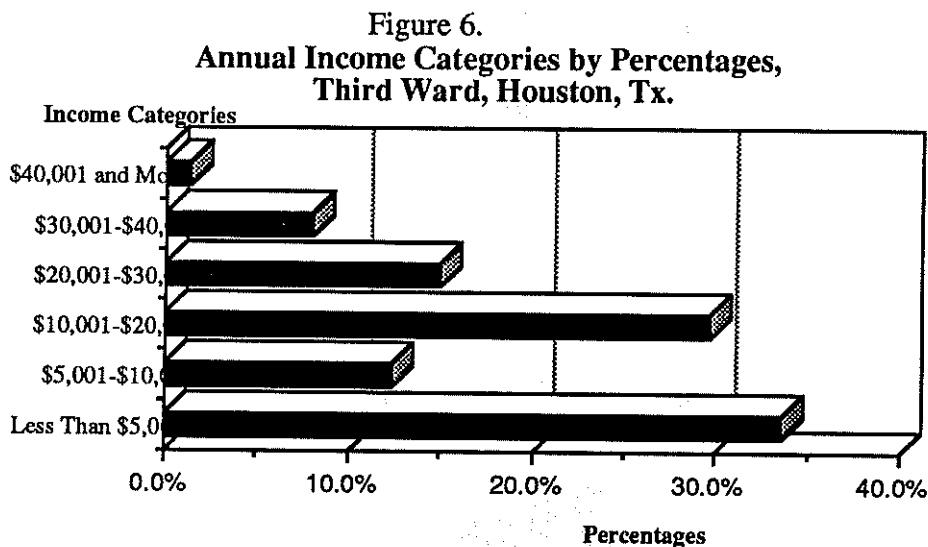
Figure 5.
Reasons for Unemployment,
Third Ward, Houston, Tx.



Source: CTTR, Texas Southern University, 1993

Income

The current annual salaries of the respondents are lower than that of the average Houstonian. The fact that Third Ward is considered as a predominately lower income black community is reflected in the income distribution. Thirty-four percent of the respondents have an income of \$5,000 or less annual salary, representing the largest portion of the sample. A great deal of this income bracket can be accounted for as a result of retirement. Thirty percent the next highest income bracket, reported receiving salaries between \$10,000 and \$20,000 a year. Fifteen percent bring home an annual salary between \$20,001 and \$30,000, 8% make between \$30,001 and \$40,000 and 1% make \$40,001 or more. (see figure 6) Consequently, there is a high correlation between annual salary and educational attainment.



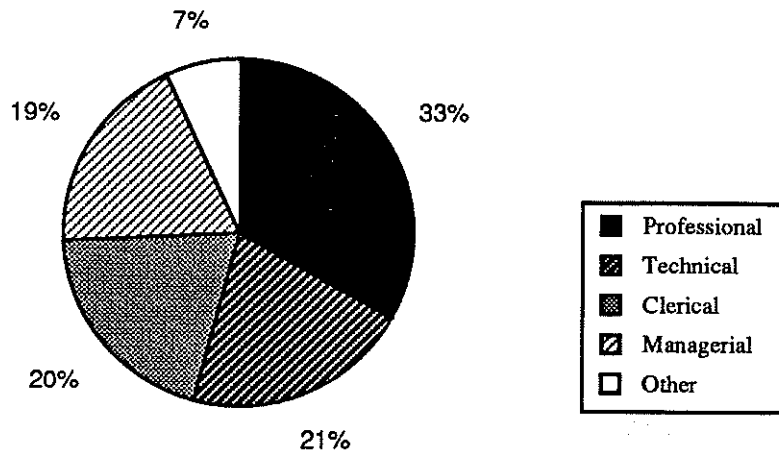
Source: CTR, Texas Southern University,
1993

Job Classification and Preparation

The largest number of employed persons included in the study classified themselves as *professionals* (33%). (see figure 7) Twenty-one percent classified themselves as *technical* workers, 20% have *clerical* jobs, 19% are in *managerial* positions with the

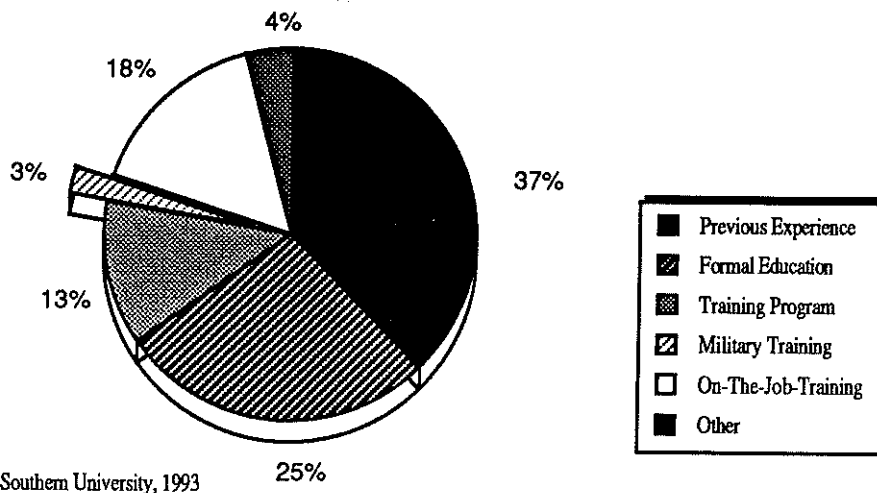
remaining 7% of the employed persons classifying their occupations as *other*. The majority (37%) of those employed qualified for the positions they presently have as a result of *previous experience* with 25% of those employed qualified as a result of *formal education*. Of note, is the fact that 53% of those who prepared for their present positions via formal education are in professional positions. (see figure 8)

Figure 7.
Job Classifications,
Third Ward, Houston, Tx.



Source: CTTR, Texas Southern University, 1993

Figure 8.
Preparation for Work,
Third Ward, Houston, Tx.



Source: CTTR, Texas Southern University, 1993

CHAPTER 4

PRESENT TRAVEL PATTERNS

"Transportation is the most vital component of today's mobile lifestyles." (Blake, 1989)

One of the core concerns of transportation issues is the commute from residence to employment. The present travel patterns are reflective of long established travel behaviors. The survey administered had numerous questions devoted to the retrieval of responses as related to present travel patterns and circumstances that may have preempted their existence.

Means of Transportation to Work

The data collected indicate that 45%, the majority, of the survey respondents travel to work via *driving alone* in a personal vehicle. Thirty-three percent responded that their means of transportation to work was by *bus*. 10% opt to *walk* or ride a *bicycle* to work, 7% *carpool* or *van pool* and 5% use some *other* means of transportation. The survey responses are very consistent with the information for the area shown in Houston-Galveston Area Council's (HGAC) U.S. Census journey to work report. HGAC reported that 45% of the area residents drive alone to work, 30% ride the bus, 9% carpool or vanpool, 11% walk or ride a bicycle and 1% use some other means of transportation. (See figure 9)

Travel Time

An essential factor of the travel to work patterns is the time it takes one to reach their place of employment from their place of residence. The majority (22%) of respondents indicated the their normal one way travel time is between five and ten minutes. This is anticipated considering the location of the sample area relative to the CBD and Texas

Medical Center. As mentioned earlier, Third Ward is an optimal residential location for those concerned with proximity to the Central Business District and/or the Texas Medial Center. Approximately 18% indicated that their travel time spans between *17-21 minutes*, 16% responded *11-16 minutes*, 12% (each) responded that their travel time is between *22-26 minutes* and *36-45 minutes*, and 10% travel 46 or more minutes. Additionally 9% said they travel between *27 and 35 minutes* one way to work. Despite the wide distribution of responses in regard to travel time this information can only be properly analyzed when cross tabulated with the distance traveled to work.

Miles Traveled to Work

Twenty-six percent of the employed respondents travel between *zero and four miles* one way to work and 34% travel between *five and ten miles* to work. Another 15% travel between *11 and 16 miles* to work, 13% between *17 and 21 miles*, 5% travel *27 or more miles* and 5% between *22 and 26 miles*. (see figure 10) Concurrent with the present trend of job availability, 25% of the respondents presently commute to the suburbs for employment, with 73% of them in jobs classified as either clerical, managerial or technical. Of those presently traveling to the suburbs for employment 68% of them drive alone in a personal vehicle, 20% ride the bus and 12% of them carpool.

Cross Tabulations

In relation to the correlation between travel time and travel distance several factors must be considered. Factors for consideration include: the means of transportation and travel route, whether an individual is accessing a freeway system, main throughfare, feeder road travel, high occupancy vehicle lanes or some combination of the above. When considering these factors we can determine why a person traveling only 8.5 miles could require the same travel time, if not more, as that of a person traveling 15 miles (almost

Figure 9.
**Modes of Transportation to Work,
 Third Ward, Houston, Tx.**

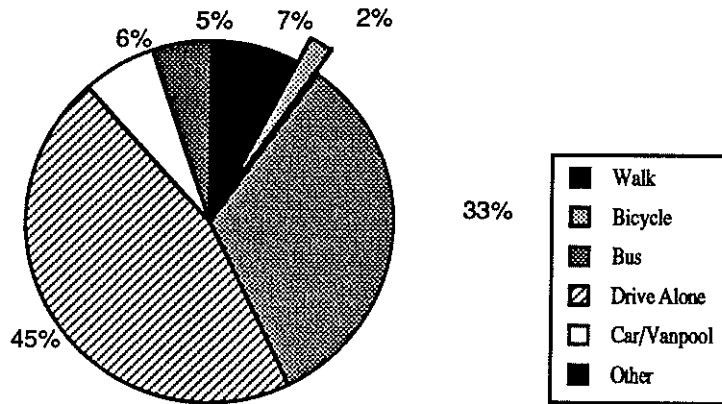
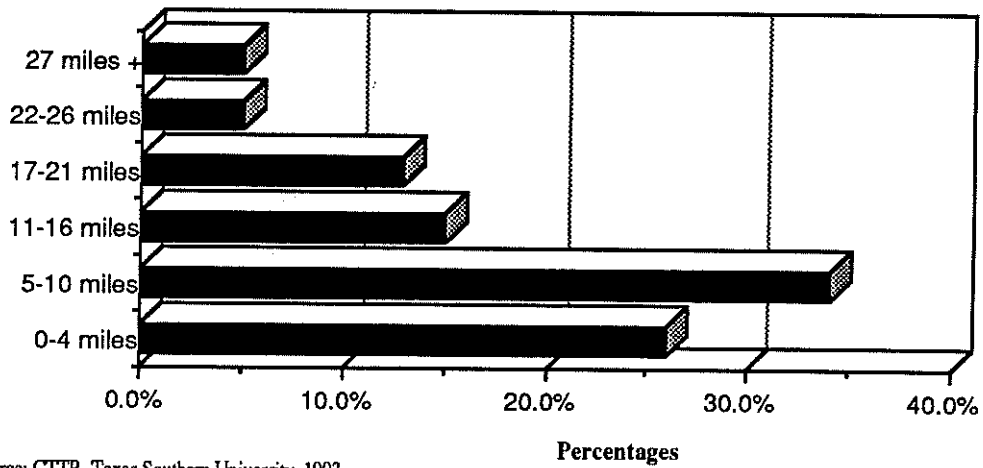


Figure 10.
**Miles Traveled to Work,
 Third Ward, Houston, Tx.**



Source: CTR, Texas Southern University, 1993

twice as many miles). In an effort to factor in these considerations, CTTR performed cross tabulations between travel time and travel distance to get a more concise look at the travel patterns of the residents in the survey area.

Cross tabulations of these two variables indicate that the majority, 17%, of the employed respondents work *zero to four* miles from their residence and it takes them from *five to ten minutes* one way travel to and from work. The next highest distribution (10%) was of those individuals that work between *five and ten* miles from their residence and it takes them on average *17 to 21 minutes* travel time. A third concentration of responses came from individuals who also work between *five and ten miles* from their work but reported travel time to be between *11 and 16 minutes*. Other than these three areas of concentrated responses, the responses varied along the spectrum of travel time and distance combinations with each combination ranging from zero respondents to 5% of the respondents.

When cross tabulating the two variables of 1) time to work and 2) means of transportation to work, some very interesting responses were obtained. CTTR found that each of the respondents who said they walked or road a bicycle to work lived within five to ten minutes from work. Those respondents that reported the *bus* as their means of transportation had varied travel times. The largest area of distribution, 22%, being bus riders whose travel time was estimated to be between *22 and 26 minutes*. Other responses for bus riders included 19% estimating their travel time to be *36 to 45 minutes*, 14% between *11 and 16 minutes* travel time and *27 to 35 minutes* travel time, 11% reported travel time between *five and ten minutes* and *17 to 21 minutes*. Only 7% of the bus riders reported that it takes *more than 45 minutes* for them to get to work.

Twenty-five percent (25%) of the respondents who reported their means of transportation to work to be driving alone in a personal vehicle, estimated travel time between *17 and 21 minutes*. Also of particular interest was the revelation that 60% of those respondents that reported *carpool or vanpool* as their means of transportation work 27 to 35 minutes away from their residence. All of those who reported travel time to be more than 45 minutes either ride the *bus* (20%) or *drive alone* (80%). The cross tabulation between travel time to work and means of transportation to work show that **the majority of employed respondents *drive alone* and travel between *17 and 21 minutes* to work.**

By cross tabulating the responses from the questions that were designed specifically to obtain information on transportation variables and basic socio-economic characteristics the environment under which many of the present travel patterns occur was deduced. In examining the variables such as income, job preparation and education level one can, based on theories of socio-economic evolution, re-create pattern origination. This process is necessary in order to logically progress to the next step of developing and implementing potentially successful transportation service to accommodate the residential to employment trip.

When cross tabulating travel distance with annual salary we obtained the following results:

Regardless of income, the majority of respondents (60%) travel less than 17 miles one way to their respective places of employment. Forty-five percent of this group make between \$10,000 and \$20,000 a year.

Sixty-seven percent of those who travel more than 26 miles one way to work make over \$20,000 a year, suggesting that above average compensation is

necessary to provoke individuals to travel over 26 miles one way to work. Only 9% of the individuals traveling over 26 miles one way makes under \$10,000 a year.

When cross tabulating miles to work with salary of those making \$40,000 a year or more we found extreme opposites. Fifty percent of those making over \$40,000 a year live within zero to four miles of their place of employment and the other 50% travel over 45 miles one way to work. Looking at these findings the following can be deduced 1) Some people making higher incomes may be concerned with living in proximity of their place of employment and 2) that money creates an incentive for longer travel distance between one's place of residence and place of employment.

When looking at the variables *miles traveled to work* and *occupation classification* of the employed respondents the following can be noted:

Respondents classifying their occupations as professionals traveled the least. Ninety-four percent of these respondents travel under 17 miles one way to work, with the majority (61%) of them making between \$10,000 and \$30,000 a year.

Those respondents classifying their occupations as either clerical, managerial or technical made up the majority (75%) of respondents traveling more than 17 miles one way to work, 50% of whom make less than \$20,000 a year.

CHAPTER 5

ATTITUDINAL RESPONSES

Only responses from employed residents were used in determining present travel patterns. However, in preparing to develop potential strategies for improved transit alternatives for residential and employment configurations, the opinions and attitudinal responses of the unemployed are equally as significant, if not more so, than those of the employed.

Willingness to Spend and Travel

Of specific importance in the development of strategies to improve access between inner city residents and jobs located in the suburban area is the distance individuals are willing to travel to work. Forty-one percent of the respondents indicated that they would be amenable to traveling to suburban areas for work, suburban areas defined as one way travel 17 or more miles. However, if transportation were provided there was an 18% increase in the number of respondents willing to travel to the suburbs for work. However, 85% of the respondents said they were only willing to spend up to \$20 a week to get to work. Fourteen percent were willing to spend between \$21-\$40 a week and less than 2% would spend *more than \$41 a week*.

Of particular interest to the development of this project is the number of respondents unemployed because of lack of transportation. After cross tabulating the responses to the question of 'employment' and if unemployed 'why' we found that, excluding retirement, slightly less than 15% of the respondents reported *lack of transportation* as the reason for their unemployment. Eighty-nine percent of respondents unemployed due to lack of transportation reported that they were willing to travel to suburban areas for work given that transportation was provided.

Willingness to Ride the Bus

The responses received in regard to 'willingness to ride the bus' are very promising. Eighty-six percent of the respondents reported that they would ride the bus given some provision. (A portion of the survey was devoted to obtaining responses as to why the Metro bus system may be unattractive, those findings will be discussed later in the chapter.) Fifty-three percent responded they would ride the bus given it *took about the same time as driving*. Twenty-one percent agreed providing the bus nearest their residence *ran more frequently* and 12% said they would ride the bus *if one were available*.

Cross tabulations showed the following:

89% of the employed respondents were willing to ride the bus.

94% of the unemployed, for reason other than retirement, were willing to ride the bus.

100% of those respondents unemployed due to lack of transportation said they were willing to ride the bus.

In looking at what bearing job classification had on one's willingness to ride the bus, the following was found:

Professionals made up 37% of those respondents not willing to ride the bus, respondents who classified their jobs as *technical* made up 32%.

100% of those respondents who classified themselves as *managerial* and *none of the above* reported that they would ride the bus given one of the provisions listed on the survey.

91% of those classified in *clerical* positions are willing to ride the bus.

Willingness to Carpool/Vanpool

From the data collected it was found that the majority (83%) of respondents are open to the option of carpooling/vanpooling given some provision. The major incentive for agreeability to carpooling/vanpooling was the provision, *providing I could save money*, 41% of the respondents gave this answer. Twenty-seven percent responded that the inspiration would be if they *lived further away* from their place of employment than they do at present. Fifteen percent said they would utilize carpool/vanpool services providing they *got a reserved parking space* at the depot or pick-up center.

The cross tabulations showed that there was a high positive correlation between the willingness to carpool and the miles willing to travel to work. The further respondents were willing to travel, the more agreeable they were to the option of carpooling/vanpooling.

Again, respondents classifying themselves as professionals or having technical jobs presented the most reluctance to the option. However, despite this fact 83% of the respondents classifying their jobs as technical were amenable to the option of carpooling/vanpooling as were, 80% of the professionals and 85% of those in clerical positions. All respondents classified in the managerial area are willing to carpool. Seventy-eight percent of the respondents who classified their jobs as something other than the above are willing to carpool.

Relocation

The majority of residents, 68%, responded that they were not willing to relocate their families to the suburbs. Even the majority of those who are unemployed, regardless of why, responded that they would not relocate. Of the 32% that responded that they would relocate, 55% were employed at the time of the survey. Interestingly, 26% of those employed respondents willing to relocate had been on their jobs *zero to two years*, 33% had been on their jobs *three to five years* and 42% had been on their jobs *5 or more years*. Seventy-nine percent of those unemployed respondents willing to relocate have been unemployed for *zero to two years*.

METRO Ridership

Data collected indicate that 70% of the respondents utilize the METRO bus system. Fifty-four of these respondents use metro as their primary means of transportation to work.

Despite the fact the majority of respondents use METRO's services, a significant number of them do not. The reasons given for not utilizing METRO's services varied. The greatest reluctance to use Metro was attributed to the trips taking too long (30% of the respondents gave this answer). Approximately 15% responded that there is too much waiting. Ten percent said they have too far to walk to work after getting off the bus. Eleven percent cited security reasons for why they are reluctant to utilize METRO services. Five percent responded that they have too far to walk to bus. Three percent complained that the buses are too crowded. Twenty-five percent of the respondents who said they do not use METRO's service responded that there is some other reason they do not use the service without providing further elaboration.

CHAPTER 6

DATA SUMMARY AND IMPLICATIONS

As a result of data collected, it was found that there is a significant need for accessing suburban areas for employment. With the dramatic transition, in regard to job location and availability, public transportation providers must be in the forefront in providing alternatives for inner city residents, specifically minorities, to access job positions in suburbs. Public transportation providers need to be trendsetters in establishing travel options that take into consideration trip reduction and congestion management. Public transportation providers need to provide service to inner city residents that counteract the need to relocate to suburban areas to obtain employment. Suburban commuting options have the potential to reverse gradual deterioration of urban cities spawned by suburban sprawl and in turn promote community revitalization. With improved accessibility to suburban jobs, inner city residents can remain residents in the metropolitan areas without sacrificing employment opportunities. Reverse commuting has the potential to inadvertently create an atmosphere of stability provoking commercial and service re-establishment in urban city communities. Commercial and service re-establishment within the metropolitan area could in turn reverse the socio-economic cycle of abandonment and deterioration that plagues many central city neighborhoods. All of these factors are possible, however, only if public transportation takes the lead in providing inner city residents with accessibility to suburban areas jobs.

Data Summaries

The data collected indicate that the respondents are ready for reverse commuting alternatives. Twenty-five percent of the survey participants presently commute to the suburbs for employment. Sixty-eight percent of them drive alone, whereas 20% of them

utilize bus service and 12% of them carpool. Fifty-nine percent of those surveyed responded they would be responsive to traveling to the suburbs for work, if transportation were provided. Eighty-five percent responded that they are willing to spend up to \$20 a week to get to work. Also most people willing to travel to the suburbs for employment would prefer carpooling/vanpooling to riding the bus as their means of transportation.

Data Implications

The Center for Transportation Training and Research proposes that public transportation providers establish transportation means that increase inner city resident's accessibility to suburban jobs by using both the present transportation alternatives and creating new methods. Based on the data collected, CTTR has formulated a demonstration project to incorporate the data findings into a model of transportation believed to improve service delivery for diverse markets, particularly accessibility to employment opportunities.

The outline of the model includes the establishment a carpool/vanpool system that services particular suburban areas. The riders will be matched by job location and residence location. CTTR will assist with identifying job placement in the selected suburban areas from a selected pool of applicants from the survey area. CTTR will provide the carpool/vanpool service at a nominal cost to the riders. The primary objectives of the demonstration project will be to: 1) improve accessibility to employment opportunities in suburban areas, 2) create an atmosphere of stability in a community touched by the socio-economic cycle of abandonment and deterioration and 3) evaluate carpooling/vanpooling systems effectiveness as an alternative service delivery model.

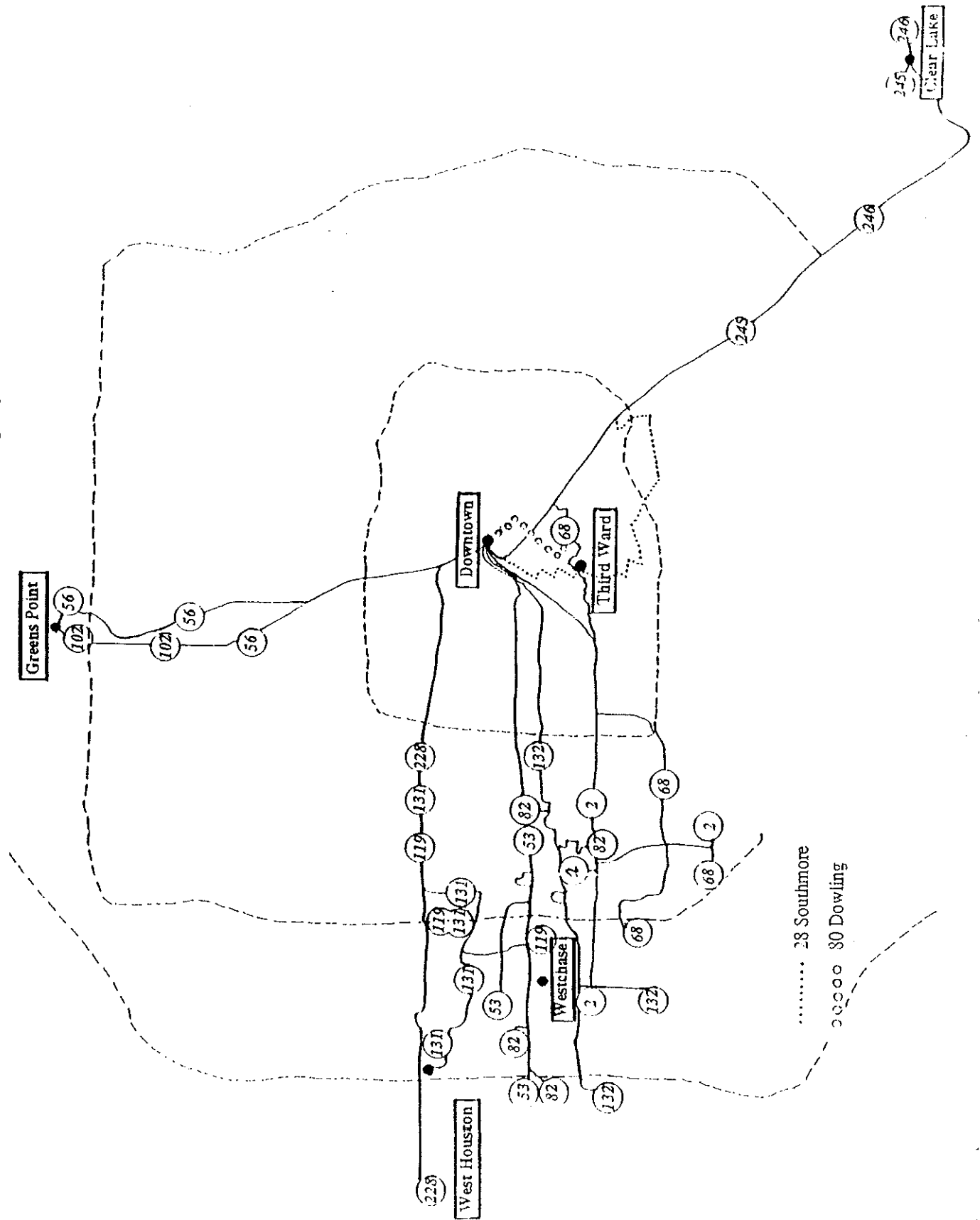
In addition, to the above demonstration project, CTTR has plotted out bus routes to primary suburban employment locations in the Greater Houston Area. With this guide

one can see specifically what routes to take in the event of travel from the third ward area to suburban employment opportunities. (See map 4)

Potential Energy Savings

The survey results indicated that many respondents who travel long distances to work are willing to carpool or vanpool under a given set of circumstances. A vanpool demonstration program will be initiated for a representative group of 3rd ward individuals. The energy savings by eliminating 10 single occupant trips for an eleven mile one way (22 mile round) trip would save 1.3 million BTU's are utilized per vehicle mile per Oak Ridge National Laboratories). This estimate could be conservative since more than 23% of the respondents travel in excess of 16 miles to work.

Bus Routes to Primary Suburban Employment Locations



..... 28 Southmore
 - - - - - 80 Dowling

REFERENCES

- 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 Report UMTA-DC-2021-89.
- Blake, Stephen E., *Inner city Minority Transit Needs in Accessing Suburban Employment Centers*. Washington, D. C., Urban Mass Transportation administration, USDOT, September, 1990.
- Boyce, P.E. *A Framework for Constructing Network Equilibrium Models of Urban Location*, Transportation Science, 14, 1980, Pp 77-96.
- Brown, W.F. and Weiner. *Transportation Planning and Application: A Compendium of Papers Based On A Conference Held in Orlando, Florida*, Technology Sharing Program Research and Special Programs Administration, Washington, D.C. December 1987.
- 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.
- 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-IF, 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.
- Gordon, Harry P. and Myung-Jin Jun, "The Communities Paradox: Evidence From the top Twenty," *Journal of the American Planning Association*, Vol. 57, No. 3, Summer 1991.
- Kain, John F. (Ed.), *Race and Poverty: The Economics of Discrimination*. Englewoods Cliffs, New Jersey: Prentice-Hall, Inc., 1969.
- Kelley, A.C. and J.G. Williamson. *What Drives Third World City Growth*, Princeton, N. J. : Princeton University Press, 1984.
- 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.

- Krueckeberg, Donald A. and A.L. Silvers, *Urban Planning Analysis Methods and Models*, John Wiley & Sons, Inc., New York, London, Sydney, Toronto, 1989.
- Lede, 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.
- Newman, D. A, et. al., *Timed-Transfers: An Evaluation of Its Structure, Performance and Cost*. Los Altos, California, August 1983.
- Nowlan David M. And G. Stewart. *Downtown Population Growth and Community Trips: Recent Toronto Experience*, Journal of the American Planning Association, Vol. 57, No. 2, Spring 1991.
- 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.
- Reichert, James P. "Wanted: National Policy on Suburban Transit," *Transit Journal*, 5, 3 (1979), 3742.
- 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.
- Schneider, J.B. and S.P. Smith, "Redesigning Urban Transit Systems: A Transit Center-based Approach," in *Transportation Research Record 798*, TRB, National Research Council, 1981, pp 56-65.
- Texas Southern University, *Third Ward Area Transportation Study*, Houston Galveston Area Council, April 1983.
- Transportation Research Board, *Research for Public Transit*. Washington, D.C.: National Research council, 1987.
- Turner, Collie & Braden, *Suburban Mobility Study Report for Two Major Suburban Activity Centers in Houston, Texas*, May, 1992.
- University of Houston, *1990 Journey to Work Census Data*, Houston Galveston Area Council, July 1991.
- U.S. Department of Transportation, *Moving America: New Directions, New Opportunities*. Washington, D.C. Statement of National Transportation Policy, Strategies for Action, February, 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.

Williams, Brad Tom Whittle, Joel Fuller and Alberto Lapuz. *Commuter and Express Bus Service in the Southern California Association of Government Region: A Policy Analysis of Public and Private Operations*, United States Department of Transportation, February, 1983.

APPENDICES

APPENDIX - A
RESIDENTIAL-EMPLOYMENT MATRIX SURVEY
from
Center for Transportation Training and Research

**A Residential-Employment Matrix for Evaluating Public
Transit Service Delivery: Implications for Public
Policy and Energy Savings**

QUESTIONNAIRE

We are conducting research in conjunction with the Center for Transportation Training and Research Department at Texas Southern University. This research concerns employment and travel patterns in the early 90s. May we take a few minutes of your time to answer a few questions?

1. Gender.
 Male Female
2. How long have you lived at your current residence. (years)
 0-2 3-4 5-7 8-10 11 or more
3. Are you...
 16-25 26-35 36-45 46-55 56-65
4. Marital status.
 Single Married Divorced
5. Are you currently employed?
 Yes No
6. How many miles do you normally travel (one way) from your residence to work each day? (Please check one) (miles)
 0-4 5-10 11-16 17-21
 22-26 27 or more
7. How many minutes is your normal travel time (one way) from your residence to your place of employment each day?
 5-10 11-16 17-21 22-26 27-35
 36-45 46 or more

8. How do you normally get to work?
 walk bicycle bus drive alone carpool or vanpool
 other _____

9. How long in current job? (years)
 0-2 3-5 5 or more

10. If no to #5, how long have you been out of work? (years)
 0-2 3-5 6-8 9 or more

11. Reasons you are unemployed.
 No transportation Disabled Lack of skills
 Lack of education Retired
 other _____

12. Are you willing to enroll in a skills training program?
 Yes No

13. How much would you be willing to spend weekly to get to work?
 \$0 - 20 \$21-40 \$41-60
 \$60 or more

14. What is the maximum number of miles you would travel (one way) for employment?
 5-10 11-16 17-21 22-26 27 or more

15. If transportation were available, would you travel to the suburbs for employment?
 Yes No

16. Would you be willing to relocate your family to gain employment in the suburbs?
 Yes No

17. What is your normal occupation classification? (Please check one)

- clerical managerial technical
- professional none
- other _____

18. Type of employment.

- full-time part-time
- permanent temporary

19. Which of the following has prepared you for work?

- Previous experience
- Formal education
- Specialized training program
- Military training
- On-the-job training other _____

20. What is your current annual salary?

- \$0-\$5,000 \$5,001-\$10,000
- \$10,001-\$20,000 \$20,001-\$30,000
- \$30,001-\$40,000 \$40,001 or more

21. What is your ethnicity?

- African American Asian
- Hispanic Native American White other

22. What is the highest level of education completed?

- Some high school
- high school graduate some college
- college graduate post graduate
- doctorate other _____

23. Do you ride METRO?

- Yes No

24. If you do not use transit to get to/from work, what is the reason you find the bus unattractive.

- Too far to walk to board the bus
- Too far to walk to work after getting off the bus
- trips take too long security reasons
- cost too much too crowded
- too much waiting unsafe
- source not frequent enough
- other _____

25. Does your employer have a transportation program?

- Yes No

26. If yes, please specify which category applies to your organization.

- Carpool/vanpool matching services
- Company vehicle
- Public transit subsidy
- Encourages informal/individual carpool/vanpool arrangements
- provides incentives for carpool/vanpool (i.e., special parking privileges)
- other _____

27. I would ride the bus if:

- It took about the same time as driving:
- the bus near me was more frequent
- a bus were available
- never

27. If a suitable match could be found I would carpool/vanpool, providing

- I got reserved parking space
- I lived further away
- I could save money
- never

Thank you for your assistance.

APPENDIX - B
TALLIED SURVEY RESULTS

**SURVEY OF THIRD WARD
Tallied Results**

1. Gender.

Male (42.44%)	Female (57.56%)
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2. Residence (years).

0-2(20.83%)	3-4(18.75%)
5-7(16.25%)	8-10(12.92%)
11 or more (31.25%)	

3. Age.

16-25(11.34%)	26-35(22.69%)
36-45(20.59%)	46-55(13.87%)
56-65(31.51%)	

4. Marital Status.

Single(41.03%)	Married(47.44%)	Divorced(11.54%)
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5. Are You Currently Employed?

Yes(41.77%)	No(58.23%)
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6. How Many Miles Do You Normally Travel (one way) From Your Residence To Work Each Day? (Please check one) (miles)

0-4(31.43%)	5-10(30.86%)
11-16(12.56%)	17-21(12%)
22-26(6.29%)	27 or more(6.86%)

7. How Many Minutes Is Your Normal Travel Time (one way) From Your Residence To Your Place Of Employment Each Day?

5-10(28.07%)	11-16(15.2%)
17-21(16.37%)	22-26(10.53%)
27-35(8.19%)	36-45(10.53%)
46 or more(11.11%)	

8. How Do You Normally Get To Work?

Walk(7.73%)	Bicycle(1.82%)
Bus(33.18%)	Drive Alone(45.45%)
Carpool(6.36%)	Other(5.45%)

9. How long in current job? (years)
 0-2(29.70%) 3-5(24.75%) 5 or more(45.54%)
10. If No to #5, How Long Have You Been Out of Work? (years)
 0-2 (48%) 3-5 (5.33%)
 6-8 (17.33%) , 9 or more (29.33%)
11. Reasons you are unemployed.
 No Transportation(7.09%) Disabled(14.17%)
 Lack of Skills(1.57%) Lack of Education (0%)
 Retired(40.94%) Other(36.22%)
12. Are you willing to enroll in a skills training program?
 Yes(56.81%) No(43.19%)
13. How much would you be willing to spend weekly to get to work?
 \$0 - 20(84.32%) \$21-40(14.41%)
 \$41-60(.85%) \$60 or more(.42%)
14. What is the maximum number of miles you would travel (one way) for employment?
 5-10(43.69%) 11-16(15.05%) 17-21(16.02%)
 22-26(5.83%) 27 or more(19.42%)
15. If Transportation Were Available, Would You Travel To The Suburbs For Employment?
 Yes(59.05%) No(40.95%)
16. Would You Be Willing To Relocate Your Family To Gain Employment In The Suburbs?
 Yes(32.19%) No(67.81%)
17. What is your normal occupation classification? (Please check one)
 Clerical(20.69%) Managerial(14.29%)
 Technical(18.72%) Professional(29.56%)
 None(3.94%) Other(12.81%)

18. Which Of The Following Prepared You For Work:

Previous Experience(37.79%)

Specialized Training Program(12.79%)

On the Job Training(15.70%)

Formal Education(27.33%)

Military Training(2.33%)

Other(4.07%)

19. Which Of The Following Has Prepared You For Work?

Previous experience(37.79%)

Specialized Training(12.79%)

On- the-Job Training(15.70%) Other(4.07%)

Formal education(27.33%)

Military training(2.33%)

20. What Is Your Current Annual Salary?

\$0-\$5,000(33.63%)

\$10,001-\$20,000(29.65%)

\$30,001-\$40,000(7.96%)

\$5,001-\$10,000(12.39%)

\$20,001-\$30,000(15.04%)

\$40,001 or More(1.33%)

21. What Is Your Ethnicity?

African-American(94.42%)

Asian(0%)

Hispanic(2.15%)

Native American(0.43%)

White(1.29%)

Other(1.72%)

22. What Is The Highest Level Of Education Completed?

Some High School(15.81%)

High School Graduate(29.49%)

Some College(33.33%)

College Graduate(18.80%)

Post Graduate(2.14%)

Doctorate(0%)

Other(0.43%)

23. Do You Use METRO?

Yes(69.54%)

No(30.46%)

24. If You Do Not Use Transit To Get To/From Work, What Is The Reason You Find The Bus Unattractive:
- Too Far To Walk To Board The Bus(5.76%)
 - Trips Take Too Long(25.18%)
 - Security Reasons(13.67%)
 - Costs Too High(3.60%)
 - Buses Are Too Crowded(4.32%)
 - There Is Too Much Waiting Time(15.83%)
 - Public Transit Is Unsafe(2.16%)
 - Headways Are Not Frequent Enough(2.16%)
 - Too Far To Walk To Work After Getting Off The Bus(8.63%)
 - Other(18.71%)
25. Does your employer have a transportation program?
Yes(3.55%) No(96.45%)
26. If yes, please specify which category applies to your organization.
- Carpool/vanpool matching services(40%)
 - Company vehicle(0%)
 - Public transit subsidy(30%)
 - Encourages informal arrangements(10%)
 - Provides incentives for carpool/vanpool (0%)
 - Other(20%)
27. I Would Ride The Bus If:
- The Bus Took The Same Time As A Car(52.58%)
 - The Bus Near Me Was More Frequent(21.13%)
 - A Bus Were Available To Me(12.37%)
 - Never(13.92%)
28. If A Suitable Match Could Be Found I Would Carpool/Vanpool, Providing:
- I Got A Reserved Parking Space(15.03%)
 - I Lived Further Away(26.94%)
 - I Could Save Money(40.93%)
 - Never(17.10%)

APPENDIX - C
CENSUS TRACT INFORMATION
from
City of Houston Department of
Planning and Development

CENSUS TRACT 30401

AREA CHARACTERISTICS

Total Acres	255
Density (persons per acre)	9.76
Number of Households	1,024
Average Household size	2.42
Median Household income	\$5,941

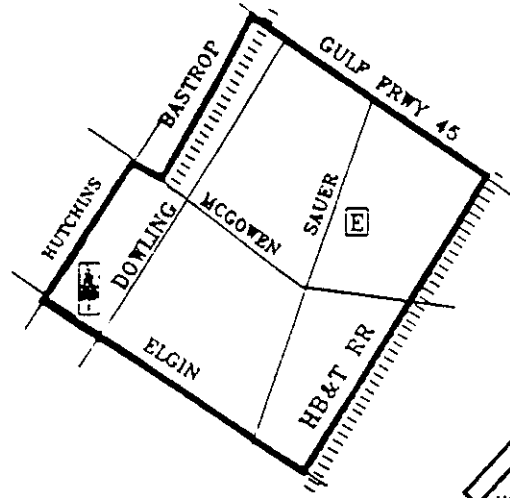
HOUSING CHARACTERISTICS

Total units	1,535
Total vacant units	511
Owner occ. units	187
Renter occ. units	837
Median housing value	\$29,500
Median contract rent	\$180

EDUCATIONAL ATTAINMENT*

Less than 9	19.4
9 to 11	39.6
High school grad	26.3
1-3 college	8.9
4+ college	5.9

* percent of persons age 25 or more



LEGEND

Elementary School		Convention Center	
Middle School		Park and Open Space	
High School		Major Street	
College, University		Rail Road	
Major Apt. Development		School District	
Hospital		Census Tract	
Police		ETJ	
Library		County Precinct	
Fire Station		Council District	
Mail		City Limit	

POPULATION CHARACTERISTICS

Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	251	454	1,311	446	2,462
American Indian	0	0	0	0	0
Asian	0	2	10	0	12
Hispanic	3	0	9	2	14
Anglo/other	0	0	1	0	1
Total (all groups)	254	456	1,331	448	2,489

Source: City of Houston, 1993

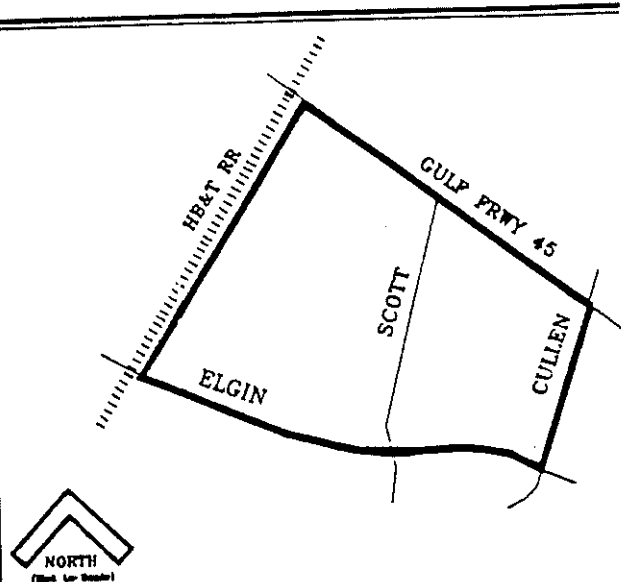
CENSUS TRACT 30402

AREA CHARACTERISTICS	
Total Acres	261
Density (persons per acre)	11.03
Number of Households	1,196
Average Household size	2.41
Median Household income	\$7,599

HOUSING CHARACTERISTICS	
Total units	1,766
Total vacant units	570
Owner occ. units	285
Renter occ. units	911
Median housing value	\$32,200
Median contract rent	\$177

EDUCATIONAL ATTAINMENT*	
Less than 9	19.2
9 to 11	40.2
High school grad	25.5
1-3 college	10.3
4+ college	4.8

* percent of persons age 25 or more



LEGEND	
Elementary School	[E]
Middle School	[M]
High School	[H]
College, University	[U]
Major Apt. Development	[A]
Hospital	[HOSP]
Police	[POL]
Library	[LIB]
Fire Station	[FIRE]
Mail	[MAIL]
Convention Center	[CC]
Park and Open Space	[PARK]
Major Street	[MAJOR ST]
Rail Road	[RR]
School District	[SD]
Census Tract	[CT]
E.T.J.	[ETJ]
County Precinct	[CP]
Council District	[CD]
City Limit	[CL]

POPULATION CHARACTERISTICS					
Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	288	473	1,532	500	2,793
American Indian	0	0	0	0	0
Asian	0	0	0	0	0
Hispanic	22	10	39	2	73
Anglo/other	2	3	6	3	14
Total (all groups)	312	486	1,577	505	2,880

Source: City of Houston, 1993

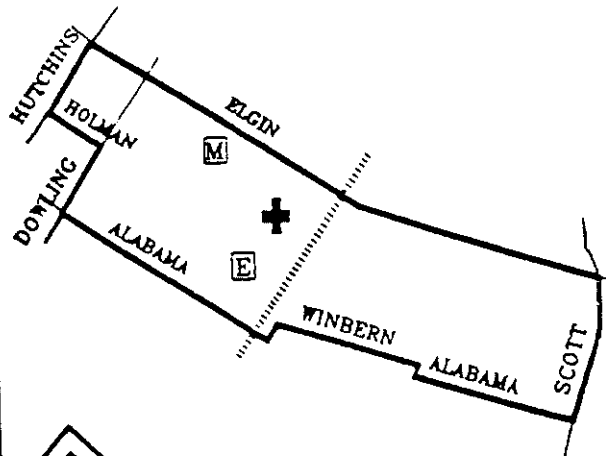
CENSUS TRACT 30501

AREA CHARACTERISTICS	
Total Acres	221
Density (persons per acre)	11.58
Number of Households	1,062
Average Household size	2.41
Median Household income	\$8,548

HOUSING CHARACTERISTICS	
Total units	1,599
Total vacant units	537
Owner occ. units	238
Renter occ. units	824
Median housing value	\$32,000
Median contract rent	\$183

EDUCATIONAL ATTAINMENT*	
Less than 9	17.7
9 to 11	35.2
High school grad	28
1-3 college	15.7
4+ college	3.4

* percent of persons age 25 or more



LEGEND			
Elementary School	(E)	Convention Center	(C)
Middle School	(M)	Park and Open Space	(P)
High School	(H)	Major Street	(—)
College, University	(U)	Rail Road	(- - - - -)
Major Acc. Development	(A)	School District	(- - - - -)
Hospital	(+)	Census Tract	(- - - - -)
Police	(P)	ETJ	(- - - - -)
Library	(L)	County Precinct	(- - - - -)
Fire Station	(F)	Council District	(- - - - -)
Mail	(M)	City Limit	(- - - - -)

POPULATION CHARACTERISTICS					
Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	219	416	1,446	442	2,523
American Indian	4	0	1	0	5
Asian	2	2	6	0	10
Hispanic	2	4	10	2	18
Anglo/other	1	1	0	1	3
Total (all groups)	228	423	1,463	445	2,559

Source: City of Houston, 1993

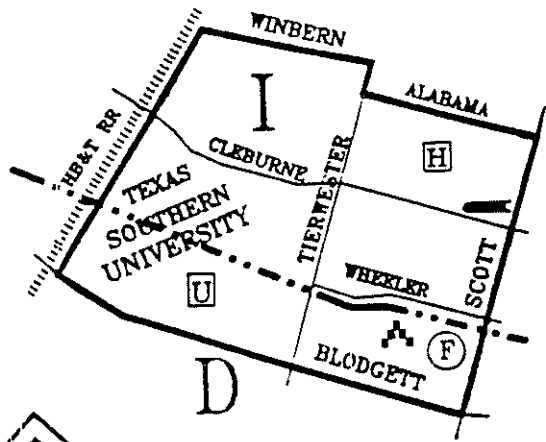
CENSUS TRACT 30502

AREA CHARACTERISTICS	
Total Acres	228
Density (persons per acre)	10.32
Number of Households	667
Average Household size	2.46
Median Household income	\$4,999

HOUSING CHARACTERISTICS	
Total units	851
Total vacant units	184
Owner occ. units	112
Renter occ. units	555
Median housing value	\$60,500
Median contract rent	\$120

EDUCATIONAL ATTAINMENT*	
Less than 9	13.9
9 to 11	45.5
High school grad	17.4
1-3 college	14.4
4+ college	8.7

* percent of persons age 25 or more



LEGEND			
Elementary School	[E]	Convention Center	[CC]
Middle School	[M]	Park and Open Space	[P]
High School	[H]	Major Street	[S]
College, University	[U]	Rail Road	[RR]
Major Art. Development	[A]	School District	[SD]
Historical	[HIST]	Census Tract	[CT]
Police	[POL]	ETJ	[ETJ]
Library	[LIB]	County Precinct	[CP]
Fire Station	[F]	Council District	[CD]
Mail	[M]	City Limit	[CL]

POPULATION CHARACTERISTICS					
Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	272	341	1,459	240	2,312
American Indian	0	0	2	0	2
Asian	2	2	2	0	6
Hispanic	1	3	24	0	28
Anglo/other	0	2	4	0	6
Total (all groups)	275	348	1,491	0	2,114

Source: City of Houston, 1993

CENSUS TRACT 30600

AREA CHARACTERISTICS

Total Acres	415
Density (persons per acre)	8.62
Number of Households	1,456
Average Household size	2.41
Median Household income	\$14,605

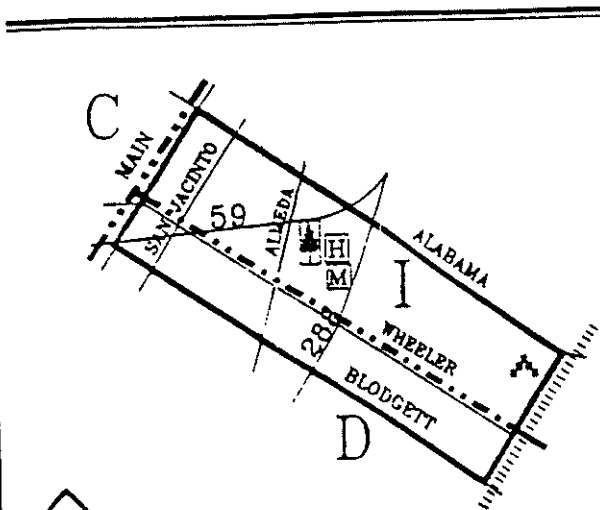
HOUSING CHARACTERISTICS

Total units	851
Total vacant units	2017
Owner occ. units	491
Renter occ. units	965
Median housing value	\$52,100
Median contract rent	\$241

EDUCATIONAL ATTAINMENT*

Less than 9	17
9 to 11	24.7
High school grad	24.5
1-3 college	20.9
4+ college	12.9

* percent of persons age 25 or more



LEGEND	
Elementary School	Ⓜ
Middle School	Ⓜ
High School	Ⓜ
College, University	Ⓜ
Major Apt. Development	Ⓜ
Hospital	Ⓜ
Police	Ⓜ
Library	Ⓜ
Fire Station	Ⓜ
Mail	Ⓜ
Convention Center	Ⓜ
Park and Open Space	Ⓜ
Major Street	Ⓜ
Rail Road	Ⓜ
School District	Ⓜ
Census Tract	Ⓜ
E.T.	Ⓜ
County Precinct	Ⓜ
Council District	Ⓜ
City Limit	Ⓜ

POPULATION CHARACTERISTICS

Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	228	369	1,635	561	2,793
American Indian	0	0	1	0	1
Asian	5	6	10	2	23
Hispanic	77	108	350	14	549
Anglo/other	8	0	183	20	211
Total (all groups)	318	483	2,179	597	3,577

Source: City of Houston, 1993

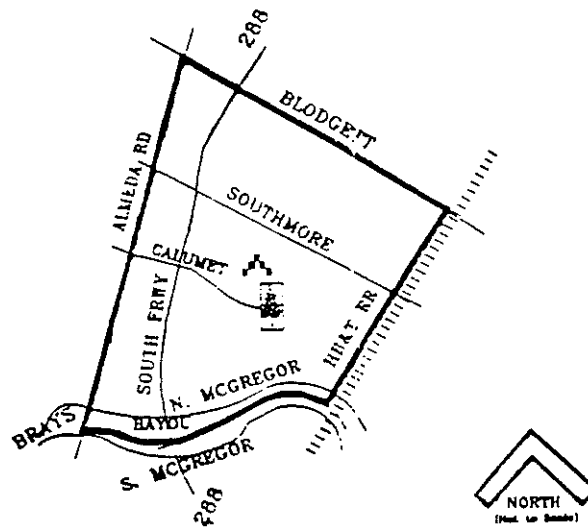
CENSUS TRACT 30701

AREA CHARACTERISTICS	
Total Acres	376
Density (persons per acre)	9.37
Number of Households	1,438
Average Household size	2.36
Median Household income	\$12,872

HOUSING CHARACTERISTICS	
Total units	2,037
Total vacant units	599
Owner occ. units	459
Renter occ. units	979
Median housing value	\$69,200
Median contract rent	\$260

EDUCATIONAL ATTAINMENT*	
Less than 9	12.9
9 to 11	22.8
High school grad	23.6
1-3 college	22.5
4+ college	18.2

* percent of persons age 25 or more



LEGEND			
Elementary School	[Symbol]	Convention Center	[Symbol]
Middle School	[Symbol]	Park and Open Space	[Symbol]
High School	[Symbol]	Major Street	[Symbol]
College, University	[Symbol]	Rail Road	[Symbol]
Major Apt. Development	[Symbol]	School District	[Symbol]
Hospital	[Symbol]	Census Tract	[Symbol]
Police	[Symbol]	E.T.j.	[Symbol]
Library	[Symbol]	County Precinct	[Symbol]
Fire Station	[Symbol]	Council District	[Symbol]
Mall	[Symbol]	City Limit	[Symbol]

POPULATION CHARACTERISTICS					
	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Ethnic groups					
Black	299	525	1,937	503	3,264
American Indian	0	0	0	0	0
Asian	2	11	46	12	71
Hispanic	12	17	68	6	103
Anglo/other	0	0	59	27	86
Total (all groups)	313	553	2,110	548	3,524

Source: City of Houston, 1993

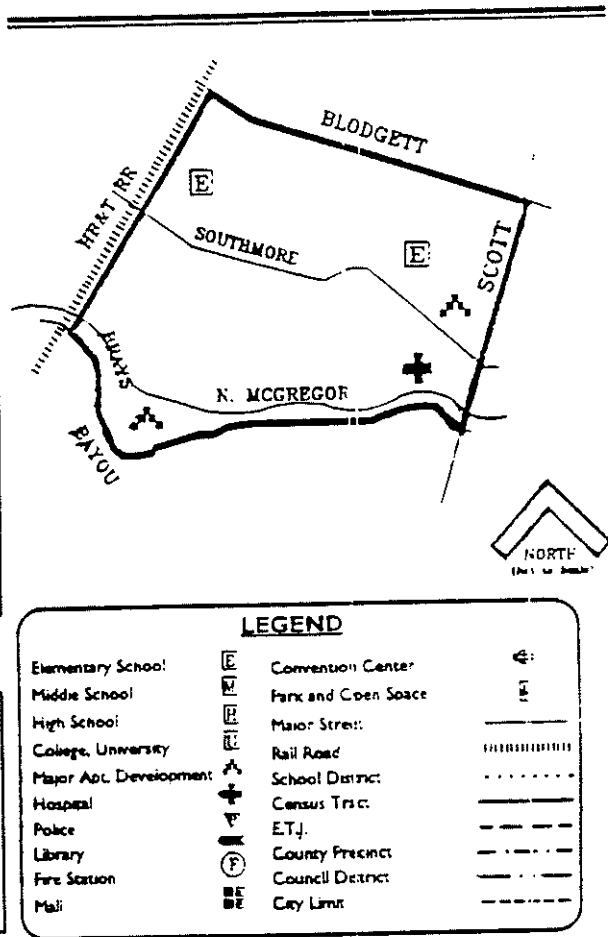
CENSUS TRACT 30702

AREA CHARACTERISTICS	
Total Acres	351
Density (persons per acre)	9.76
Number of Households	1,427
Average Household size	2.4
Median Household income	\$19,970

HOUSING CHARACTERISTICS	
Total units	1,896
Total vacant units	469
Owner occ. units	681
Renter occ. units	746
Median housing value	\$76,300
Median contract rent	\$273

EDUCATIONAL ATTAINMENT*	
Less than 9	4.7
9 to 11	14.2
High school grad	19.9
1-3 college	19.2
4+ college	42.1

* percent of persons age 25 or more



POPULATION CHARACTERISTICS					
Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	364	472	1,953	582	3,371
American Indian	0	0	1	0	1
Asian	2	2	2	0	6
Hispanic	2	0	24	7	33
Anglo/other	0	0	8	6	14
Total (all groups)	368	474	1,988	595	3,425

Source: City of Houston, 1993

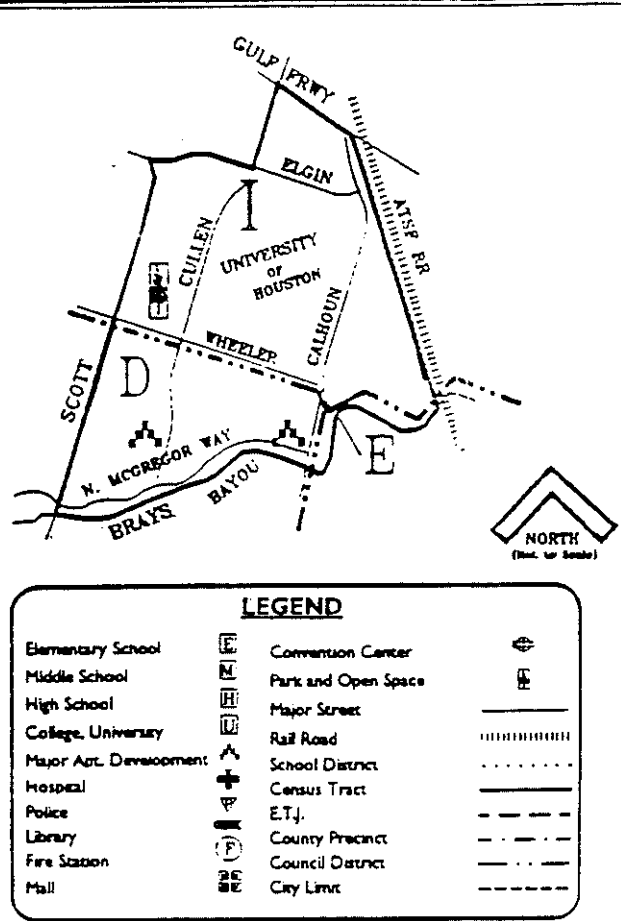
CENSUS TRACT 30810

AREA CHARACTERISTICS	
Total Acres	786
Density (persons per acre)	5.64
Number of Households	897
Average Household size	2.4
Median Household income	\$26,021

HOUSING CHARACTERISTICS	
Total units	1,090
Total vacant units	193
Owner occ. units	*****
Renter occ. units	*****
Median housing value	\$73,400
Median contract rent	\$271

EDUCATIONAL ATTAINMENT*	
Less than 9	6
9 to 11	10.7
High school grad	11.8
1-3 college	26.4
4+ college	45.1

* percent of persons age 25 or more



POPULATION CHARACTERISTICS					
Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	106	185	1,141	239	1,671
American Indian	0	0	8	0	8
Asian	12	13	546	6	577
Hispanic	7	11	279	5	302
Anglo/other	36	79	1,693	68	1,876
Total (all groups)	161	288	3,667	318	4,434

Source: City of Houston, 1993

CENSUS TRACT 31500

AREA CHARACTERISTICS

Total Acres	965
Density (persons per acre)	4.4
Number of Households	1,394
Average Household size	2.72
Median Household income	\$24,242

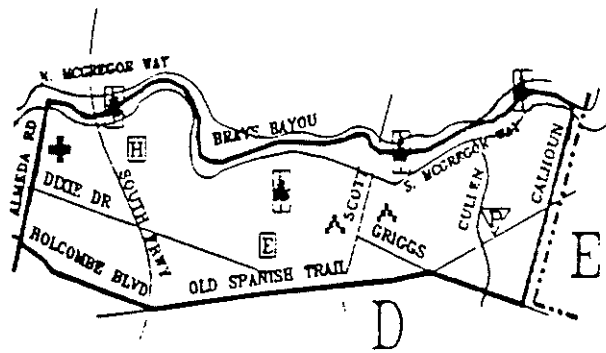
HOUSING CHARACTERISTICS

Total units	2,037
Total vacant units	643
Owner occ. units	924
Renter occ. units	470
Median housing value	\$88,300
Median contract rent	\$251

EDUCATIONAL ATTAINMENT*

Less than 9	10
9 to 11	9.1
High school grad	20.9
1-3 college	21.1
4+ college	39

* percent of persons age 25 or more



LEGEND

Elementary School		Convention Center	
Middle School		Park and Open Space	
High School		Major Street	
College, University		Rail Road	
Major Apt. Development		School District	
Hospital		Census Tract	
Police		E.T.J.	
Library		Country Precinct	
Fire Station		Council District	
Mail		City Limit	

POPULATION CHARACTERISTICS

Ethnic groups	0-5 yrs	6-17 yrs	18-64 yrs	65+ yrs	Total
Black	253	539	2,156	401	3,349
American Indian	0	1	3	0	4
Asian	1	4	78	3	86
Hispanic	26	39	121	24	210
Anglo/other	7	38	256	293	594
Total (all groups)	287	621	2,614	721	4,243

Source: City of Houston, 1993