TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA/TX-88/1086-7		

4. Title and Subtitle	5. Report Date
Land Use Impacts of the Houston Transitway System: Fourth Year Update	August 1988
	6. Performing Organization Code

7. Author's:	8. Performing Organization Report No.
James A. Mullins III and Robert W. Stokes	Technical Report 1086-7

9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135	11. Contract or Grant No. Study No. 2-10-85-1086
	13. Type of Report and Period Covered Interim - September 1987 August 1988
12. Sponsoring Agency Name and Address Texas State Department of Highways and Public Transportation, Transportation Planning Division P.O. Box 5051 Austin, Texas 78763	14. Sponsoring Agency Code

15. Supplementary Notes

Technical assistance performed in cooperation with U.S. DOT, UMTA.
Technical Study Title: Land Use and Innovative Funding Impacts in a Permanent Busway/Park-and-Ride Transit System

16. Abstract

This report provides a fourth year update of research performed under Project 2-10-85-1086 between the State Department of Highways and Public Transportation and the Texas Transportation Institute. The data collection and analysis procedures are closely tied to the basic procedures used in other transit/land use impact studies. The research plan (Technical Report 1086-2) outlines how the work is to be performed and sets forth the basic framework for the data collection activities and anticipated results. This five year research effort examines transportation and land use impacts resulting from the implementation of an extensive priority system of busways (transitways) and park-and-ride facilities in Houston, Texas. Over the duration of this research, four high-occupancy vehicle (HOV) lanes with supporting park-and-ride facilities will be placed in operation in Houston's North (I-45N), Katy (I-10W), Gulf (I-45S) and Northwest (US 290) Freeway Corridors. The impacts resulting from three of these HOV treatments (I-45N, I-45S, I-10W) are the object of this research. Results indicate that while the transportation impacts of those elements of the Houston Transitway system which are operational have been substantial, no substantial land use impacts can be identified at this time. It appears that a more definitive assessment of land use impacts may not be possible until the transitway system is fully operational and more fully integrated into the community's total transportation system.

17. Key Words	18. Distribution Statement
Land Use, Transitways, Busways, HOV Lanes, Park-and-Ride Priority Treatment Impact Studies, Land Use Impacts, Land Use Changes Impact Area	No. restrictions. This document is available to the public through the National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	51	

Form DOT F 1700.7 (8-69)

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	millimetres	mm
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yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km
AREA				
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yd^2	square yards	0.836	metres squared	m^2
mi^2	square miles	2.59	kilometres squared	km^2
ac	acres	0.395	hectares	ha
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gal	gallons	3.785	litres	L
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yd^3	cubic yards	0.0765	metres cubed	m^3

NOTE: Volumes greater than 1000 L shall be shown in m^3.

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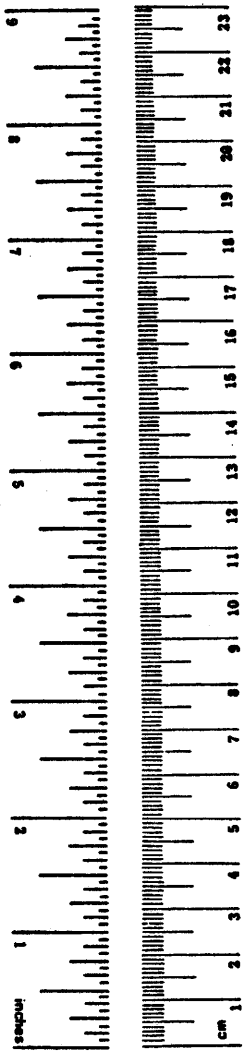

APPROXIMATE CONVERSIONS TO SI UNITS

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m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi
AREA				
mm^2	millimetres squared	0.0016	square inches	in^2
m^2	metres squared	10.764	square feet	ft^2
km^2	kilometres squared	0.39	square miles	mi^2
ha	hectores (10 000 m^2)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T
VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
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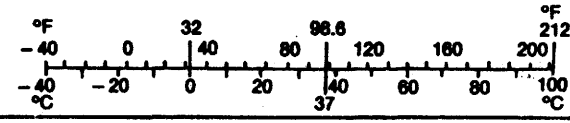

These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

LAND USE IMPACTS OF THE HOUSTON TRANSITWAY SYSTEM: FOURTH YEAR UPDATE

by

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Technical Report 1086-7
Land Use and Innovative Funding Impacts in a
Permanent Busway/Park-and-Ride Transit System
Study Number 2-10-85-1086

Sponsored by
Texas State Department of Highways and Public Transportation
in cooperation with
U.S. Department of Transportation
Urban Mass Transportation Administration

Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843

August 1988

The preparation of this study was financed in part through a grant from the Urban Mass Transportation Administration, United States Department of Transportation under the Urban Mass Transportation Act of 1964, as amended.

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ABSTRACT

This report provides a fourth year update of research performed under Project 2-10-85-1086 between the State Department of Highways and Public Transportation and the Texas Transportation Institute. The data collection and analysis procedures are closely tied to the basic procedures used in other transit/land use impact studies. The research plan (Technical Report 1086-2) outlines how the work is to be performed and sets forth the basic framework for the data collection activities and anticipated results. This five year research effort examines transportation and land use impacts resulting from the implementation of an extensive priority system of busways (transitways) and park-and-ride facilities in Houston, Texas. Over the duration of this research, four high-occupancy vehicle (HOV) lanes with supporting park-and-ride facilities will be placed in operation in Houston's North (I-45N), Katy (I-10W), Gulf (I-45S) and Northwest (US 290) Freeway Corridors. The impacts resulting from three of these HOV treatments (I-45N, I-45S, I-10W) are the object of this research. Results indicate that while the transportation impacts of those elements of the Houston Transitway system which are operational have been substantial, no substantial land use impacts can be identified at this time. It appears that a more definitive assessment of land use impacts may not be possible until the transitway system is fully operational and more fully integrated into the community's total transportation system.

Key Words: Land Use, Transitways, Busways, HOV Lanes, Park-and-Ride, Priority Treatment, Impact Studies, Land Use Impacts, Land Use Changes, Impact Area.

SUMMARY

This report is an update of the fourth year of a study of the land use impacts resulting from implementation of HOV priority treatments in the North (I-45N), Katy (I-10W) and Gulf (I-45S) Freeway Corridors in Houston, Texas.

Overall, the land use impacts of these three HOV priority treatments appear to be relatively insignificant. Only a few possible examples of potential land use impacts have appeared in the past two years, with only one in the past year.

Within the past year, only one site (Spring Park-and-Ride Lot), which is in the North (I-45N) Freeway Corridor, has exhibited a land use change in the vicinity of the study site that may have been influenced by the location of the facility. At one other site (North Shepherd Park-and-Ride Lot), also along the North (I-45N) Freeway Corridor, a recent land use change at a parcel which last year was identified as exhibiting possible influence of a transitway facility has cast some doubt on that hypothesis. At all other sites along the North Freeway Corridor, as well as the other freeway corridors under study, there appear to have been no land use impacts within the past year.

The results of this update of land use impacts are for the most part inconclusive. Only one of seven sites studied showed any land use changes that could possibly be related to the presence of the transitway and/or its support facilities.

It appears that a more definite assessment of the land use impacts will not be possible until sometime after the transitway and associated support facilities have become fully operational and established as integral elements of the corridors' transportation systems. In addition, it is reasonable to assume that the economic situation in the Houston area has had a stagnating influence on potential land use development and potential land use changes. Given this assumption, it may also prove necessary to delay any final assessment of the land use impacts of transitways and transitway facilities until such time as the transitways become fully operational and the Houston

economy fully recovers. Both of the Katy Freeway Corridor study sites and all but one of the North Freeway Corridor study sites have substantial amounts of undeveloped land and should serve as excellent test sites for monitoring the long-term land use impacts of transitway facilities.

IMPLEMENTATION STATEMENT

This project is oriented toward assisting the Texas State Department of Highways and Public Transportation (SDHPT) in the planning and impact evaluation of high-occupancy vehicle (HOV) lanes or transitways. The study concentrates on the freeway corridors in Houston, Texas, where priority facilities for HOVs are being constructed.

Identification of secondary data sources and a survey of relevant literature (Technical Report 1086-1) on similar impact studies provided the primary data bases for development of the study's work program (Technical Report 1086-2). An assessment of other HOV projects in the U.S. and Canada (Technical Report 1086-3), along with a pilot examination of Houston's North (I-45N) Transitway Corridor impacts (Technical Report 1086-4), as well as second and third year updates of the impacts of the North (I-45N), Gulf (I-45S) and Katy (I-10W) Corridors (Technical Reports 1086-5 and 1086-6), was undertaken prior to the work presented herein. The results of this research, when completed, should assist the State Department of Highways and Public Transportation in evaluating potential land use and transportation impacts resulting from implementation of transitways and/or park-and-ride facilities.

This research may be applied nationwide by local, state and federal officials responsible for, or concerned with, busway/park-and-ride system development. Evaluation of land use impacts (if any) associated with permanent transitway facility construction will provide valuable guidance to transportation planners and policy makers in assessing alternative improvements.

The study findings will be of particular interest to the Texas State Department of Highways and Public Transportation, the Urban Mass Transportation Administration, the Federal Highway Administration, other State Departments of Transportation, local transit agencies, city planners, and various professional societies or organizations.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Urban Mass Transportation Administration, U.S. Department of Transportation or of the Texas State Department of Highways and Public Transportation. This report does not constitute a standard, specification or regulation.

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1. INTRODUCTION

1.1 BACKGROUND

The tremendous growth experienced in urban areas of Texas in recent years has caused concern by State and local transportation officials over the declining level of service being provided by the urban transportation system. Future growth and economic vitality in the Texas metropolitan regions are in jeopardy unless major improvements are implemented in the existing urban transportation system. It is generally not economically nor physically possible to provide sufficient additional highway capacity through major cross section expansion or to expand transit services to accommodate anticipated demand (1). Therefore, new and innovative means of freeway system management have been examined as possible remedies.

One alternative to increase roadway capacity is to provide high-occupancy vehicle (HOV) priority treatments. The first major priority treatment effort in Texas, the Houston I-45N Contraflow Lane (CFL), proved operationally successful and received favorable public acceptance. Implementation of five, more permanent HOV projects on the Katy (I-10W), North (I-45N), Gulf (I-45S), Northwest (US 290) and Southwest (US 59S) Freeways in Houston began in 1982 and will continue through 1994.

The Houston Metropolitan area is developing approximately 70 miles of transitways within the rights-of-way of five radial freeways. The first of the Houston transitways opened on the Katy Freeway (I-10W) in October 1984. The North Freeway (I-45N) Transitway opened in November 1984, replacing a temporary contraflow lane that had operated on the freeway since 1979. The Gulf Freeway (I-45S) Transitway, Houston's newest transitway, became operational in May 1988.

At the present time, only authorized buses and vanpools are allowed access to the North Transitway. Initially, access to the Katy Transitway was also restricted to authorized buses and vanpools. However, to increase utilization of the Katy Transitway, carpools were permitted on the transitway on a test basis. Authorized 4+ carpools were allowed to use the transitway

beginning April 1, 1985. In November of 1985, the minimum carpool occupancy requirement for the Katy Transitway was lowered to 3-or-more persons per authorized vehicle. In August 1986 the authorization process was suspended, and the Katy Transitway was opened to all vehicles having 2-or-more occupants. The Gulf Transitway is also open to all vehicles having 2-or-more occupants.

In addition to the HOV priority lanes being developed, the Houston transitway system will also include a number of mode-change support facilities. Figure 1 shows the location and status of the transitway elements monitored in this research effort.

The current status of the research effort is documented in the following research reports. The reader is referred to these reports for a more detailed background on the study.

1. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: An Annotated Bibliography, Technical Report 1086-1, December 1985.

2. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Work Program, Technical Report 1086-2, January 1986.

3. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Survey of Transitway Projects in the United States and Canada, Technical Report 1086-3, November 1986.

4. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Preliminary Assessment of Land Use Impacts in Houston's North (I-45N) Transitway Corridor, Technical Report 1086-4, January 1987.

5. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Land Use Data Base for Houston's Transitway Corridors and Second Year Summary, Technical Report 1086-5, March 1987.

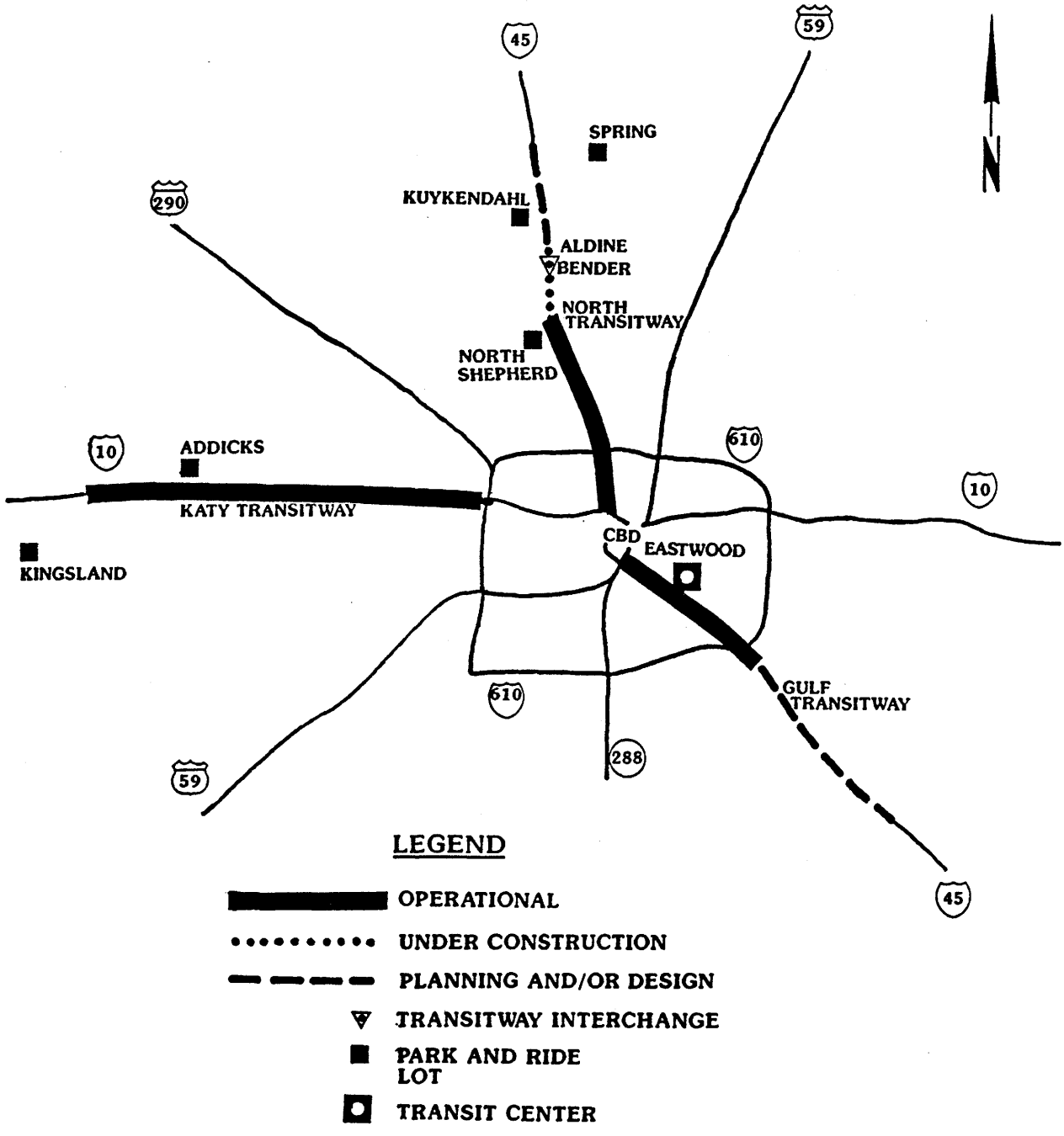

Figure 1. Elements of the Houston Transitway System Monitored for this Study

6. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Land Use Impacts of the Houston Transitway System, Third Year Update, Technical Report 1086-6, February 1988.

7. Land Use and Innovative Funding Impacts In A Permanent Busway/Park-and-Ride Transit System: Turnkey Park-and-Ride Facility Investigation, Technical Report 1085-1 (Draft), (no date).

8. Land Use Impacts In The I-45 North Freeway Corridor: Results of Developer Interviews, Technical Report 1085-2 (Draft), September 1986.

9. Land Use Impacts In The I-10 West/Katy Freeway Corridor: Results of Developer Interviews, Technical Report 1085-3, February 1988.

1.2 RESEARCH OBJECTIVES

This five-year study has two primary objectives;

1. To measure, analyze, and evaluate the transportation and land use impacts resulting from the construction of permanent busways (transitways) and park-and-ride facilities in the Houston area; and

2. To evaluate the "turnkey" procurement concept used by the Harris County Metropolitan Transit Authority (METRO) and to determine its nationwide potential for park-and-ride facility development.

During the initial phase of the study, the following six secondary objectives were identified:

- To prepare a detailed work program compatible with other prior or ongoing impact evaluation studies;

- To conduct, based upon available data, case studies of transitway facilities in cities other than Houston for comparison of design and operational characteristics;

- To examine land use impacts of the contraflow lane in Houston's North (I-45N) Freeway Corridor;

- To develop a "before" or pre-busway land use data base in Houston's North (I-45 North), Gulf (I-45 South) and Katy (I-10 West) Freeway Corridors;

- To project anticipated land use impacts, in the three Houston freeway corridors, which are likely to occur from implementing permanent busways and park-and-ride facilities; and

- To document the study data and findings in one or more reports.

The evaluation of turnkey development for park-and-ride facilities by Houston METRO examined the key ingredients of the program. This portion, as well as the portion of the research dealing with the problems, opportunities and potential costs and benefits of the concept applied on a nationwide basis, was conducted by The Goodman Corporation. Research Report 1085-1 presents documentation of this research and the reader is referred to this earlier report for further background on the turnkey development process.

1.3 SCOPE

Houston, Texas, is in the process of implementing exclusive, physically separated HOV priority facilities along five major radial freeway corridors. These facilities, referred to locally as Authorized Vehicle Lanes (AVLs) and more commonly as transitways or busways, are or will be located in the following corridors:

- Katy Freeway (I-10W)
- North Freeway (I-45N)
- Gulf Freeway (I-45S)
- Northwest Freeway (US 290)
- Southwest Freeway (US 59S)

All of the priority facilities have similar designs with cross-sections of approximately 20 feet. They are single, reversible lanes; traffic travels inbound toward downtown in the morning and outbound in the afternoon. These lanes are typically constructed within the existing median of the involved freeways and are protected from other freeway lanes by concrete barriers.

Adequate space is provided for emergencies and breakdowns within the transitway cross-section. Access points are limited and controlled. However, each facility differs slightly from the others in particular design, construction, and operational features.

The following facilities are being monitored as part of this research effort:

1. North (I-45N) Freeway Transitway
   a. Aldine-Bender Transitway Interchange (under construction)
   b. Kuykendahl Park-and-Ride
   c. North Shepherd Park-and-Ride
   d. Spring Park-and-Ride

2. Gulf (I-45S) Freeway Transitway
   a. Eastwood Transit Center (formerly known as Lockwood Transit Center)

3. Katy (I-10W) Freeway Transitway
   a. Addicks Park-and-Ride
   b. Kingsland Park-and-Ride

This report presents the 1988 update of the land use impacts which have resulted in the past year from either the transitways or their associated park-and-ride facilities, transit center or transitway interchange area.

1.4 STUDY METHOD

1.4.1 General

The methodology used in the research for this project is referred to as the "before-after" study approach. Data from a time period prior to the transportation improvement are compared to similar data collected after the completion of the improvement in the affected area. Therefore, the effects of the transportation change are determined by comparing "before" period data to "after" period data which are collected and updated on an annual basis.

To satisfy the study objectives, land use data were obtained from 1) aerial photographs of study areas, 2) site visits, 3) Cole's City Directory, and 4) developer interviews. The use of each of these is described in the following subsections.

1.4.2 Aerial Photographs/Site Visits

Aerial photographs of the study areas were examined to identify land use changes in the vicinity of the study sites. The process of identifying land use changes consisted of taking the earliest available photos (between 1973-1975) and overlaying them with the next interval (time frame) photos. This procedure was repeated until the most current (1986) photos available were examined.

Site visits were made to the study areas to verify and supplement the results obtained from the aerial photograph analysis. The visits were also used to assess the types of development and their approximate age.

Because the aerial photography analysis can identify only "new developments", changes in use of existing structures (prior to "before" time frame) had to be identified through the site visits and the city directory.

1.4.3 City Directory

Cole's City Directory contains information on each occupied address in the Greater Houston Area. Land use changes were identified by reviewing the addresses listed within the study area on an annual basis. The addresses listed for the first year of observation (1973) were compared to those for the following year (1974) and so on until the most current year of the study period available (1987). Also, any new addresses within the study area were listed and observed for the remainder of the study period.

For the Kuykendahl, North Shepherd and Kingsland sites, years one through eight (1973-1980) are the "before" data base, while years nine through fifteen (1981-1987) provide the "after" data base. Additionally, for the Spring and Addicks sites the "before" and "after" dates are years one through ten (1973-1982) and years eleven through fifteen (1983-1987), respectively. All Eastwood data are "before" data, as the transit center only recently opened (May 1988). All data are considered "before" data for the Aldine-Bender site, as it is currently under construction.

1.4.4 Developer Interviews

As part of this research effort, it was decided that interviews with the developers of major office and commercial projects within the freeway corridors would be an expedient and direct method of assessment of the actual interaction between the transitway and its support facilities and the developer's decision concerning where, when, what, why and how much to develop. The information obtained from the interviews, combined with the other data should provide as complete a picture as possible with regard to the transitway and transit facilities impacts on the freeway corridors.

Interviews with developers along both the North (I-45N) and Katy (I-10W) Freeway Corridors have been completed. The conclusion drawn from both sets of interviews conducted with the development community in these areas was that neither the transitways nor their support facilities have influenced land use or development decisions over the period of their existence. More complete discussions of the results of the North Freeway Corridor and Katy

Freeway Corridor developer interviews can be found in Reports 1085-2 and 1085-3.

Interviews with developers along the Gulf (I-45S) Freeway Corridor have recently been completed. The results of the interviews will be presented in a separate report by The Goodman Corporation.

1.5 ZONE OF INFLUENCE

The zone of influence or "impact area" is commonly an area of a specified dimension inside which may occur land use impacts as a result of a transit improvement.

For this study, a distance of one-quarter mile was chosen as the limit for the impact area of all study locations. This distance was chosen in order to maintain consistency with prior rail and rapid transit impact studies. The one-quarter mile distance has become somewhat of a standard definition for the zone of influence of transit improvements and is consistent with the general approach used in impact studies outlined in Technical Report 1086-1.

1.6 DATA PRESENTATION

For presentation purposes, both mapping and tabular methods were developed for the data obtained through the analysis of aerial photos, the site visits and the city directory. The tabular format was developed to further detail the land use changes presented in the maps. This tabular presentation includes data not only for the update period but for the study period years 1973 to 1987. It is hoped that the tabular presentation provides more insight into the "evolution" of uses around the various sites. For those sites containing facilities that have been operational through at least one data collection period, the tables are separated into "before" and "after" sections based on the timing of the improvement.

2. FOURTH-YEAR UPDATE OF LAND USE IMPACTS

2.1 NORTH (I-45N) TRANSITWAY CORRIDOR

As set forth in the research work program (Technical Report 1086-2), the North (I-45N) Transitway Corridor was used as a pilot for land use analyses resulting from the implementation of permanent transit facilities (i.e., busways and park-and-ride lots). The results of this initial effort were fully documented in Technical Report 1986-4.

The results of the 1988 update of land use changes at the four study sites along the North Transitway Corridor are presented in the following sections. Analyses of each area's changes in previous years are more fully documented in Technical Reports 1086-5 and 1086-6.

2.1.1 Aldine-Bender Transitway Interchange

The only land use changes in the vicinity of the transitway interchange have been the closing of twelve commercial establishments and the vacating of three residential units. The commercial establishments that experienced closings were in the strip center developments in the vicinity.

Figure 2 shows that no new land uses have appeared in the last year and that land uses in the area continue to be generally of the type that one might expect in the vicinity of a major transportation facility access point with numerous apartment and office complexes, as well as a few commercial developments in the impact area. Table 1 indicates in detail the types and numbers of land use changes that have occurred in the vicinity of the interchange.

The data in Table 1 appear to show a stabilization of land use patterns in terms of the relative number of commercial and residential uses. The data for 1987 indicate that the dominance of commercial uses over residential uses continues.

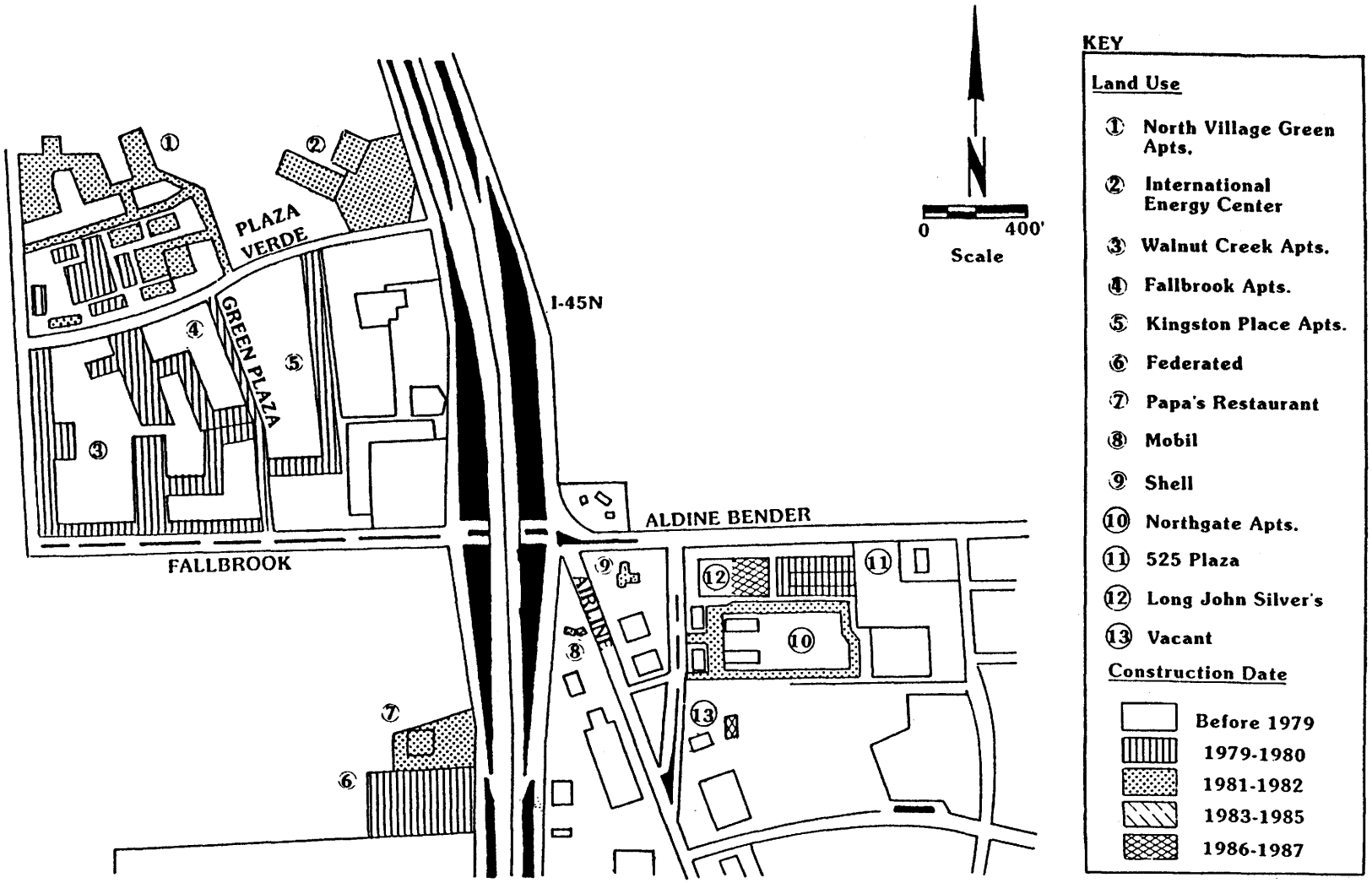

Figure 2. Land Use Trends in the Vicinity of the Aldine-Bender Transitway Interchange (1979-1988)

Table 1. Impact Area Development Assessment in the Vicinity of the Aldine-Bender Transitway Interchange: "Before" Period

Type of Use	Year														
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Commercial	22 76	29 83	27 90	28 90	34 92	49 91	58 95	75 88	76 84	88 83	93 82	83 80	79 64	80 64	68 62
Residential	7 24	6 17	3 10	3 10	3 8	5 9	3 5	10 12	15 16	18 17	21 18	21 20	44 36	44 36	41 38
Total	29 100	35 100	30 100	31 100	37 100	54 100	1 100	85 100	91 100	106 100	114 100	104 100	123 100	124 100	109 100

No. = Number of Addresses

Source: Cole's City Directory

The closing of the twelve commercial establishments appears to have occurred not because of any transitway impact but more likely because of the continued poor local economic situation. In addition, the transitway interchange is still under construction and any land use impacts probably will not be evident for several years.

2.1.2 Kuykendahl Park-and-Ride

Figure 3 shows land use changes in the vicinity of the Kuykendahl Park-and-Ride Lot. Within the past year, two commercial establishments have closed in the area, while one commercial establishment, a new car dealership, has opened in the vicinity of the park-and-ride lot. This new land use continues the trend of previous land use changes in the area which have almost exclusively involved auto sales establishments. However, the location of the park-and-ride lot does not appear to be an important factor in the location of the car sales businesses, as they are not the type of business which would benefit from locating in the vicinity of a transitway facility.

As Tables 2 and 3 show, there has been a change in the dominant type of land use in the vicinity of the Kuykendahl Park-and-Ride Lot. The apparent reversal in share of uses between residential and commercial must be tempered by pointing out that there was originally such a relatively small amount of developed land that any change results in a dramatic percentage change.

Table 2. Impact Area Development Assessment in the Vicinity of Kuykendahl Park-and-Ride Lot: "Before" Period

	Year							
	1973	1974	1975	1976	1977	1978	1979	1980
Type of Use	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Commercial	3 30	5 42	6 40	7 50	10 62	10 62	13 76	14 82
Residential	7 70	7 58	9 60	7 50	6 38	6 38	4 24	3 18
Total	10 100	12 100	15 100	14 100	16 100	16 100	17 100	17 100

No. = Number of Addresses
Source: Cole's City Directory

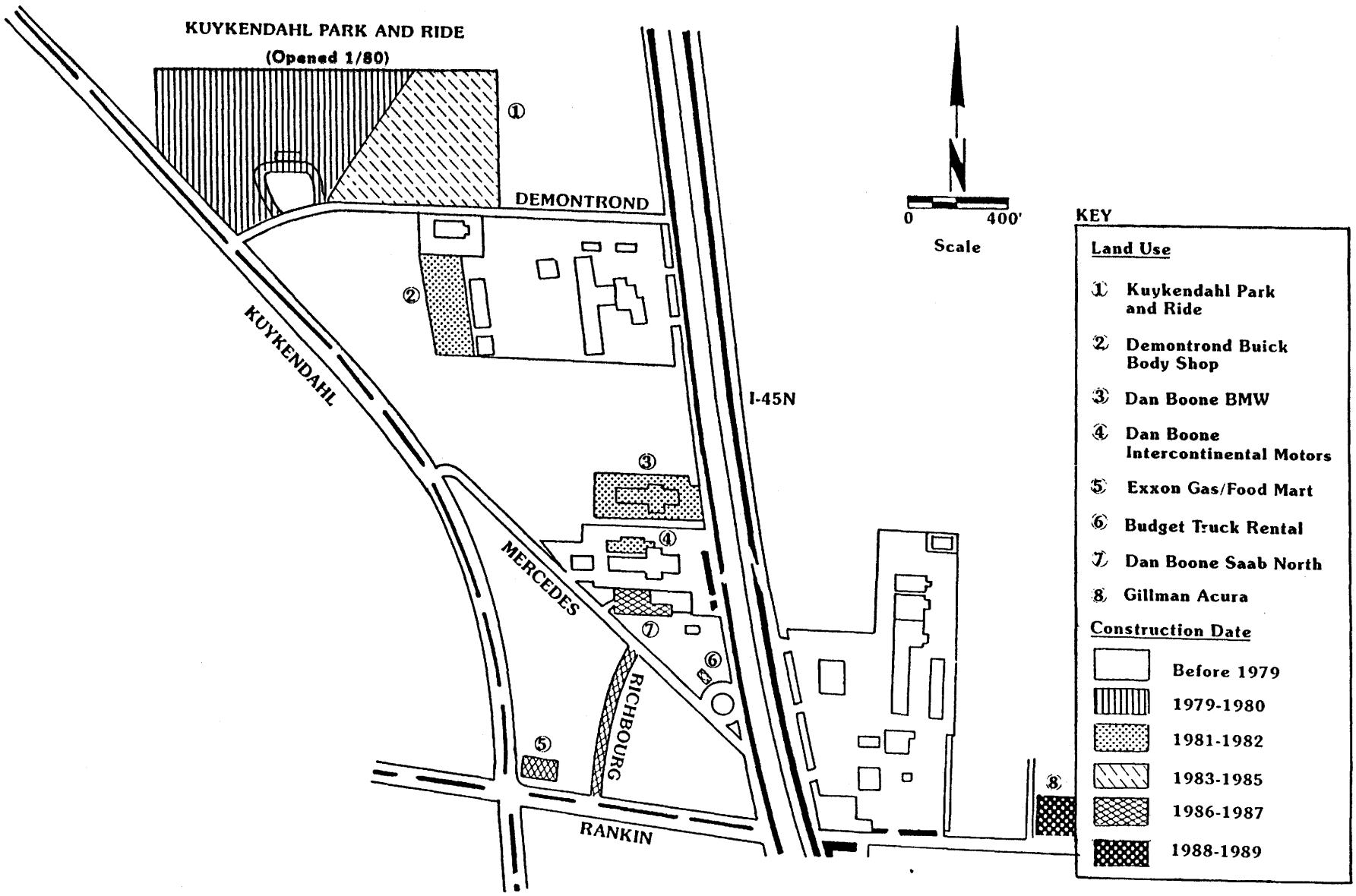

Figure 3. Land Use Trends in the Vicinity of the Kuykendahl Park-and-Ride Lot (1979-1988)

Table 3. Impact Area Development Assessment in the Vicinity of Kuykendahl Park-and-Ride Lot: "After" Period

Type of Use	Year													
	1981		1982		1983		1984		1985		1986		1987	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	16	89	18	100	20	95	22	92	20	87	20	87	19	86
Residential	2	11	0	0	1	5	1	4	2	9	2	9	2	10
Public/Quasi-Public	-	-	-	-	-	-	1	4	1	4	1	4	1	4
Total	18	100	18	100	21	100	24	100	23	100	23	100	22	100

No. = Number of Addresses
Source: Cole's City Directory

The latest year's data (1987) seem to indicate that the relative amounts of commercial and residential uses have stabilized somewhat. The past three year's data have essentially identical relative quantities of commercial and residential uses. However, there does not appear to be any connection between either the transitway or the park-and-ride lot and these or any other trend of land use changes within the study period. The fact that there is such a small amount of developed land in the impact area indicates that, like the situation at the Aldine-Bender Interchange, the area surrounding the park-and-ride lot should continue to be an ideal site for monitoring land use impacts of the park-and-ride lot and the North Freeway Transitway.

2.1.3 North Shepherd Park-and-Ride

Figure 4 shows that there have been no new land uses established in the vicinity of the North Shepherd Park-and-Ride Lot. Land use changes in the past year have involved the closing of one auto repair establishment and the addition of three residences. The auto repair establishment, which closed during the past year, was one of those identified in last year's report (1086-6) as representing a potential land use impact of the park-and-ride lot due to its location immediately adjacent to the park-and-ride lot and the nature of the business it conducted (auto repair service). The events of the past year regarding this establishment do not prove the assumption of potential influence incorrect, but may more correctly represent and reinforce the fact that local economic conditions play or have played a role in

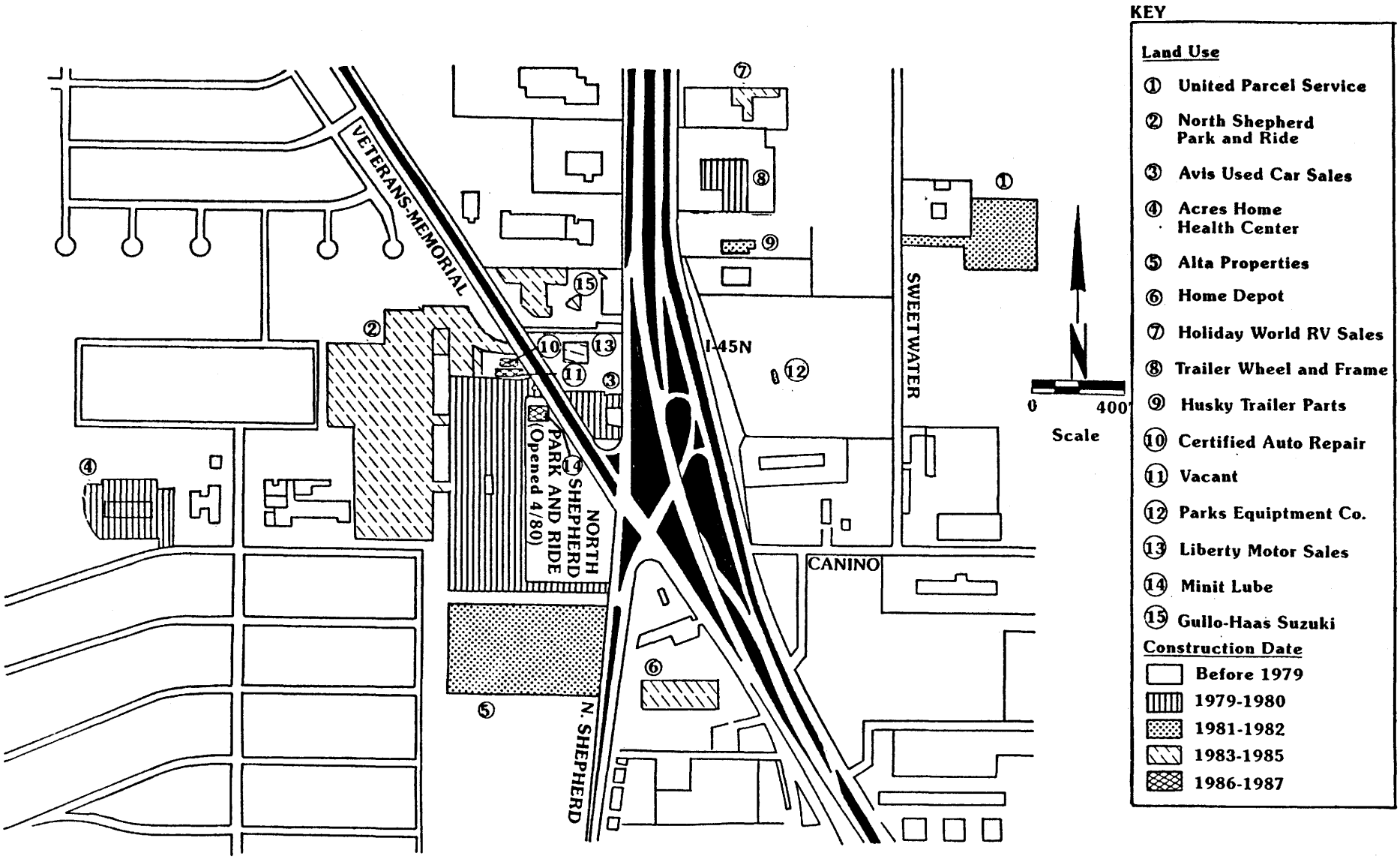

Figure 4. Land Uses in the Vicinity of the North Shepherd Park-and-Ride Lot (1979-1988)

terms of influence of land use development patterns. As can be seen from Figure 4, two of the three auto repair establishments located adjacent to the park-and-ride lot remain in operation.

Tables 4 and 5 present land use data for the entire study period. The data show that the area surrounding the North Shepherd Park-and-Ride Lot has become dominated by commercial land uses. The data also suggest that over the length of the study period, particularly after 1980, the character of the area began to change, resulting in large numbers of residential uses becoming vacant and commercial uses appearing in areas that had previously been vacant. The new data for the update year show the trend of dominant commercial land uses to be continuing. However, other than the two auto repair establishments, there is little direct evidence of any land use impacts that can be attributed either to the North Shepherd Park-and-Ride Lot or the North Freeway Transitway.

Table 4. Impact Area Development in the Vicinity of North Shepherd Park-and-Ride Lot: "Before" Period

	Year							
	1973	1974	1975	1976	1977	1978	1979	1980
Type of Use	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Commercial	59 63	60 62	63 64	67 63	79 72	80 72	88 75	94 75
Residential	35 37	36 38	36 36	39 37	30 28	31 28	30 25	31 25
Total	94 100	96 100	99 100	106 100	109 100	111 100	118 100	125 100

No. = Number of Addresses
Source: Cole's City Directory

Table 5. Impact Area Development in the Vicinity of North Shepherd Park-and-Ride Lot: "After" Period

	Year						
	1981	1982	1983	1984	1985	1986	1987
Type of Use	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Commercial	93 83	98 82	98 84	109 86	104 87	109 89	106 87
Residential	19 17	21 18	19 16	17 14	16 13	13 11	16 13
Total	112 100	119 100	117 100	126 100	120 100	122 100	122 100

No. = Number of Addresses
Source: Cole's City Directory

2.1.4 Spring Park-and-Ride

Recent land use changes in the vicinity of the Spring Park-and-Ride Lot are shown in Figure 5. The land use changes that have occurred in the past year are the opening of a gas station and a mini-storage business on FM 1960E. The presence of the park-and-ride lot does not appear to have had any influence on the location of the mini-storage business. However, because of its proximity to the park-and-ride lot and the type of the business being conducted, the location of the gasoline station may have been slightly influenced by the park-and-ride lot. Tables 6 and 7 present the land use data from the entire study period. The data show that both residential and commercial uses experienced little change from 1973 to 1979. However, beginning in 1980, both residential and commercial land uses began to increase in number. In 1982, with the opening of a major strip mall development, the number of commercial uses grew rapidly while residential uses stabilized. The latest data show that this trend appears to be continuing. Excluding the newest commercial developments as well as the savings and loan and two apartment complexes, all changes occurred prior to the construction of the park-and-ride lot and thus could not have been influenced by the location of the park-and-ride lot. Of those developments constructed after the park-and-ride lot opened, only the recent opening of the gasoline station can be considered a potential land use impact. Most of the land use changes in this area are probably tied to the general economic growth experienced in the FM 1960 area in the early and mid-1980's.

Table 6. Impact Area Development Assessment in the Vicinity of the Spring Park-and-Ride Lot: "Before" Period

Type of Use	Year																			
	1973		1974		1975		1976		1977		1978		1979		1980		1981		1982	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	8	73	8	73	5	71	5	71	5	71	5	50	5	83	4	57	4	33	13	57
Residential	3	27	3	27	2	29	2	29	2	29	5	50	1	17	3	43	8	67	10	43
Total	11	100	11	100	7	100	7	100	7	100	10	100	6	100	7	100	12	100	23	100

No. = Number of addresses
Source: Cole's City Directory

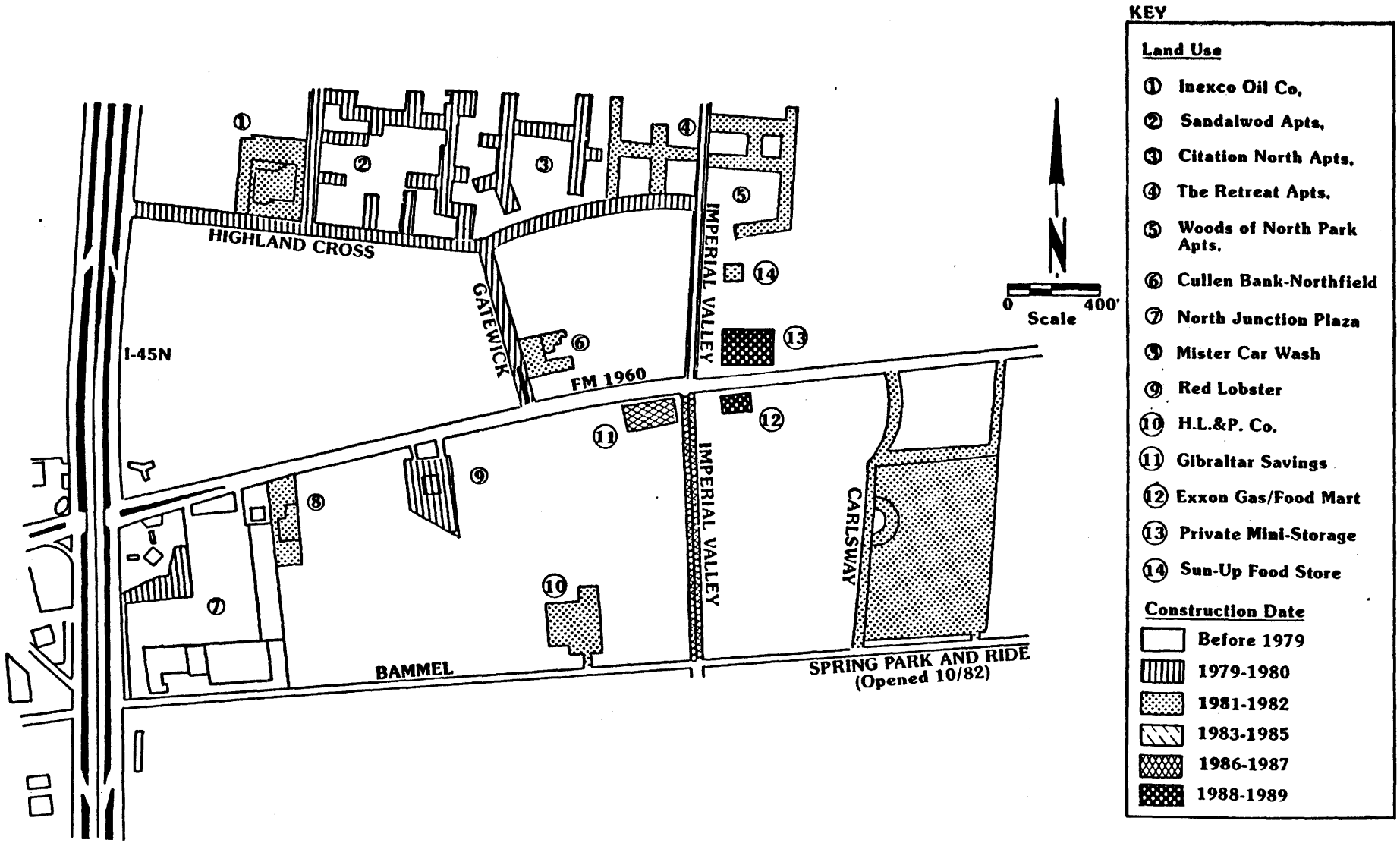

Figure 5. Land Use Trends in the Vicinity of the Spring Park-and-Ride Lot (1979-1988)

Table 7. Impact Area Development Assessment in the Vicinity of Spring Park-and-Ride Lot: "After" Period

Type of Use	Year									
	1983		1984		1985		1986		1987	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	21	70	26	72	30	77	31	77	37	82
Residential	9	30	10	28	9	23	9	23	8	18
Total	30	100	36	100	39	100	40	100	45	100

No. = Number of addresses
Source: Cole's City Directory

2.2 GULF (I-45S) TRANSITWAY CORRIDOR

2.2.1 Eastwood Transit Center

There have been two land use changes of note in the vicinity of the Eastwood Transit Center since the previous update. These changes, which are shown in Figure 6, involve the opening of a used car sales establishment and a little league baseball facility. As Table 8 indicates, the area surrounding the transit center remains a well-established predominantly residential area. There are areas of commercial activity, but these are located mostly along the Gulf (I-45S) Freeway. The most recent data show that while the total number of uses declined, the overall shares of each type of use remain essentially constant. The most plausible explanation for the decline in the total number of uses to a point that is below the level that existed in 1973 is that this area has been hard hit by the economic problems that exist in the Houston area.

As the transit center and the adjacent section of transitway have been in operation only since May 1988, it is doubtful that the presence of the transitway had any influence on the overall decline in land uses or any particular land use changes, including the most recent ones. It appears that, similar to the situation at other study sites, economic influences may be the controlling factor in terms of land use changes.

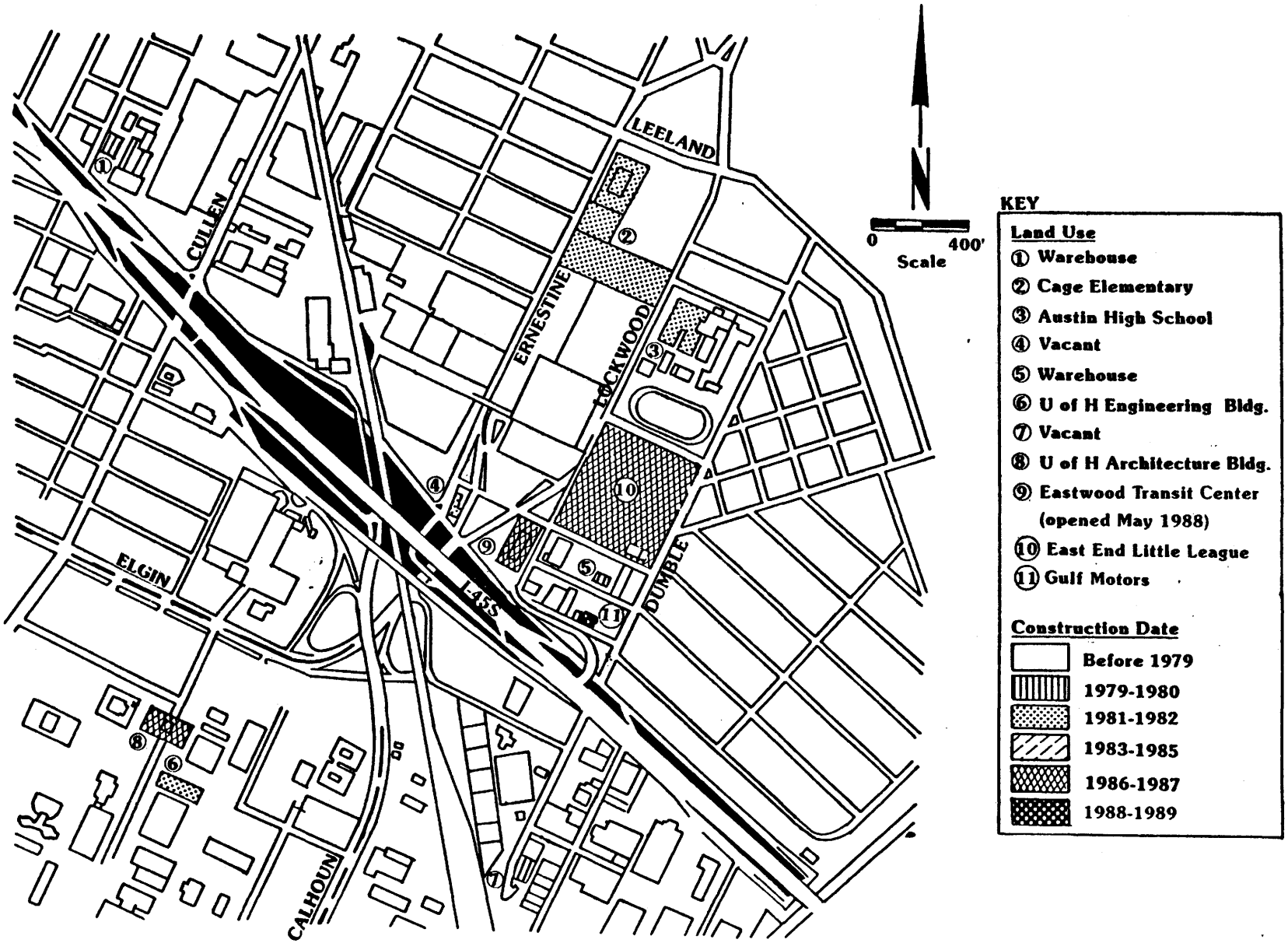

Figure 6. Land Use Trends in the Vicinity of the Eastwood Transit Center (1979-1988)

Table 8. Impact Area Development Assessment in the Vicinity of Eastwood Transit Center: "Before" Period

Type of Use	Year																			
	1973		1974		1975		1976		1977		1978		1979		1980		1981		1982	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	73	24	75	22	75	22	76	23	76	23	80	24	77	23	76	23	74	23	72	23
Residential	223	75	257	77	260	77	255	77	252	76	255	76	252	76	255	77	240	76	237	76
Public/Quasi-Public	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1
Total	297	100	333	100	336	100	332	100	329	100	336	100	330	100	332	100	315	100	310	100

Type of Use	Year									
	1983		1984		1985		1986		1987	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	76	25	69	24	65	22	63	23	58	22
Residential	229	75	220	75	222	77	210	76	208	77
Public/Quasi-Public	1	0	2	1	2	1	2	1	3	1
Total	306	100	291	100	289	100	275	100	269	100

No. = Number of Addresses
Source: Cole's City Directory

2.3 KATY (I-10W) TRANSITWAY CORRIDOR

Two sites in the Katy Corridor were chosen to assess land use impacts of the park-and-ride lots and the Katy Transitway. The impacts on the area surrounding each site are summarized below.

2.3.1 Addicks Park-and-Ride

Figure 7 presents land use changes that have occurred in the area surrounding the Addicks Park-and-Ride Lot. The land use changes that have occurred most recently include the opening of two gasoline stations, one auto service establishment, as well as a truck and equipment rental business. All of these changes fit the general pattern of recent land use changes involving commercial and service uses on the south side of I-10W. However, there does not appear to have been any influence of either the transitway or the park-and-ride lot on these or any other land use changes.

The land use data, as shown in Tables 9 and 10, indicate that the trend of stabilization of commercial uses and slow but steady increases in residential uses has begun to change. The two most recent year's data show that a period of maintenance of each land uses' share of total land use may have begun.

Table 9. Impact Area Development Assessment in the Vicinity of the Addicks Park-and-Ride Lot: "Before" Period

	Year																	
	1973		1974		1975		1976		1977		1978		1979		1980		1981		1982	
Type of Use	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	9	27	11	31	12	34	13	37	17	45	24	62	25	61	34	62	42	70	43	71
Residential	23	70	23	66	22	63	21	60	20	53	14	35	14	36	19	34	16	26	15	25
Public/Quasi-Public	1	3	1	3	1	3	1	3	1	2	1	2	1	2	1	2	1	2	1	2
Park or Recreational	-	-	-	-	-	-	-	-	-	-	-	-	1	2	1	2	1	2	1	2
Total	33	100	35	100	35	100	35	100	38	100	39	100	41	100	55	100	60	100	60	100

No. = Number of Addresses
Source: Cole's City Directory

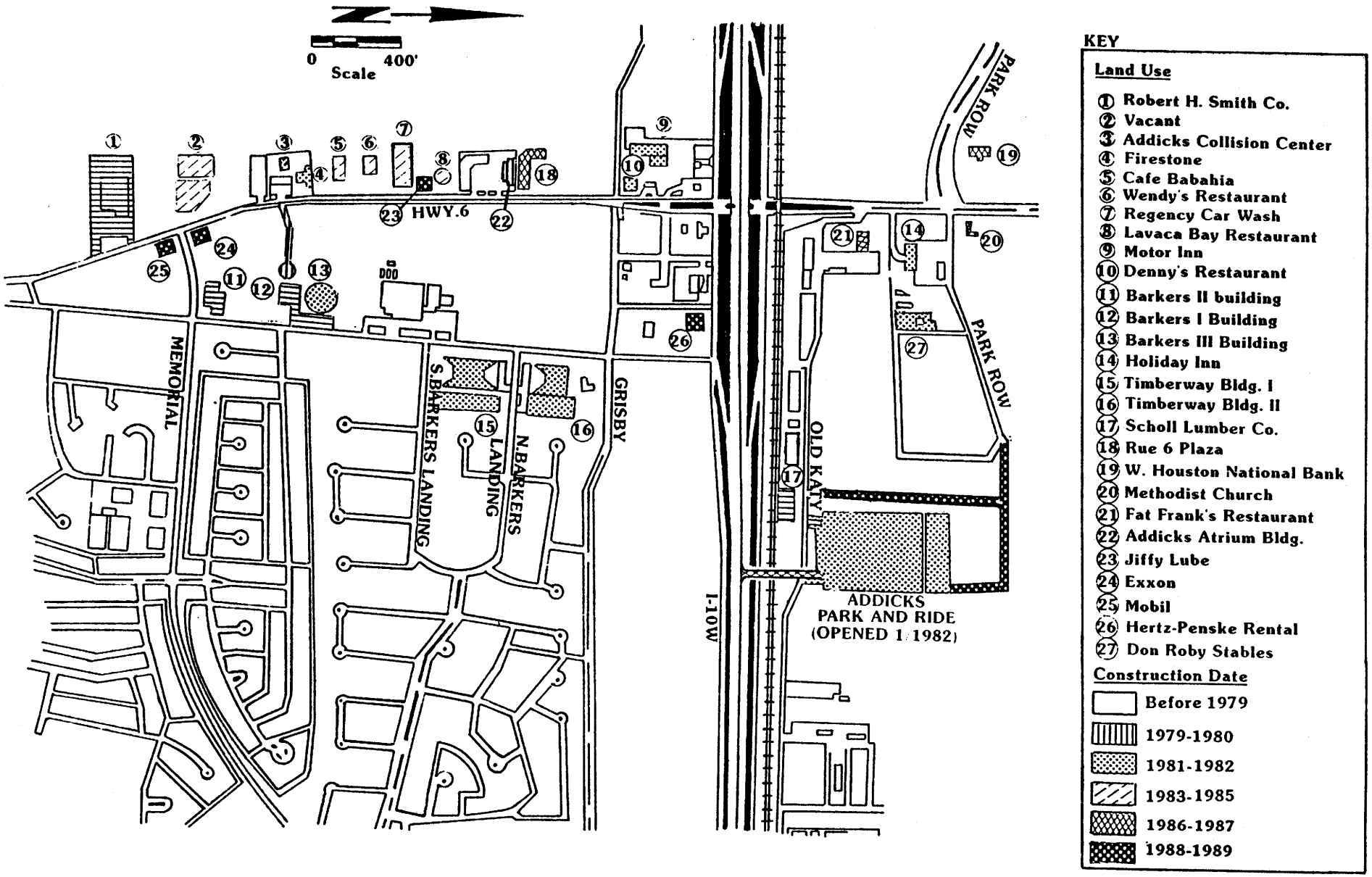

Figure 7. Land Use Trends in the Vicinity of the Addicks Park-and-Ride Lot (1979-1988)

Table 10. Impact Area Development Assessment in the Vicinity of Addicks Park-and-Ride Lot: "Before" Period

Type of Use	Year									
	1983		1984		1985		1986		1987	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	52	74	46	69	55	69	53	65	54	64
Residential	17	24	20	30	24	30	28	34	30	35
Public/Quasi-Public	1	1	1	1	1	1	1	1	1	1
Park or Recreational	1	1	-	-	-	-	-	-	-	-
Total	71	100	67	100	80	100	82	100	85	100

No. = Number of Addresses
Source: Cole's City Directory

Figure 7 indicates that there are pockets of undeveloped land, particularly on the south side of I-10W. This, combined with one aspect of the trend of land use changes described earlier (i.e., predominantly on the south side of I-10W), should make this area a site well suited for monitoring the land use impacts of the Katy Transitway and its park-and-ride lots.

2.3.2 Kingsland Park-and-Ride

Recent land use changes in the area surrounding the Kingsland Park-and-Ride Lot are presented in Figure 8. Land use changes identified in the past year include the opening of three fast food establishments and one auto service establishment. All three of the fast food establishments have opened in locations within a shopping center. Therefore, it appears that the overall trend of land use changes of a strip center or shopping center nature is continuing.

Details of the land use changes in the area around the Kingsland Park-and-Ride Lot are shown in Tables 11 and 12. Although there has been a park-and-ride facility in the area since 1980 (Mason Road Lot which was replaced by Kingsland Lot), there appears to have been no influence by these facilities on any land use changes that have occurred in the area thus far.

Of the four new land uses identified, only the auto service establishment location was previously a vacant tract of land. This probably

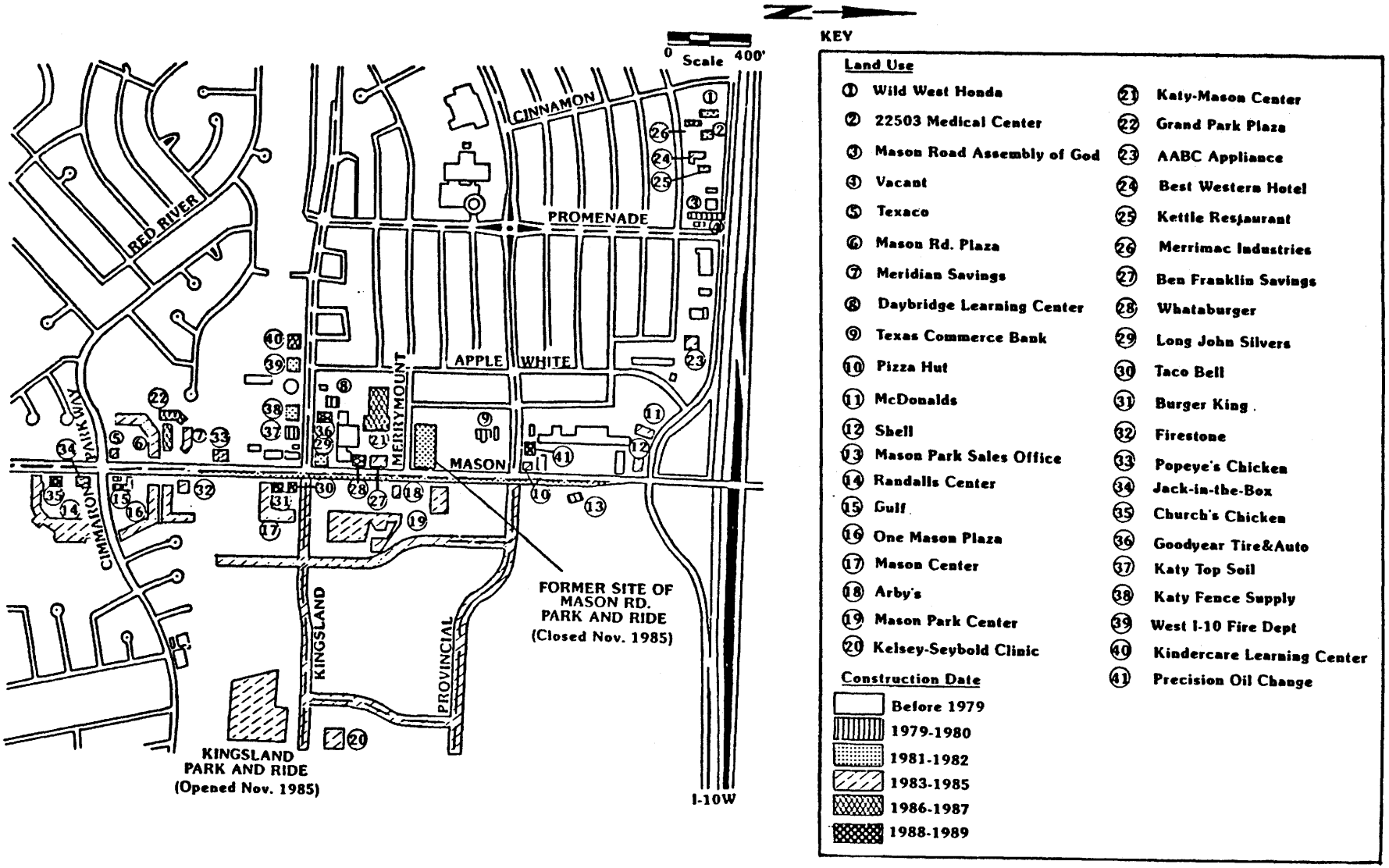

Figure 8. Land Use Trends in the Vicinity of the Kingsland Park-and-Ride Lot (1979-1988)

does not mean that the previously identified trend of land use changes involving almost exclusively vacant tracts of land has ceased. It may merely be a result of recently established trends by fast food companies to locate outlets within or adjacent to developments which draw large con-centrations of customers. This, in combination with the economic slow-down in the Houston area, has probably contributed to the fact that only one of the four land use changes in the past year involved a vacant tract of land.

Table 11. Impact Area Development Assessment in the Vicinity of Kingsland Park-and-Ride: "Before" Period

Type of Use	Year															
	1973		1974		1975		1976		1977		1978		1979		1980	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	-	-	-	-	-	-	1	25	0	0	8	12	33	35	49	43
Residential	-	-	2	100	2	100	3	75	38	95	55	87	60	64	63	56
Public/Quasi-Public	-	-	-	-	-	-	-	-	1	5	1	1	1	1	1	1
Total	-	-	2	100	2	100	4	100	39	100	64	100	94	100	113	100

No. Number of Addresses
Source: Cole's City Directory

Table 12. Impact Area Development Assessment in the Vicinity of Kingsland Park-and-Ride Lot: "After" Period

Type of Use	Year													
	1981		1982		1983		1984		1985		1986		1987	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial	57	46	63	152	67	51	62	52	92	61	101	61	105	62
Residential	65	53	55	47	61	47	54	46	57	38	63	38	62	37
Public/Quasi-Public	1	1	2	1	2	2	2	2	2	1	2	1	2	1
Total	123	100	122	100	130	100	118	100	151	100	166	100	169	100

No. = Number of Addresses
Source: Cole's City Directory

3. CONCLUSIONS

This update suggests that the land use impacts of the HOV treatments along the North Freeway (I-45N) and Katy Freeway (I-10W), as well as the Gulf Freeway (I-45S), remain relatively insignificant. Only one of the seven sites showed any change in land use that may have resulted from the HOV facilities. However, areas in two of the three corridors surveyed have substantial amounts of undeveloped land. It may prove necessary to wait until the transitways and associated support facilities become fully operational and a healthy economic solution exists before a more definitive assessment of land use impacts will be possible. Continued monitoring of land uses and completion of the developer interview portions of research should result in a reasonable assessment of the potential land use impacts of transitway systems.

4. REFERENCES

1. Kuo, Nana M., Richard L. Peterson and John M. Mounce, Evaluation of High-Occupancy Vehicle Priority Treatment Projects: First Year's Analysis, Research Report 339-2, Texas Transportation Institute, College Station, Texas, August 1984.