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16. Abstract

In an effort to address the congestion problem and improve mobility levels within the Houston metropolitan area, the Metropolitan Transit Authority of Harris County and the State Department of Highways and Public Transportation have joined together to develop an extensive system of transitways in the medians of the existing freeway network. These lanes are reserved for the exclusive use of high-occupancy vehicles. Texas Transportation Institute (TTI) is currently monitoring the impacts associated with the implementation and operation of these facilities. In addition, TTI is also engaged in an assessment of public attitudes concerning the transitways. This assessment is being accomplished through the periodic distribution of survey questionnaires to both transitway users and nonusers. This report summarizes survey data collected along the Katy, North, Northwest and Gulf Transitway corridors from April 1985 through October 1989. The primary intent of the surveys was to: 1) determine perceptions of transitway utilization; 2) identify why commuters have chosen their present travel mode; and 3) assess attitudes and impacts pertaining to the transitways. Demographic data and data concerning general travel characteristics were also collected.

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A SUMMARY OF SURVEY DATA FROM THE KATY, NORTH, NORTHWEST AND GULF TRANSITWAYS APRIL 1985 THROUGH OCTOBER 1989

by

Diane L. Bullard
Associate Research Planner

Research Report 484-12

An Evaluation of the Impact of Permitting Carpools to Use the Katy Transitway

Research Study 2-10-85-484

Sponsored by the
Metropolitan Transit Authority of Harris County
and the
Texas State Department of Highways and Public Transportation

In Cooperation with the
U.S. Department of Transportation, Federal Highway Administration

Texas Transportation Institute
The Texas A&M Unversity System
College Station, Texas 77843-3135

July 1990

METRIC (SI*) CONVERSION FACTORS

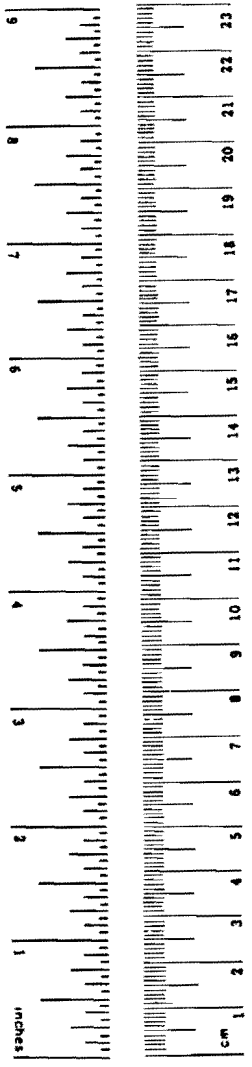
APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	centimetres	cm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km
AREA				
in^2	square inches	645.2	centimetres squared	cm^2
ft^2	square feet	0.0929	metres squared	m^2
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
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft^3	cubic feet	0.0328	metres cubed	m^3
yd^3	cubic yards	0.0765	metres cubed	m^3

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

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
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mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
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
m^3	metres cubed	35.315	cubic feet	ft^3
m^3	metres cubed	1.308	cubic yards	yd^3

TEMPERATURE (exact)

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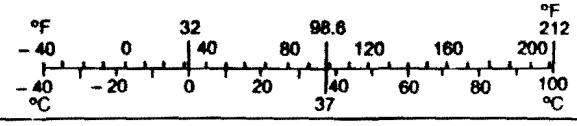

These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

ABSTRACT

In an effort to address the congestion problem and improve mobility levels within the Houston metropolitan area, the Metropolitan Transit Authority of Harris County and the Texas State Department of Highways and Public Transportation have joined together to develop an extensive system of transitways in the medians of the existing freeway network. These lanes are reserved for the exclusive use of high-occupancy vehicles. At present, carpools are permitted to use three of the four transitways in operation. Texas Transportation Institute (TTI) is currently monitoring the impacts associated with the implementation and operation of these facilities. In addition, TTI is also engaged in an assessment of public attitudes concerning the transitways. This assessment is being accomplished through the periodic distribution of survey questionnaires to both transitway users and nonusers. This report summarizes survey data collected along the Katy, North, Northwest and Gulf Transitway corridors from April 1985 through October 1989. The primary intent of these surveys was to: 1) determine perceptions of transitway utilization; 2) identify why commuters have chosen their present travel mode; and 3) assess attitudes and impacts pertaining to the transitways. Demographic data and data concerning general travel characteristics were also collected.

Key Words: Transitways, High-Occupancy Vehicle Lanes, Busways, Authorized Vehicle Lanes, Priority Treatment, Carpools, Vanpools, Transit

IMPLEMENTATION STATEMENT

In October 1984, the first completed transitway was opened on the Katy Freeway (I-10) in west Houston. In November 1984, the I-45 North Freeway Contraflow Lane was converted to a transitway, and in 1988 additional transitways were opened on the Northwest (US 290) and Gulf (I-45) Freeways. Since these are the first such facilities to operate in Texas, many of the operating procedures and approaches are being developed through experience. A major issue that is being addressed is determination of the types of vehicles that will be permitted to use the transitways.

Texas Transportation Institute (TTI) is currently monitoring the impacts associated with permitting carpools to utilize the transitways. In addition, TTI is also engaged in the assessment of public attitudes concerning these facilities. This assessment is being undertaken to assist the Metropolitan Transit Authority of Harris County and the Texas State Department of Highways and Public Transportation in the implementation and operation of future transitway improvements.

DISCLAIMER

SUMMARY

In response to a growing congestion problem within the Houston metropolitan area, a major effort is currently underway to implement a plan of physically separated high-occupancy vehicle lanes in the medians of the existing freeway network. Known locally as transitways, the development of these facilities is a joint venture between the Metropolitan Transit Authority of Harris County (METRO) and the Texas State Department of Highways and Public Transportation (SDHPT). As of October 1989, 36.6 miles of barrier-protected transitways in four freeway corridors were in operation.

Since their inception, one of the major operating issues regarding the transitways has been the designation of eligible user groups. In an effort to maximize utilization, carpools are permitted to use three of the four transitways presently in operation. Texas Transportation Institute (TTI) is currently monitoring and evaluating the impacts associated with permitting carpools to utilize these facilities. In addition, TTI is also engaged in the assessment of public attitudes concerning the transitways. This assessment is being accomplished through the periodic distribution of survey questionnaires to both transitway users and nonusers. This report presents the results of surveys performed in the Katy, North, Northwest and Gulf Transitway corridors from April 1985 through October 1989. In addition to obtaining socio-economic, demographic and travel information, the surveys were designed to:

1) Determine perceptions of the level of utilization of the transitways;
2) Identify why individuals have chosen their present travel mode; and
3) Assess attitudes and impacts pertaining to the transitways.

Status of Transitway Development and Survey Activities as of October 1989

In October 1984, the first of Houston's transitways opened along the Katy Freeway. At the time the Katy Transitway opened, only buses and 8+ passenger vanpools authorized by METRO and the SDHPT were allowed to use the priority lane. To address a perception that the transitway was underutilized, authorized 4+ carpools were allowed to begin using the facility in April 1985. Six months later (October 1985), authorized 3+ carpools were permitted to use the transitway. In August 1986, the minimum passenger requirement for vehicles was lowered to 2 persons and all authorization requirements were eliminated. By the fall of 1988, however, a.m. peak-hour vehicle volumes were exceeding capacity. As a result, the minimum carpool passenger occupancy requirement was raised from 2 to 3 persons between 6:45 a.m. and 8:15 a.m. effective October 17, 1988; 2-person carpools are still permitted to use the facility during all other operating hours.

In addition to changes in the types of vehicles which have been permitted to use the Katy Transitway, there have also been modifications in the transitway configuration. When opened in October 1984, the Katy Transitway extended from Post Oak to Gessner, a distance of 4.7 miles. The only access point on the western terminus was at Gessner. In May 1985, the transitway was extended 1.7 miles from Gessner to West Belt and an additional access point was temporarily provided at West Belt. By June 1987, the transitway had been extended from West Belt to State Highway 6, a distance of 5.1 miles. The West Belt access point was closed and two additional access points were opened -- a flyover ramp connecting the transitway to the Addicks Park-and-Ride Lot and an access point located just west of SH 6. Because of the changing operating restrictions and conditions on the Katy Transitway, a number of surveys were performed in order to assess the impacts of these changes.

In the North Freeway corridor, the North Transitway replaced the North Freeway Contraflow Lane in November 1984. The North Transitway extends from downtown to North Shepherd, a distance of 9.6 miles. Access from the north is via one of two points. Since the North Transitway opened, usage has been limited to buses and authorized 8+ vanpools. Because the operating restrictions and conditions have remained relatively stable

on the North Transitway, no additional surveys have been performed since the 1986 effort (approximately 16 months after the transitway had opened).

Because of the success of permitting carpools on the Katy Transitway, the decision was made to permit 2+ carpools on the Gulf and Northwest Transitways when they become operational in May 1988 and August 1988, respectively. The Northwest Transitway extends from Little York to the Northwest Transit Center, a distance of 9.5 miles. Access to the transitway from the northwest is possible from one of three points: 1) the Little York flyover ramp; 2) the Pinemont flyover ramp; or 3) the Dacoma entrance.

The Gulf Transitway extends from Broadway to downtown, a distance of 6.5 miles. This facility may be accessed from the southeast via the Broadway ramp, from the South Loop (I-610) ramp or by using the Eastwood (Lockwood) ramp. Survey efforts along the Gulf and Northwest Transitway corridors were performed in 1988 (3 months after the Northwest Transitway became operational and 6 months after the Gulf Transitway became operational) and again in 1989 (14 months after the Northwest Transitway opened and 1.5 years after the Gulf Transitway opened).

Some of the more important data from the transitway user and nonuser surveys (that which relate to trip destination, choice of commuting mode and perceptions of the transitways) are summarized on the following pages.

Trip Destinations

During the a.m. peak period, less than half of the total trips (transitway user and nonuser) are destined to downtown Houston (Table S-1). Yet, essentially all bus service caters to trips downtown. Vanpools and carpools continue to demonstrate more capability of serving trips to destinations other than downtown. In fact, 59% of the 1989 Northwest Transitway carpool/vanpool trips and 61% of the Katy Transitway carpool/vanpool trips were destined to locations other than downtown.

Table S-1.
Trip Destinations of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1989

A.M. Trip Destination	Katy Corridor					North Corridor	Northwest Corridor		Gulf Corridor	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=357)	(n=575)	(n=632)	(n=776)	(n=641)	(n=1252)	—	(n=215)	—	(n=464)
Downtown	96%	95%	94%	97%	94%	94%	—	97%	—	86%
Galleria	—	0%	1%	0%	2%	1%	—	—	—	1%
Greenway Plaza	0%	0%	1%	0%	0%	2%	—	—	—	0%
Texas Medical Center	1%	1%	1%	1%	1%	1%	—	2%	—	5%
Other	3%	4%	3%	2%	3%	2%	—	1%	—	8%
Transitway Carpools/Vanpools	(n=95)	(n=123)	(n=597)	(n=404)	(n=567)	(n=199)	(n=268)	(n=250)	(n=123)	(n=122)
Downtown	57%	55%	39%	42%	39%	61%	38%	41%	81%	78%
Galleria	12%	14%	22%	19%	20%	7%	26%	22%	9%	6%
Greenway Plaza	6%	2%	6%	3%	5%	8%	4%	4%	3%	1%
Texas Medical Center	4%	5%	5%	5%	5%	4%	4%	2%	—	4%
Other	21%	24%	28%	31%	31%	20%	28%	31%	7%	11%
Freeway Motorists	(n=302)	(n=728)	(n=1418)	(n=1056)	(n=1126)	(n=1126)	—	(n=1118)	—	(n=648)
Downtown	38%	33%	23%	30%	28%	28%	—	17%	—	28%
Galleria	24%	10%	13%	12%	13%	13%	—	19%	—	9%
Greenway Plaza	8%	4%	5%	4%	4%	4%	—	4%	—	5%
Texas Medical Center	9%	3%	3%	4%	4%	4%	—	4%	—	9%
Other	21%	50%	56%	50%	51%	51%	—	56%	—	49%

Mode Choice Considerations

Previous Mode of Travel

One of the primary reasons for implementing the transitways is to influence mode choice decisions. By offering an attractive alternative to traveling in heavily congested freeway mainlanes, it is hoped that the transitways will: 1) encourage drivers of single-occupant vehicles on the freeway to switch to a higher-occupancy vehicle on the transitway; and 2) encourage commuters making new trips in the corridor to choose a transitway mode. In looking at the previous travel modes of the transitway users, significant percentages reported that they either drove alone or did not make the trip prior to using the transitway (Table S-2).

A review of the most current survey data from each corridor shows that in the Katy Freeway corridor, 37% of the transitway bus users and 51% of the carpoolers and vanpoolers previously drove alone. An additional 29% of the bus riders and 11% of the carpoolers and vanpoolers did not make the trip prior to using the transitway.

In the North Freeway corridor, 35% of the transitway bus users and 30% of the vanpoolers drove alone prior to using a transitway mode. In addition, 25% of bus trips and 23% of the vanpool trips were new trips made on the transitway. Similar trends were also observed in the other two freeway corridors. A total of 64% of the bus users and almost half of the carpoolers/vanpoolers using the Northwest Transitway either previously drove alone or didn't make the trip prior to using the transitway; and 56% of the bus users and 45% of the poolers on the Gulf Transitway previously drove alone or didn't make the trip.

A major concern of permitting carpools (particularly 2-person carpools) to use the transitways was that they would simply attract riders from buses or vans, thereby moving no more people but requiring many more vehicles. Such does not appear to be the case, however; recent data show that only 6% of the Gulf Transitway carpoolers, 7% of the

Table S-2.
Previous Travel Mode of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1989

Previous Travel Mode	Katy Corridor					North Corridor	Northwest Corridor		Gulf Corridor	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=255)	(n=573)	(n=630)	(n=771)	(n=631)	(n=1240)	—	(n=214)	—	(n=457)
Drove alone	24%	35%	34%	38%	37%	35%	—	46%	—	38%
Carpool	5%	5%	9%	9%	10%	10%	—	9%	—	8%
Vanpool	4%	6%	2%	4%	4%	7%	—	3%	—	6%
Bus	54%	34%	33%	21%	20%	22%	—	21%	—	30%
Didn't make trip	12%	18%	21%	28%	29%	25%	—	18%	—	18%
Other	1%	2%	1%	0%	0%	1%	—	3%	—	0%
Transitway Carpoolers/Vanpoolers	(n=549)	(n=624)	(n=588)	(n=391)	(n=552)	(n=1622)	(n=239)	(n=242)	(n=97)	(n=117)
Drove alone	36%	39%	50%	45%	51%	30%	34%	43%	28%	40%
Carpool	22%	17%	29%	33%	26%	21%	60%	45%	53%	44%
Vanpool	12%	9%	3%	3%	4%	12%	1%	3%	6%	7%
Bus	13%	13%	9%	7%	8%	14%	4%	4%	5%	4%
Didn't make trip	17%	22%	9%	12%	11%	23%	1%	5%	8%	5%
Freeway Motorists[1]	(n=445)	(n=738)	(n=1424)	(n=1053)	(n=1122)	(n=423)	—	(n=1130)	—	(n=651)
Drive alone	88%	90%	85%	91%	89%	87%	—	85%	—	88%
Carpool	8%	6%	12%	8%	9%	8%	—	13%	—	9%
Vanpool	1%	1%	0%	0%	0%	1%	—	0%	—	0%
Other	3%	3%	3%	1%	2%	4%	—	2%	—	3%

[1] *For the motorists, this is the current mode they normally use.*

Northwest Transitway carpoolers, and 11% of the Katy Transitway carpoolers formerly used vans or buses.

Impacts of the Transitways on Mode Choice

From all appearances, the Katy, North, Northwest and Gulf Transitways have had a definite effect on mode choice. While sizable percentages of the transitway users indicated that they would be using their current mode even if there was no transitway, more than one-third of the current Katy Transitway users said they would not (Table S-3).

On the North Transitway, 27% of the vanpoolers and 41% of the bus riders stated they would not be using their current mode if not for the transitway. In addition, 39% of the Northwest Transitway bus riders and 30% of the carpoolers and vanpoolers on that lane would not be using their current mode if not for the transitway and at least 20% of the Gulf Transitway users would not be riding in buses, carpools, or vanpools if not for that transitway. Accordingly, it follows that the transitways can be credited with encouraging individuals to switch travel modes.

Perceived Transitway Travel Time Savings

One of the primary reasons for developing the transitway system is to offer riders of high-occupancy vehicles a travel time advantage and travel time reliability over traveling in the regular freeway lanes. Transitway users generally do perceive a travel time savings as a result of being able to use a priority lane (Table S-4).

In the Katy Transitway corridor, the median perceived travel time savings by current users is 20 minutes in both the a.m. and p.m.

Table S-3.
Use of Current Mode by Transitway Users if Transitway Had Not Opened, 1985-1989

Use Current Mode if No Transitway	Katy Transitway					North Transitway	Northwest Transitway		Gulf Transitway	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=356)	(n=575)	(n=629)	(n=773)	(n=641)	(n=1247)	—	(n=215)	—	(n=457)
Yes	69%	43%	52%	35%	32%	23%	—	41%	—	56%
No	15%	26%	20%	33%	36%	41%	—	39%	—	22%
Not sure	16%	31%	28%	32%	32%	36%	—	20%	—	22%
Transitway Carpoolers/Vanpoolers	(n=551)	(n=633)	(n=588)	(n=398)	(n=559)	(n=1632)	(n=255)	(n=247)	(n=122)	(n=120)
Yes	84%	68%	50%	54%	42%	43%	70%	52%	75%	68%
No	8%	16%	37%	35%	42%	27%	21%	30%	14%	20%
Not sure	8%	16%	13%	11%	16%	30%	9%	18%	11%	12%

Table S-4.
Perceived Transitway Travel Time Savings, 1985-1989

Travel Time Savings	Katy Transitway					North Transitway	Northwest Transitway		Gulf Transitway	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Perceived Transitway Travel Time Savings (minutes)										
Transitway Bus Users	(n=328)	(n=530)	(n=590)	(n=726)	(n=588)	(n=1147)	—	(n=185)	—	(n=386)
a.m. (50th Percentile)	9	15	15	20	20	20	—	15	—	10
p.m. (50th Percentile)	13	20	15	20	20	25	—	15	—	15
Transitway Carpoolers/Vanpoolers	(n=505)	(n=588)	(n=592)	(n=394)	(n=565)	(n=1595)	(n=256)	(n=245)	(n=121)	(n=121)
a.m. (50th Percentile)	8	10	20	20	20	20	15	15	15	12
p.m. (50th Percentile)	12	17	20	22	20	30	15	15	15	15
Actual Transitway Travel Time Savings (minutes)[1]										
a.m. (6:00-9:30 a.m.)	6.8	3.0	4.4	5.1	7.9	4.2	3.1	-4.6	3.3	3.1
p.m. (3:30-7:00 p.m.)	5.5	4.0	1.0	2.7	1.1	8.0	1.3	-5.7	7.7	-3.1

[1] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI travel time studies*

North Transitway users also perceive a significant travel time savings. Median perceived travel time savings reported by bus users is 20 minutes in the a.m. and 25 minutes in the p.m. Vanpoolers generally perceive a 20-minute savings in the a.m. and a 30-minute savings in the p.m.

Median perceived travel time savings reported by Northwest Transitway bus users, carpoolers and vanpoolers is 15 minutes in the a.m. and p.m. In the Gulf corridor, transitway users also perceive a 15-minute travel time savings in the p.m. with an a.m. savings in the range of 10 to 12 minutes.

Motorists' Attitudes Concerning the Transitways

In the North, Northwest, and Gulf Freeway corridors, less than one-third of the motorists traveling on the freeway mainlanes (non transitway users) felt the transitways are sufficiently utilized to justify the projects. Nevertheless, between 62% and 71% of the motorists did state the transitways are good transportation improvements (Table S-5).

In the Katy Freeway corridor, as transitway utilization has increased, acceptance of the transitway by the freeway motorists has also increased significantly (Table S-5). In 1985 (before carpools were allowed on the transitway) and again in 1986 (when only authorized 3+ carpools were permitted on the lane), only 3% of the non transitway motorists felt the lane was sufficiently utilized to justify the project. However, by the fall of 1987 (after 2+ unauthorized carpools were permitted), 44% of the motorists surveyed felt the transitway was sufficiently utilized. In 1988 (after the use of lane was restricted to 3+ carpools between 6:35 a.m. and 8:15 a.m.), both the actual and perceived utilization of the lane dropped somewhat. Even so, 64% of the motorists surveyed in 1988 still felt the transitway was a good transportation improvement. In 1989, that percentage further increased to 66%. Thus, it appears that permitting carpools to utilize the facility has had a positive effect on both the actual and perceived utilization of the facility.

Table S-5.
Motorists' Attitudes Toward the Transitways, 1985-1989

Measure of Effectiveness or Success	Katy Freeway						North Freeway	Northwest Freeway	Gulf Freeway
	1985[1]	1986[2]	Spring 1987[3]	Fall 1987[3]	1988[4]	1989[4]	1986[5]	1989[3]	1989[3]
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=1123)	(n=418)	(n=1109)	(n=643)
Yes	3%	3%	36%	44%	31%	30%	26%	22%	21%
No	90%	92%	55%	42%	55%	53%	56%	58%	61%
Not sure	7%	5%	9%	14%	14%	17%	18%	20%	18%
Transitway Vehicle Volumes (A.M. Peak Period)[6]	138	256	2412	2854	2032	2186	393	1463	1139
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=1126)	(n=422)	(n=1121)	(n=652)
Yes	4%	4%	30%	36%	24%	26%	23%	19%	21%
No	85%	86%	58%	46%	58%	54%	57%	57%	55%
Not sure	11%	19%	12%	18%	18%	20%	20%	24%	24%
Transitway Persons Moved (A.M. Peak Period)[6]	2465	3156	7769	8599	7210	7801	6647	4098	3956
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=1110)	(n=417)	(n=1109)	(n=647)
Yes	41%	36%	56%	64%	64%	66%	62%	71%	63%
No	35%	43%	29%	20%	22%	20%	20%	13%	21%
Not sure	24%	21%	15%	16%	14%	14%	18%	16%	16%

[1] *Authorized buses and vanpools (before carpools were allowed)*
[2] *Authorized buses, vanpools and 3+ carpools*
[3] *2+ vehicles, no authorization*
[4] *3+ vehicles, no authorization between 6:45 a.m. and 8:15 a.m., 2+ vehicles, no authorization at all other times*
[5] *Authorized buses and vanpools*
[6] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI transitway vehicle volume and occupancy counts*

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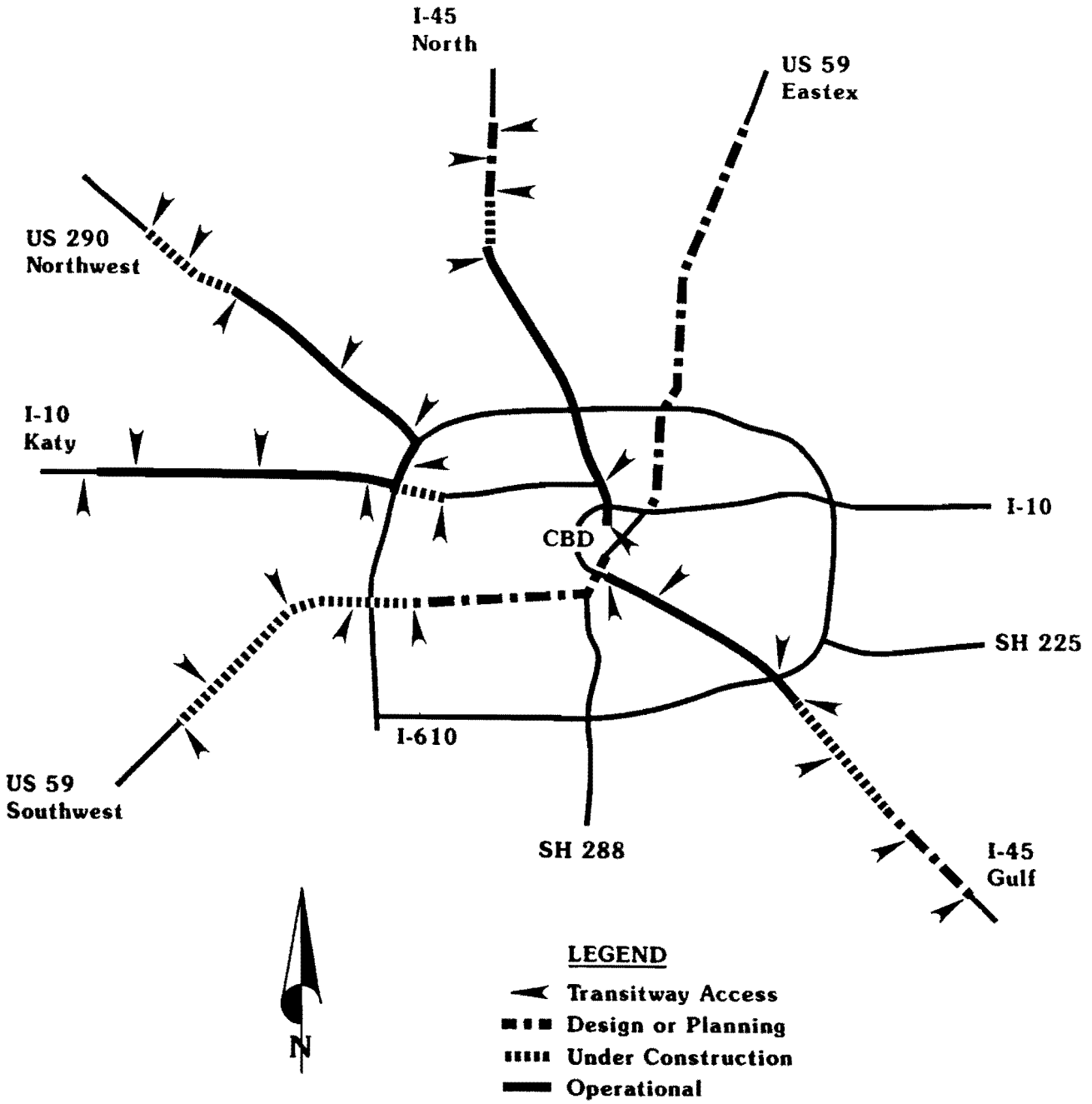
CHAPTER 1
INTRODUCTION

In an effort to address the severe congestion problem and improve mobility levels within the Houston metropolitan area, a variety of measures are currently being undertaken. One such measure is the implementation of an extensive system of high-occupancy vehicle (HOV) lanes in the medians of the existing freeway network. Known locally as transitways, these special lanes are being jointly developed by the Metropolitan Transit Authority of Harris County (METRO) and the Texas State Department of Highways and Public Transportation (SDHPT). A total of 95.5 miles of barrier-protected transitways will ultimately be constructed on six of the city's freeways. At present, four of the six transitways are operational (Figure 1).

An area of critical importance to the success of the transitway project is the designation of the types of vehicles that will be permitted to use these special lanes. Based on the highly successful operation of the I-45 North Freeway Contraflow Lane in north Houston, only authorized buses and 8+ vanpools (truly high-occupancy vehicles) were initially envisioned to be eligible users of the transitway system.

Consequently, when the first transitway opened in October 1984 on the Katy Freeway, its use was also limited to authorized buses and 8+ vanpools. However, under this operating strategy, fewer than 150 vehicles per peak period traveled the transitway during its initial months of operation, giving the facility the appearance of being underutilized. To encourage increased vehicular utilization, the decision was made to permit authorized 4+ carpools on the transitway beginning April 1, 1985. This action only resulted in adding an average of five vehicles to the transitway during the peak period. Therefore, in October 1985, authorized 3+ carpools were permitted on the lane. Even with the 3+ carpool designation, however, peak-hour carpool volumes remained less than 100 vehicles per hour



Note: The eastern extension to the Katy Transitway became operational January 9, 1990.
The northwestern extension to the Northwest Transitway became operational February 6, 1990.
Construction on one phase of North Transitway extension was completed and opened April 2, 1990.

Figure 1.
Status of the Houston Transitway Development, October 1989

and the perception of underutilization remained. As a result, in August 1986, the minimum passenger requirement for eligible vehicles was lowered to 2 persons and all authorization requirements were eliminated.

By the fall of 1988, however, traffic volumes on the transitway during the a.m. peak hour (7:00 a.m. - 8:00 a.m.) increased to levels exceeding 1500 vehicles per hour, normally assumed to be the capacity of the facility. This dramatic increase was beginning to have a negative effect on the facility's a.m. operation (lower travel speeds, increased travel times and unreliable travel times). To relieve this peak-hour congestion, the minimum carpool occupancy requirement was raised from 2 to 3 persons between 6:45 a.m. and 8:15 a.m. effective October 17, 1988; 2-person carpools were still permitted on the facility in the mornings before 6:45 a.m. or after 8:15 a.m. and during the entire p.m. operating period.

In the North Freeway corridor, the North Transitway replaced the North Freeway Contraflow Lane in November 1984. Since the North Transitway opened, its usage has been restricted to authorized buses and 8+ vanpools (the same operating restrictions as were present during the operation of the Contraflow Lane). Carpools have not been allowed on this facility due to freeway and additional transitway construction within the corridor.

Because of the success of permitting carpools on the Katy Transitway, METRO and the SDHPT agreed to permit 2+ carpools on the Gulf and Northwest Transitways when they became operational in May 1988 and August 1988, respectively. Since these four transitways are the first of their kind to open, the operating experiences associated with each are continually being monitored and evaluated to develop improved guidelines for planning, designing and operating future freeway/transitway improvements. Included in the evaluation is an assessment of public attitudes concerning the transitways. This assessment is being accomplished through the periodic distribution of survey questionnaires to both transitway users and nonusers. A chronological listing of survey efforts (through October 1989) relative to the changing conditions on the Katy Transitway follows.

KATY TRANSITWAY

October 1984 - Katy Transitway opened for operation from Post Oak to Gessner; authorized buses and 8+ vanpools were designated as eligible users.

March 1985 - Vehicle utilization of the transitway was low and the transitway appeared to be underutilized; decision was made to allow carpools on the transitway on a test basis. A major "before carpools" evaluation (which included transitway user and nonuser surveys) was performed; the results are documented in TTI Research Report 484-1.

April 1985 - Authorized 4+ carpools were allowed to use the transitway.

May 1985 - Operation of the Katy Transitway extended from Gessner to West Belt.

October 1985 - A major 6-month "after carpools" evaluation (similar in scope to the "before carpools" evaluation) originally scheduled for this month was postponed until the spring of 1986 due to the relatively low carpool volumes present (less than 50 carpools per peak period). In order to have some data on carpool utilization at an earlier date, a special survey of carpools using the transitway was performed. The results are documented in TTI Research Report 484-2. Immediately after the survey, the passenger requirement for eligible carpools was lowered to 3 persons to encourage increased vehicular utilization of the facility.

April 1986 - A major "after carpools" evaluation (which included transitway user and nonuser surveys) was performed; the results are documented in TTI Research Report 484-4.

August 1986 - Passenger requirement on the transitway was lowered to 2 persons and all authorization requirements were eliminated.

April 1987 - A special survey of Katy Transitway carpool drivers and Katy Freeway motorists was performed; the results are documented in a technical memorandum.

June 1987 - Operation of Katy Transitway was extended from West Belt to State Highway 6.

October 1987 - Second major "after carpools" evaluation (which included transitway user and nonuser surveys) was performed. A special survey of persons who utilize the park-and-pool lots adjacent to the Katy Freeway was also performed. The results are documented in TTI Research Report 484-9.

October 1988 - A.M. peak hour vehicle volumes on the Katy Transitway were approaching capacity; therefore, the minimum carpool occupancy requirement was raised from 2 to 3 persons between the hours of 6:45 a.m. and 8:15 a.m. The 2-person carpool requirement remained in effect for all other operating hours.

November 1988 - A third major "after carpools" evaluation (which included transitway user and nonuser surveys) was performed. This evaluation included a survey of carpools who had previously used the Katy Transitway during the a.m. peak period, but were no longer eligible due to the increase in minimum vehicle occupancy to 3 persons between 6:45 a.m. and 8:15 a.m. The results are documented in TTI Research Report 484-10.

October 1989 - A fourth major "after carpools" evaluation (which included transitway user and nonuser surveys) was performed. The results are documented in this report.

In addition to the carpool evaluation surveys being performed periodically on the Katy Transitway, surveys in the North, Northwest, and Gulf Transitway corridors are also being undertaken. These evaluations are designed to complement other research efforts by collecting pertinent information on transitway user and nonuser characteristics, travel patterns and attitudes toward the transitways.

Phase I of the North Transitway, which replaced the North Freeway Contraflow Lane, became operational in November 1984. A major "after" transitway implementation survey effort was performed in January 1986, approximately 15 months after the switch to transitway operations. The results of that survey, documented in TTI Research Report 484-4, are also presented in this report for comparative purposes.

Because of the success of permitting carpools on the Katy Transitway, 2+ carpools were also permitted on the Gulf and Northwest Transitways when they opened for operation in May 1988 and August 1988, respectively. A special survey of Northwest and Gulf Transitway carpool/vanpool users was performed in November 1988. The results of that survey, documented in TTI Research Report 484-9, are also presented in this report for comparative purposes. In addition, major "after" transitway implementation survey efforts (which included transitway user and nonuser surveys) were performed in the Northwest and Gulf Transitway corridors in October 1989. The results of these surveys are summarized in this report.

Surveys of Transitway Users and Nonusers

Surveys of both users and nonusers of Houston's four operating transitways were undertaken including:

- Transit riders traveling on the Katy, North, Northwest and Gulf Transitways;

- Vanpoolers using the Katy, North, Northwest and Gulf Transitways;

- Carpoolers using the Katy, Northwest and Gulf Transitways; and

- Motorists on the Katy, North, Northwest and Gulf Freeways **not** using the transitways.

The primary intent of these surveys was to: 1) determine perceptions of the level of transitway utilization; 2) identify why individuals have chosen their present travel mode; and 3) assess attitudes and impacts pertaining to the transitways. Demographic data and data concerning general travel characteristics were also collected as part of the major survey efforts.

All survey efforts were performed by TTI personnel. Comprehensive Katy Transitway survey efforts were undertaken in October 1985 and April 1986. Somewhat less comprehensive efforts were performed in October 1987, November 1988 and October 1989. In addition, a special carpool survey was undertaken in October 1985 and special carpool and motorist surveys were performed in April 1987. Comprehensive North Transitway user and nonuser data was collected in January 1986. Comprehensive Northwest and Gulf Transitway carpool/vanpool survey data were collected in November 1988; somewhat less comprehensive Northwest and Gulf Transitway user and nonuser surveys were performed in October 1989.

This research report documents the results of the October 1989 surveys performed in the Katy, Northwest and Gulf Transitway corridors and compares them to the results of previous surveys conducted in 1985, 1986, 1987 and 1988. No attempt is made in this report to include all relevant data collected in previous survey efforts.

A chronological listing of survey activities relative to the opening dates and operating restrictions of each transitway is outlined on the following page.

MAJOR SURVEY ACTIVITIES

Katy Transitway User and Nonuser Surveys

March 1985 - 5 months after the opening of the transitway and 1 month before carpools were allowed on the facility.

April 1986 - 18 months after the transitway operation began; 1 year after carpools were introduced; approximately 7 months after the carpool passenger requirement was lowered to 3 persons.

October 1987 - Approximately 3 years after the transitway opened; 2.5 years after carpools were introduced; 14 months after unauthorized 2+ carpools were permitted.

November 1988 - Approximately 4 years after the transitway began operation; 3.5 years after carpools were introduced; 2 years after unauthorized 2+ carpools were permitted; 3 weeks after the carpool occupancy requirement was raised from 2 to 3 persons between the hours of 6:45 a.m. and 8:15 a.m.

October 1989 - Approximately 5 years after the transitway opened; 4.5 years following the introduction of carpools; 3 years after unauthorized 2+ carpools were allowed; 1 year after the passenger requirement for carpools was increased from 2 to 3 persons between the hours of 6:45 a.m. and 8:15 a.m.

(Note: A special carpool survey was also undertaken in October 1985 and special carpool and motorist surveys were performed in April 1987.)

North Transitway User and Nonuser Surveys

January 1986 - 16 months after the North Transitway replaced the North Freeway Contraflow Lane.

Northwest Transitway User and Nonuser Surveys

November 1988 - 3 months after the transitway opened (transitway carpool/vanpool surveys only).

October 1989 - 14 months after the transitway opened.

Gulf Transitway User and Nonuser Surveys

November 1988 - 6 months after the transitway opened (transitway carpool/vanpool surveys only).

October 1989 - Approximately 1.5 years after the transitway had opened.

Survey Methodologies

Transitway User Surveys

Bus Mode. On-board transit user surveys were conducted on all METRO bus routes using the Katy, North, Northwest and Gulf Transitways during the a.m. peak operating period. For each route, the objective was to survey 100% of the passengers on approximately 30% of the bus runs. Katy Transitway bus service was provided on two express routes (one in 1985 and 1986) and from 3 park-and-ride lots (4 in 1989). North Transitway bus service was provided by one express bus route and from 4 park-and-ride lots. Bus service along the Northwest Transitway was provided from 2 park-and-ride lots and the Gulf Transitway serviced 1 express and 2 park-and-ride routes. The location of the park-and-ride lots within the transitway corridors are illustrated in Figure 2. TTI staff were present on all buses surveyed to distribute and collect the surveys. Survey response rates by route are summarized in Table 1. An example survey instrument used is included in the Appendix.

Carpool and Vanpool Modes. For the 1985 and 1986 surveys, vanpools and carpools were surveyed during the p.m. operating period. All vehicles were stopped at the entrances to the transitways by METRO police. TTI staff distributed surveys to all carpools and vanpools on the Katy Transitway and to all vanpools using the North Transitway. One survey was given to the driver and a different survey was given to each passenger. The driver survey requested more detailed data than did the passenger survey. Postage-paid return envelopes were included with the surveys and the respondents were requested to return the completed questionnaire to TTI by mail.

For the 1987 Katy Transitway survey, however, it became necessary to modify the survey procedures. Vehicle volumes on the Katy Transitway during the p.m. peak were approaching 2,000 vehicles. Hence, for safety and operational reasons, it was no longer possible to distribute surveys by stopping vehicles as they entered the transitway. Instead, license plates of carpools and vanpools traveling inbound on the transitway during the a.m.

Table 1.
On-Board Transit User Survey Distribution,
Katy, North, Northwest and Gulf Transitway Bus Routes

Bus Route	Surveys Distributed	Surveys Completed	Response Rate
Katy Transitway, March 1985			
Katy-Mason Park-and-Ride	81	73	90%
Addicks Park-and-Ride	96	94	98%
West Belt Park-and-Ride	55	55	100%
Memorial Express	137	136	99%
Total	369	358	97%
North Transitway, January 1986			
Kuykendahl Park-and-Ride	582	557	96%
North Shepherd Park-and-Ride	212	208	98%
Spring Park-and-Ride	246	234	95%
Seton Lake Park-and-Ride	151	144	95%
FM 1960 Express	104	104	100%
Total	1,295	1,247	96%
Katy Transitway, April 1986			
Kingsland (formerly Katy-Mason) Park-and-Ride	106	104	98%
Addicks Park-and-Ride	219	211	96%
West Belt Park-and-Ride	100	99	99%
Memorial Express	169	167	99%
Total	594	581	98%
Katy Transitway, October 1987			
Kingsland Park-and-Ride	101	101	100%
Addicks Park-and-Ride	204	193	95%
West Belt Park-and-Ride	56	55	98%
Memorial Express	175	173	99%
Wilcrest Express	112	112	100%
Total	648	634	98%
Katy Transitway, October 1988			
Kingsland Park-and-Ride	111	105	95%
Addicks Park-and-Ride	363	341	94%
West Belt Park-and-Ride	86	79	92%
Memorial Express	171	166	97%
Wilcrest Express	89	86	97%
Total	820	777	95%
Katy Transitway, October 1989			
Katy-Fry Park-and-Ride	25	25	100%
Kingsland Park-and-Ride	113	104	92%
Addicks Park-and-Ride	290	279	96%
West Belt Park-and-Ride	64	61	95%
Memorial Express	122	114	93%
Wilcrest Express	69	61	88%
Total	683	644	94%
Northwest Transitway, October 1989			
Northwest Station Park-and-Ride	172	169	98%
West Little York Park-and-Ride	48	48	100%
Total	220	217	99%
Gulf Transitway, October 1989			
Bay Area Park-and-Ride	216	197	91%
Edgebrook Park-and-Ride	215	205	95%
South Belt Express	65	63	97%
Total	496	465	94%

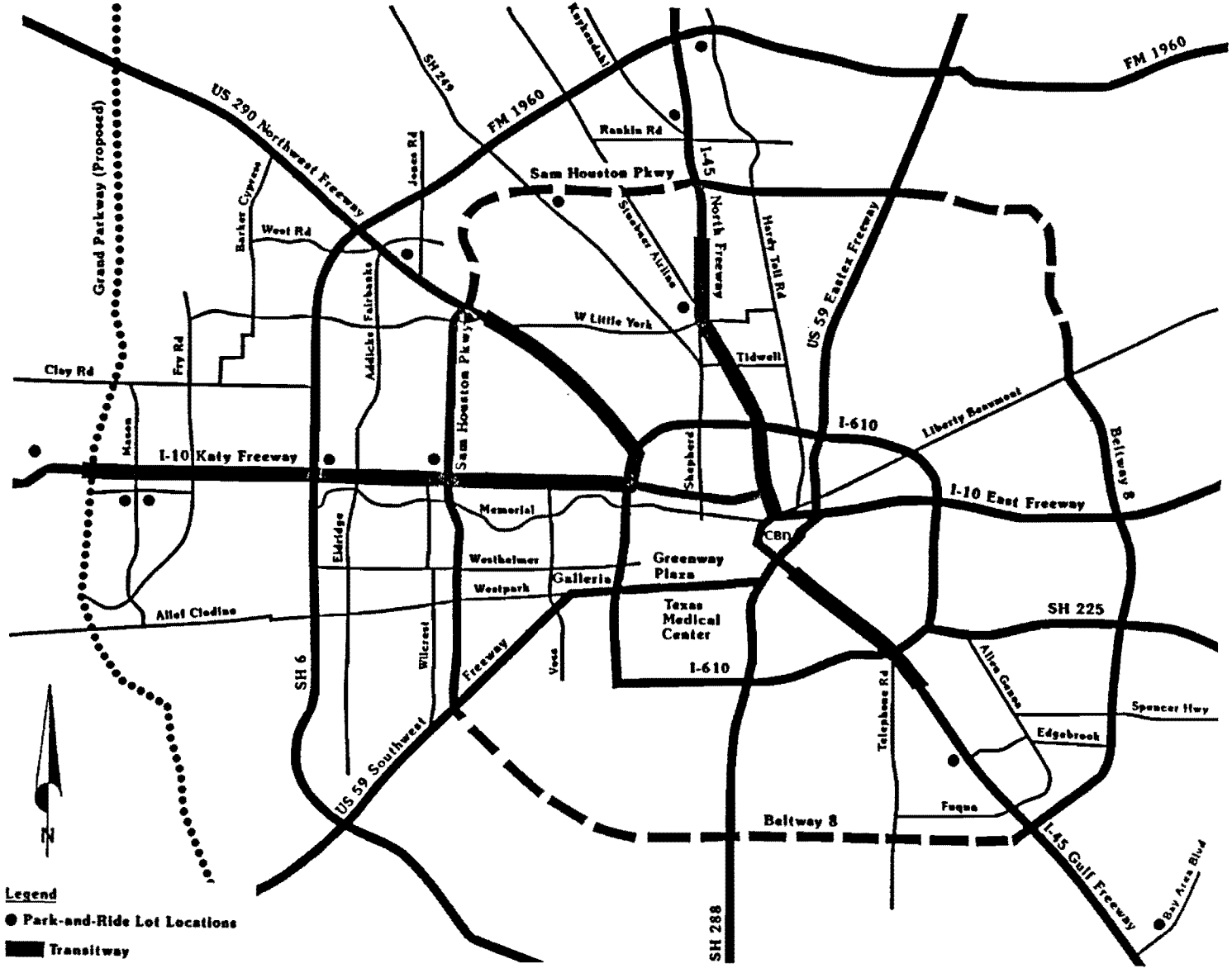


Figure 2.
North, Northwest, Katy and Gulf Transitway Study Corridors

operating period were recorded by TTI staff. The SDHPT Division of Motor Vehicles license plate files were accessed to obtain addresses. A survey was mailed to each address (excluding corporate addresses and leasing agencies). A postage-paid return envelope was included with each of the surveys. Carpool and vanpool drivers were asked to complete the survey and return it to TTI. This same procedure was followed for the 1988 and 1989 carpool/vanpool surveys along the Katy, Northwest and Gulf Transitways. An example survey instrument and cover letter is included in the Appendix. Response rates to the Katy, North, Northwest and Gulf Transitway carpool/vanpool surveys are presented in Table 2.

Table 2.
Carpool/Vanpool Survey Distribution,
Katy, North, Northwest and Gulf Transitways

Survey Group	License Plates Read	Surveys Mailed or Distributed	Surveys Returned Address Unknown or Vehicle Not on Transitway	Surveys Completed	Response Rate (% of Surveys Mailed or Distributed)
Katy Transitway, March 1985 Vanpool Drivers & Passengers	—	689	—	465	67%
Katy Transitway, October 1985 Carpool Drivers & Passengers	—	121	—	81	67%
North Transitway, January 1986 Vanpool Drivers & Passengers	—	2,323	—	1,637	70%
Katy Transitway, April 1986 Carpool & Vanpool Drivers & Passengers	—	977	—	637	65%
Katy Transitway, April 1987 Carpool & Vanpool Drivers	2,459	1,603	147	607	38%
Katy Transitway, October 1987 Carpool & Vanpool Drivers	2,502	1,536	111	605	39%
Katy Transitway, November 1988 Carpool & Vanpool Drivers	1,704	1,033	81	409	40%
Northwest Transitway, November 1988 Carpool & Vanpool Drivers	797	553	71	261	47%
Gulf Transitway, November 1988 Carpool & Vanpool Drivers	500	363	27	124	34%
Katy Transitway, October 1989 Carpool & Vanpool Drivers	2,204	1,507	91	590	39%
Northwest Transitway, October 1989 Carpool & Vanpool Drivers	917	596	42	253	42%
Gulf Transitway, October 1989 Carpool & Vanpool Drivers	567	367	19	122	33%

Non Transitway User Surveys

During the 6:00 a.m. - 9:30 a.m. peak period, license plates of motorists traveling inbound on the Katy, North, Northwest and Gulf Freeway mainlanes were recorded by TTI observers. The survey procedures followed were essentially identical to those described previously for the 1987, 1988 and 1989 carpool/vanpool surveys.

SDHPT Division of Motor Vehicle license plate files were accessed to obtain addresses. A survey was mailed to each address (excluding corporate addresses and leasing agencies). Motorists were asked to complete the survey and return it to TTI in the postage paid envelope provided. Response rates to the motorist surveys are presented in Table 3. An example of the survey questionnaire used is included in the Appendix.

Table 3.
Motorist (Non Transitway User) Survey Distribution,
Katy, North, Northwest and Gulf Freeways

Motorists	License Plates Read	Surveys Mailed	Surveys Returned Address Unknown or Vehicle Not on Freeway	Surveys Completed	Response Rate (% of Surveys Mailed)
Katy Freeway, March 1985	2,090	1,435	121	454	32%
North Freeway, January 1986	2,470	1,585	154	422	27%
Katy Freeway, April 1986	2,817	1,714	106	744	43%
Katy Freeway, April 1987	3,220	2,030	154	910	45%
Katy Freeway, October 1987	5,118	3,241	221	1,436	44%
Katy Freeway, November 1988	3,910	2,018	97	1,069	53%
Katy Freeway, October 1989	4,876	3,069	207	1,135	37%
Northwest Freeway, October 1989	5,045	3,271	215	1,133	35%
Gulf Freeway, October, 1989	3,820	2,290	172	656	29%

Comparison to Previous Data

Several of the survey questions used in the Katy, North and Gulf Transitway user and nonuser surveys are similar to those used in surveys of park-and-ride users along the Katy,

North and Gulf Freeways conducted by TTI in 1981 and 1984. When possible, for comparative purposes, the 1981 and 1984 data are also presented. During the 1981 and 1984 survey efforts, no priority treatment of any form was available along the Katy or Gulf Freeways. On the North Freeway, however, a contraflow lane was available for authorized buses and vanpools at the time of the 1981 and 1984 surveys.

Additional Data Available on the Houston Transitway System

TTI Research Report 1146-2, entitled "The Status and Effectiveness of the Houston Transitway System, 1989," presents a comprehensive assessment of the overall operation and performance of the Houston transitway system through calendar year 1989. Included in the report is an analysis of trend data related to: 1) operation of the transitways; 2) operation of the freeway mainlanes; 3) combined transitway and freeway data; and 4) data relating to transitway usage and operations. It should be noted, however, that some of the transitway volume and transitway travel time savings data presented in *this* report may differ slightly from that presented in Research Report 1146-2. This variation is due to the fact that the figures presented in this report are based on data collected during the specific months that transitway user and nonuser surveys were performed (in order to compare commuter perceptions of transitway utilization and travel time savings with empirical data recorded in the field during the same time period). Thus, the monthly figures cited in this report should not be confused with those presented in Research Report 1146-2 (or any other TTI report) which may represent quarterly or yearly averages for trend comparisons.

CHAPTER 2
TRANSITWAY BUS USER SURVEYS

Transitway bus user surveys were performed on five different occasions in the Katy Freeway Corridor (1985, 1986, 1987, 1988 and 1989). North Transitway bus user surveys were performed in 1986. Northwest and Gulf Transitway bus patrons were surveyed in 1989. In general, responses from users of the park-and-ride services within each transitway corridor are similar. The responses from the express route(s) surveyed in each corridor differ in some respects from the park-and-ride responses and are, therefore, presented separately. The surveys of Katy, North, Northwest and Gulf Transitway transit users were primarily designed to address the following 3 areas:

- Personal characteristics;
- Travel patterns and trip characteristics; and
- Attitudes and impacts pertaining to the transitways.

Personal Characteristics

Questions pertaining to the transit patron's age, sex, occupation and last year of school completed were asked. Responses to these questions are presented in Tables 4 and 5.

Age

As indicated in Table 4, the median age of the transitway park-and-ride patrons is in the mid 30s. These data are consistent with previous park-and-ride transit user surveys

Table 4.
Age and Sex of Transitway Transit Users,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Age (years)								
Total Sample	(n=351)	(n=568)	(n=613)	(n=746)	(n=615)	(n=1226)	(n=202)	(n=440)
50th Percentile	33	32	35	34	35	34	34	34
Park-and-Ride Routes	(n=219)	(n=409)	(n=341)	(n=506)	(n=451)	(n=1129)	(n=202)	(n=387)
50th Percentile	33	31	34	34	34	33	34	34
Express Routes	(n=132)	(n=159)	(n=272)	(n=240)	(n=164)	(n=97)	—	(n=53)
50th Percentile	37	37	37	36	36	42	—	36
Sex								
Total Sample	(n=351)	(n=565)	(n=607)	(n=741)	(n=593)	(n=1203)	(n=205)	(n=432)
Male	49%	44%	42%	42%	47%	44%	41%	30%
Female	51%	56%	58%	58%	53%	56%	59%	70%
Park-and-Ride Routes	(n=218)	(n=402)	(n=332)	(n=504)	(n=435)	(n=1105)	(n=205)	(n=377)
Male	47%	40%	36%	40%	44%	41%	41%	30%
Female	53%	60%	64%	60%	56%	59%	59%	70%
Express Routes	(n=133)	(n=163)	(n=275)	(n=237)	(n=158)	(n=98)	----	(n=55)
Male	53%	54%	49%	46%	54%	74%	----	29%
Female	47%	46%	51%	54%	46%	26%	----	71%

Table 5.
Occupation and Education of Transitway Transit Users,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Occupation								
Total Sample	(n=343)	(n=550)	(n=603)	(n=718)	(n=584)	(n=1140)	(n=199)	(n=437)
Professional	56%	46%	44%	44%	51%	38%	36%	41%
Managerial	13%	20%	14%	26%	15%	23%	12%	16%
Clerical	21%	26%	27%	24%	26%	30%	40%	32%
Sales	4%	4%	6%	3%	3%	3%	5%	2%
Student	3%	3%	3%	1%	1%	1%	2%	4%
Other	3%	1%	6%	2%	4%	5%	5%	5%
Park-and-Ride Routes	(n=215)	(n=391)	(n=334)	(n=487)	(n=432)	(n=1092)	(n=199)	(n=381)
Professional	57%	47%	47%	46%	52%	38%	36%	43%
Managerial	13%	20%	11%	24%	14%	22%	12%	17%
Clerical	22%	28%	31%	26%	28%	32%	40%	31%
Sales	4%	3%	5%	2%	3%	3%	5%	2%
Student	1%	1%	5%	0%	2%	0%	2%	3%
Other	3%	1%	1%	2%	1%	5%	5%	4%
Express Routes	(n=128)	(n=159)	(n=269)	(n=231)	(n=152)	(n=98)	—	(n=56)
Professional	54%	45%	41%	40%	48%	41%	—	29%
Managerial	14%	22%	19%	29%	15%	34%	—	14%
Clerical	20%	19%	22%	21%	23%	12%	—	34%
Sales	4%	4%	8%	3%	2%	6%	—	5%
Student	5%	6%	5%	3%	—	3%	—	11%
Other	3%	4%	5%	4%	12%	4%	—	7%
Education (years)								
Total Sample	(n=346)	(n=570)	(n=591)	(n=739)	(n=593)	(n=1214)	(n=195)	(n=432)
Average	15.6	15.4	15.4	15.2	15.3	14.9	14.5	14.2
Park-and-Ride Routes	(n=215)	(n=409)	(n=326)	(n=502)	(n=438)	(n=1112)	(n=195)	(n=378)
Average	15.4	15.4	15.3	15.2	15.3	14.9	14.5	14.2
Express Routes	(n=131)	(n=161)	(n=265)	(n=237)	(n=155)	(n=102)	—	(n=54)
Average	16.0	15.5	15.5	15.4	15.1	15.8	—	14.2

conducted in 1981 and 1984. The median ages for riders of the express routes which utilize the Katy, Northwest and North Transitways range from 2 to 9 years higher, however.

Sex

Most recent survey data indicate that between 56% and 70% of the park-and-ride ridership within each corridor is female (Katy - 56%, North - 59%, Northwest - 59%, and Gulf - 70%). In addition, 71% of the ridership on the Gulf Transitway express route is also female. By contrast, 54% of the express route riders on the Katy Transitway and 74% of those on the North Transitway express route are male (Table 4).

Occupation

At least three-fourths of the riders on all routes serving the Katy, North, Northwest and Gulf Transitways are employed in "professional," "clerical," or "managerial" job positions (Table 5). The greatest number of park-and-ride and express bus riders on the Katy and North Transitway routes are "professional," as are the greatest number of Gulf Transitway park-and-ride users. By contrast, the greatest number of riders on the Gulf Transitway express route and the Northwest Transitway park-and-ride routes are classified as "clerical."

Education

As has been found in previous park-and-ride surveys, users of this type of bus service are highly educated. The average transitway bus patron (park-and-ride and express route) has completed at least two years of college (Table 5).

Travel Patterns and Trip Characteristics

Questions relating to trip origin, trip destination, trip purpose, whether the employer pays for part of the bus fare, and whether a car was available for the trip were asked. Responses to these questions are highlighted on the following pages.

Trip Origin

Transit riders were asked to identify the Zip Code origin of their a.m. trip. Data for the Katy Transitway routes are illustrated in Figures 3-8 and summarized in Table 6. Data for the North Transitway routes are shown in Figures 9-13 and outlined in Table 7. Northwest Transitway route data are illustrated in Figures 14 and 15 and summarized in Table 8; Gulf Transitway route data are outlined in Table 9 and shown in Figures 16-18. The park-and-ride route origin data are consistent with market areas as defined in previous surveys.

Katy Transitway Routes. As to be expected, the 1985-1989 ridership on the Memorial Express route primarily originates from Zip Codes immediately adjacent to Memorial Drive. Similarly, the 1987-1989 ridership on the Wilcrest Express route primarily originates from Zip Codes immediately adjacent to Wilcrest.

Both the West Belt and Addicks Park-and-Ride Lots are located north of the Katy Freeway. In 1985, approximately 60% of the ridership for the West Belt Lot originated from Zip Codes north of the freeway. In 1986, however, the north/south ridership split was 50%/50%. In 1987, trip origins shifted once again; about 65% of the riders originated from north of the freeway. About 65% of the 1988 and 1989 riders also originated from north of the freeway.

Most recent data for the Addicks Lot indicate that about 60% of its current ridership originates from north of the Katy Freeway (as compared to 65% in 1987 and 1986 and 70% in 1985 originating from north of the freeway).

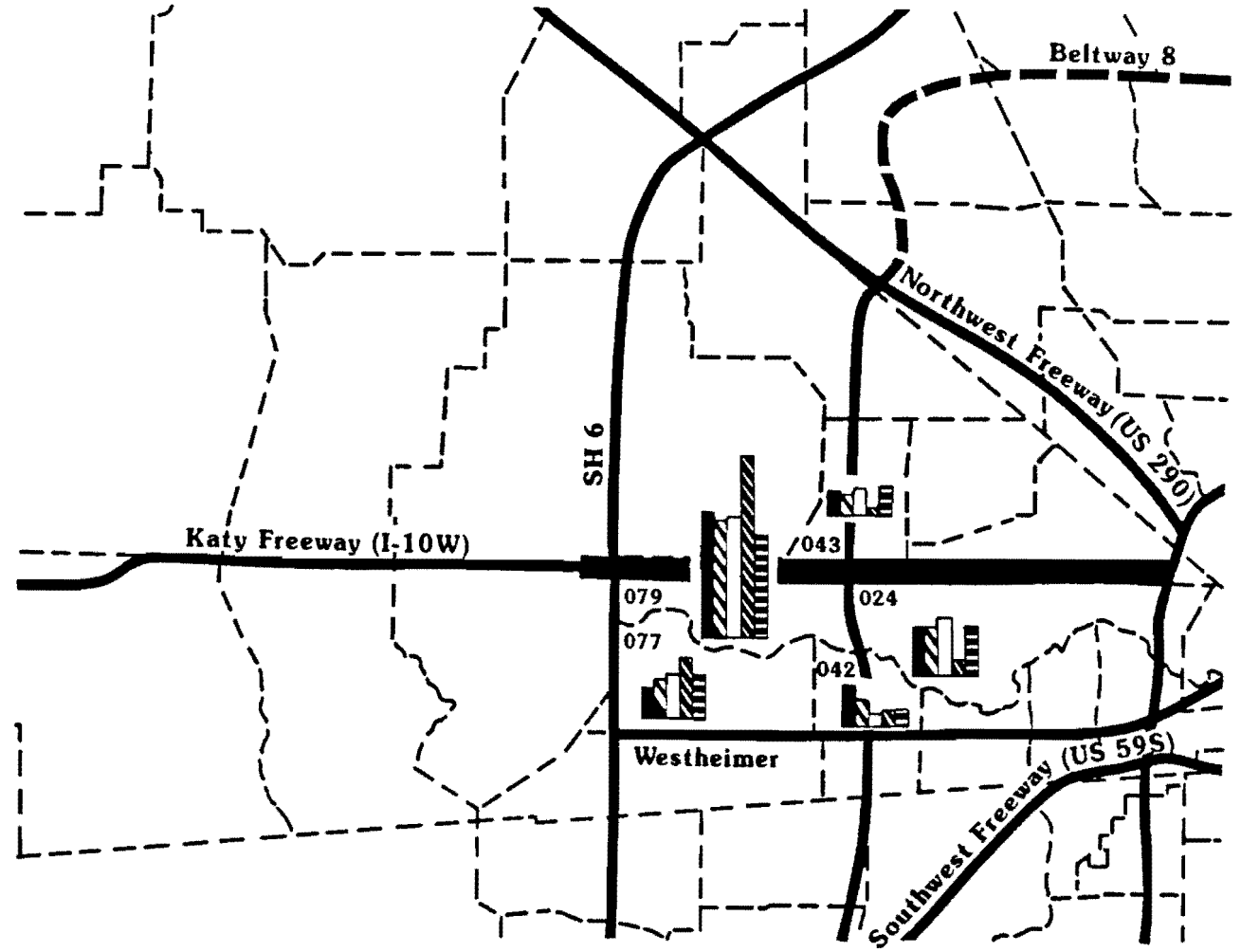


Figure 3.
Home Origins of Patrons of the Memorial Express Route

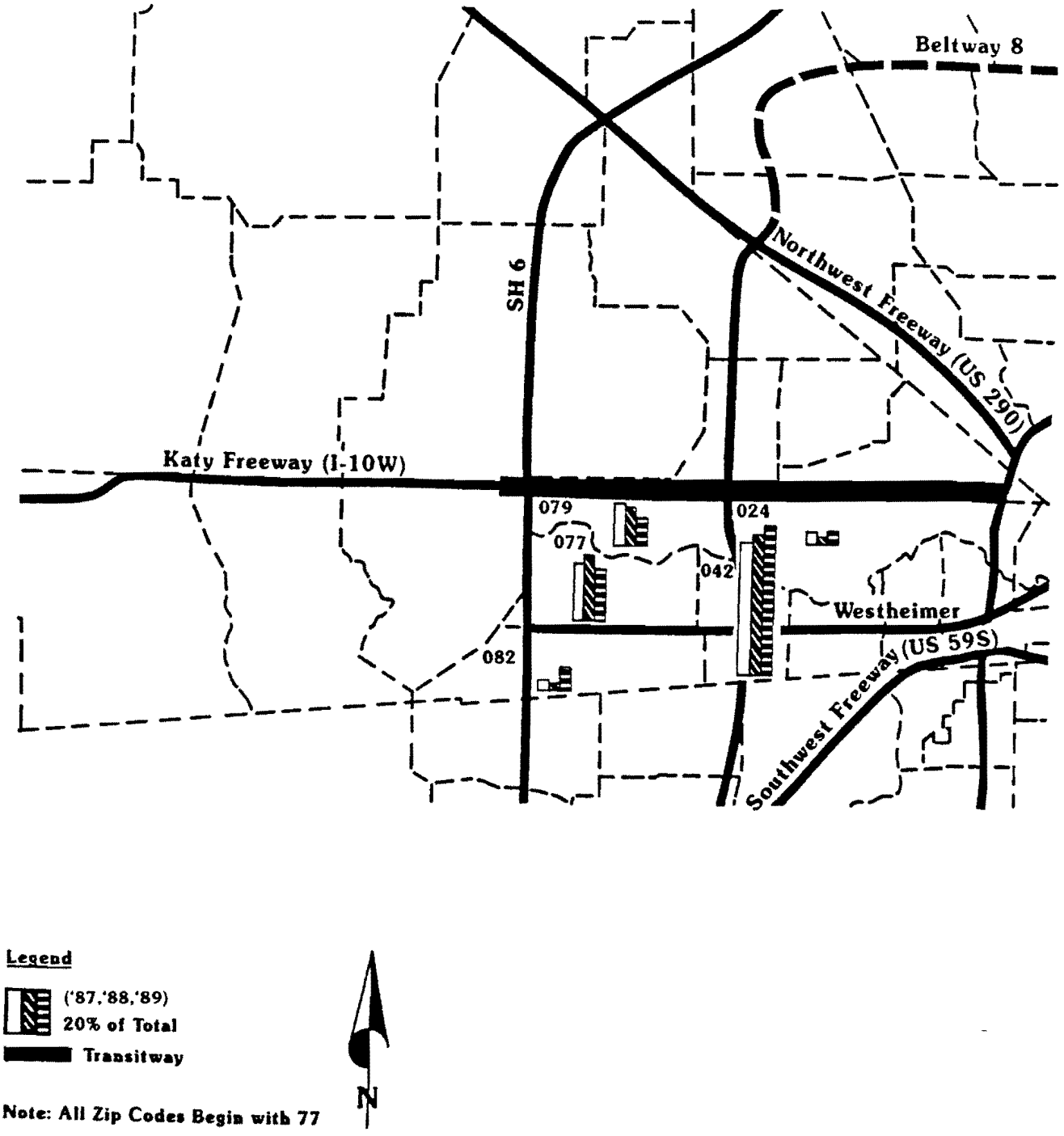


Figure 4.
Home Origins of Patrons of the Wilcrest Express Bus Route

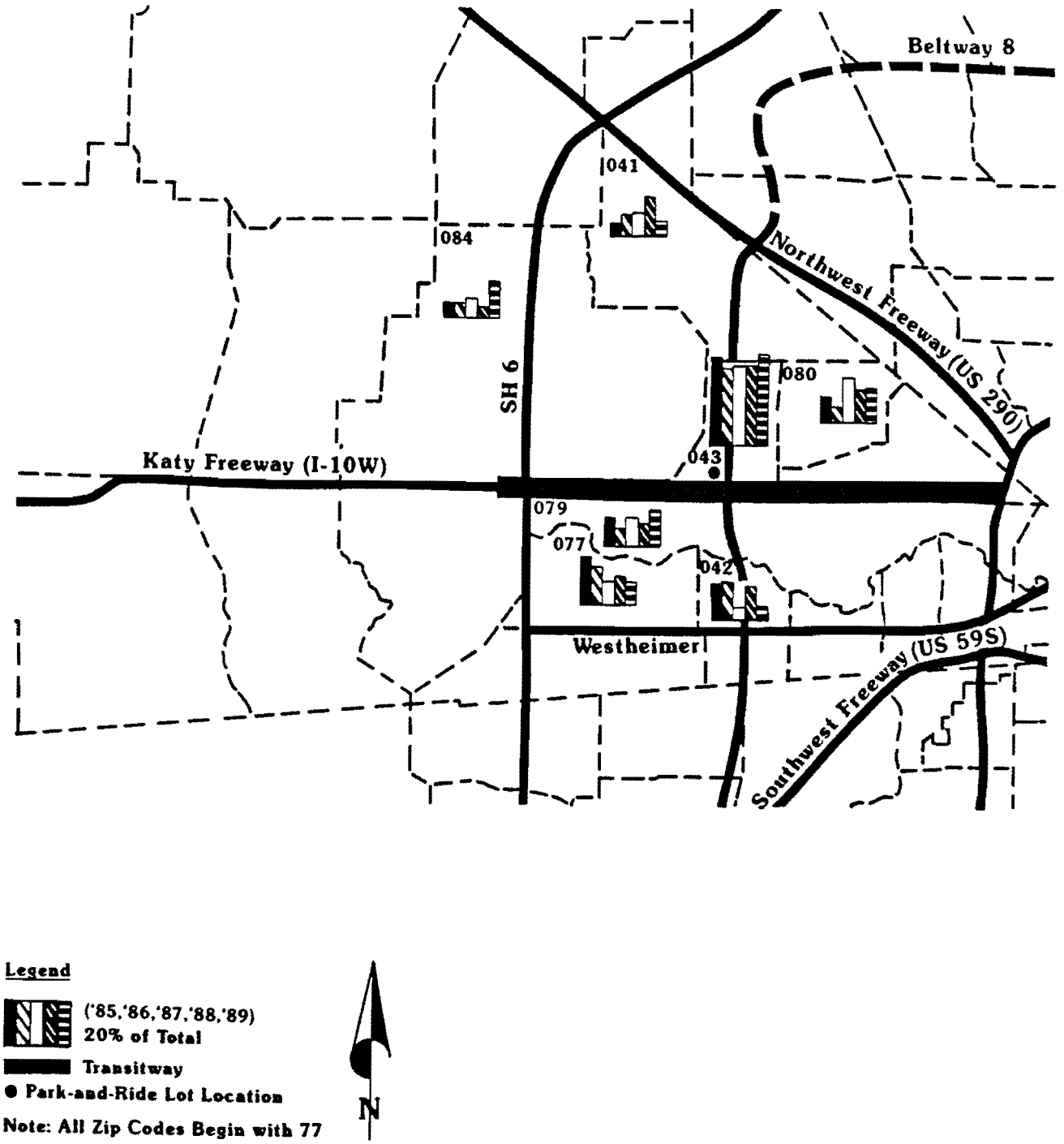


Figure 5.
Home Origins of Patrons of the West Belt Park-and-Ride Service

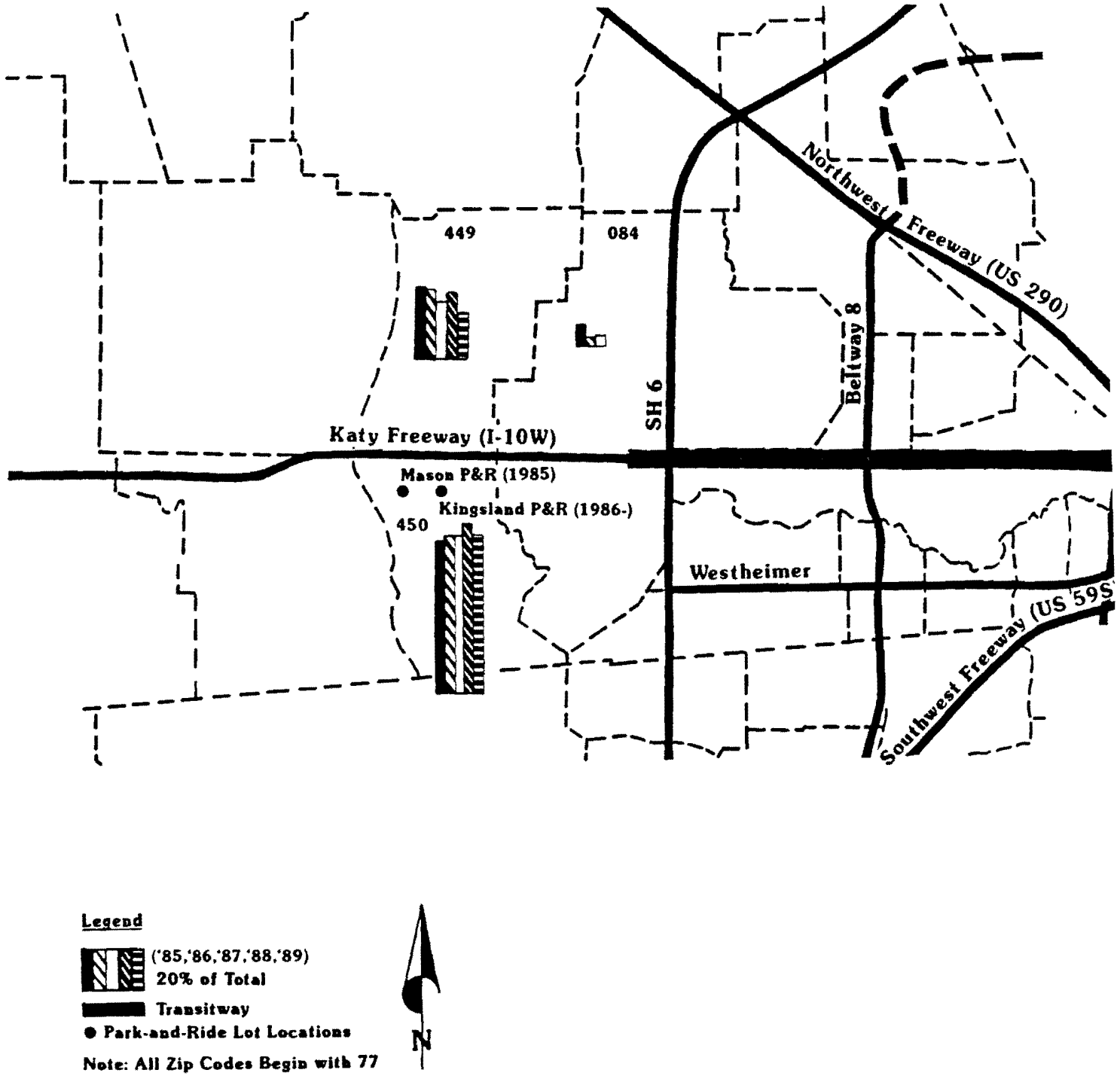


Figure 6.
Home Origins of Patrons of the Katy-Mason/Kingsland Park-and-Ride Service

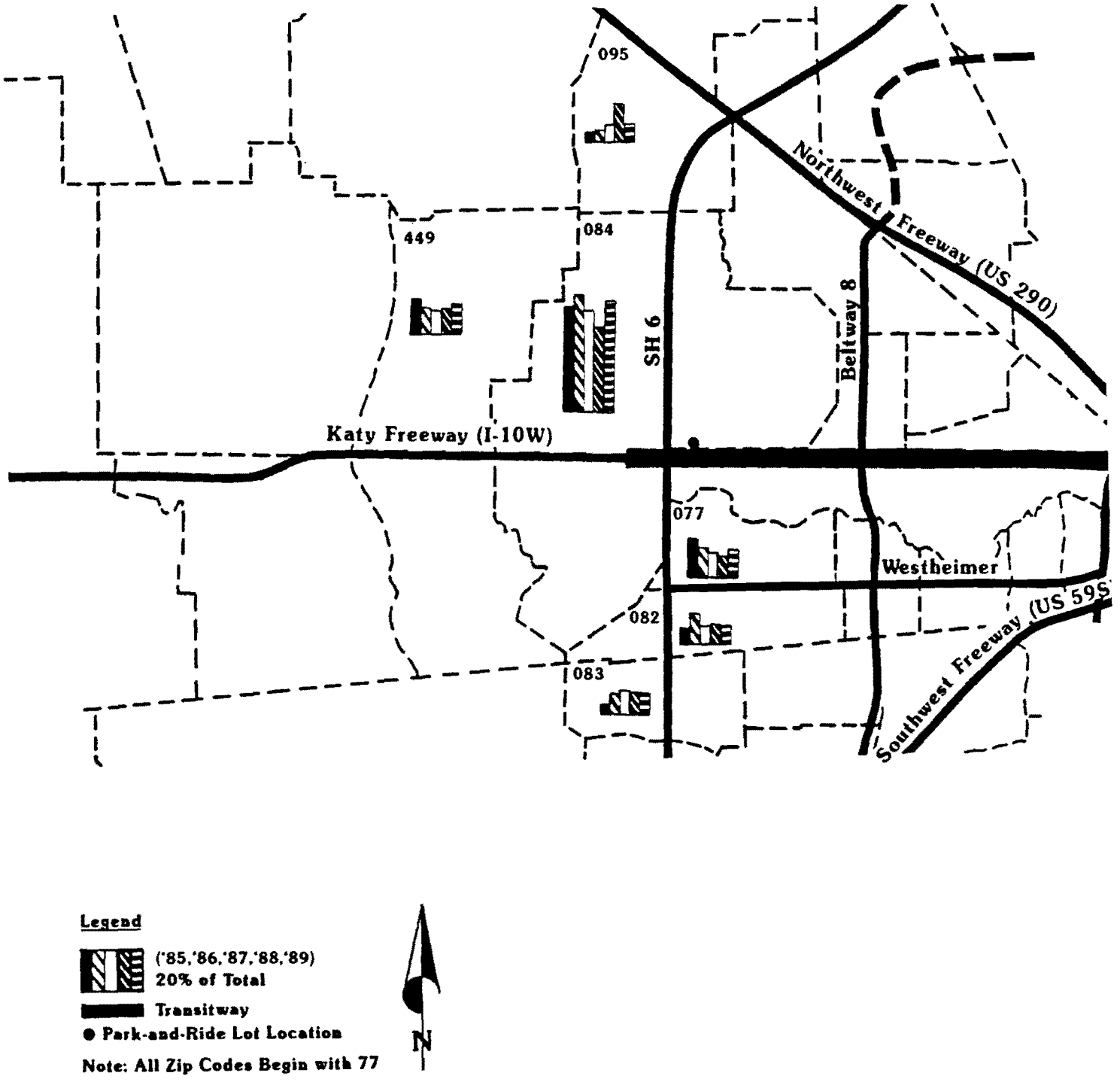


Figure 7.
Home Origins of Patrons of the Addicks Park-and-Ride Service

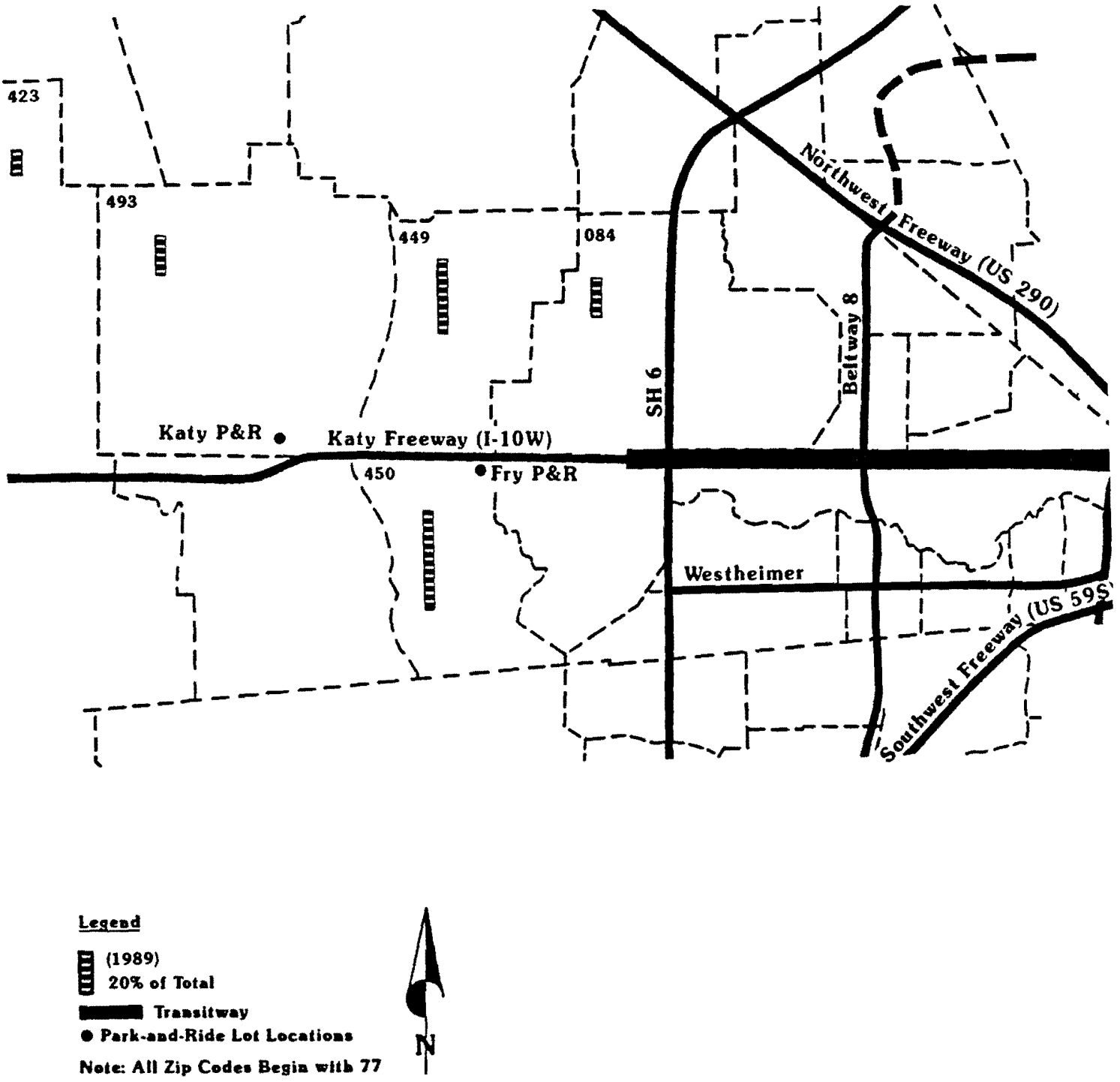


Figure 8.
Home Origins of Patrons of the Katy-Fry Park-and-Ride Service

Table 6.
Zip Code Origins for Katy Transitway Transit Trips,
Katy Transitway Transit User Surveys

Katy Transitway Bus Route	Zip Code	Location Relative to Katy Freeway	Percent of Total Origins				
			1985	1986	1987	1988	1989
Memorial Express	77079	——	41%	38%	39%	59%	33%
	77024	——	15%	15%	19%	4%	15%
	77042	——	13%	8%	4%	5%	5%
	77077	——	9%	12%	14%	19%	14%
	77043	——	7%	6%	9%	2%	9%
	Other	——	15%	21%	15%	11%	24%
Wilcrest Express	77042	——	—	—	51%	53%	56%
	77077	——	—	—	22%	24%	19%
	77079	——	—	—	16%	14%	10%
	77024	——	—	—	5%	2%	3%
	77082	——	—	—	3%	2%	9%
	Other	——	—	—	3%	5%	3%
West Belt Park-and-Ride							
	77043	North	33%	29%	30%	30%	34%
	77077	South	18%	14%	9%	10%	8%
	77042	South	13%	13%	4%	12%	5%
	77041	North	4%	8%	9%	14%	5%
	77079	South	10%	6%	11%	8%	13%
	77080	North	9%	5%	17%	12%	13%
	77084	North	5%	5%	7%	4%	13%
	Other	——	8%	20%	13%	10%	9%
Katy-Mason Park-and-Ride (1985); Kingsland Park-and-Ride (1986-1989)	77450	South	62%	64%	64%	69%	65%
	77449	North	29%	28%	24%	27%	18%
	77084	North	8%	3%	4%	—	—
	Other	——	1%	5%	8%	4%	17%
Addicks Park-and-Ride							
	77084	North	43%	47%	42%	34%	38%
	77077	South	15%	12%	10%	8%	10%
	77449	North	14%	10%	9%	10%	11%
	77082	South	6%	12%	7%	8%	7%
	77083	South	3%	8%	9%	8%	8%
	77095	North	3%	4%	7%	15%	7%
	Other	——	16%	7%	16%	17%	19%
Katy-Fry Park-and-Ride							
	77450	South	——	——	——	——	33%
	77449	North	——	——	——	——	25%
	77084	North	——	——	——	——	13%
	77493	North	——	——	——	——	13%
	77423	North	——	——	——	——	8%
	Other	——	——	——	——	——	8%

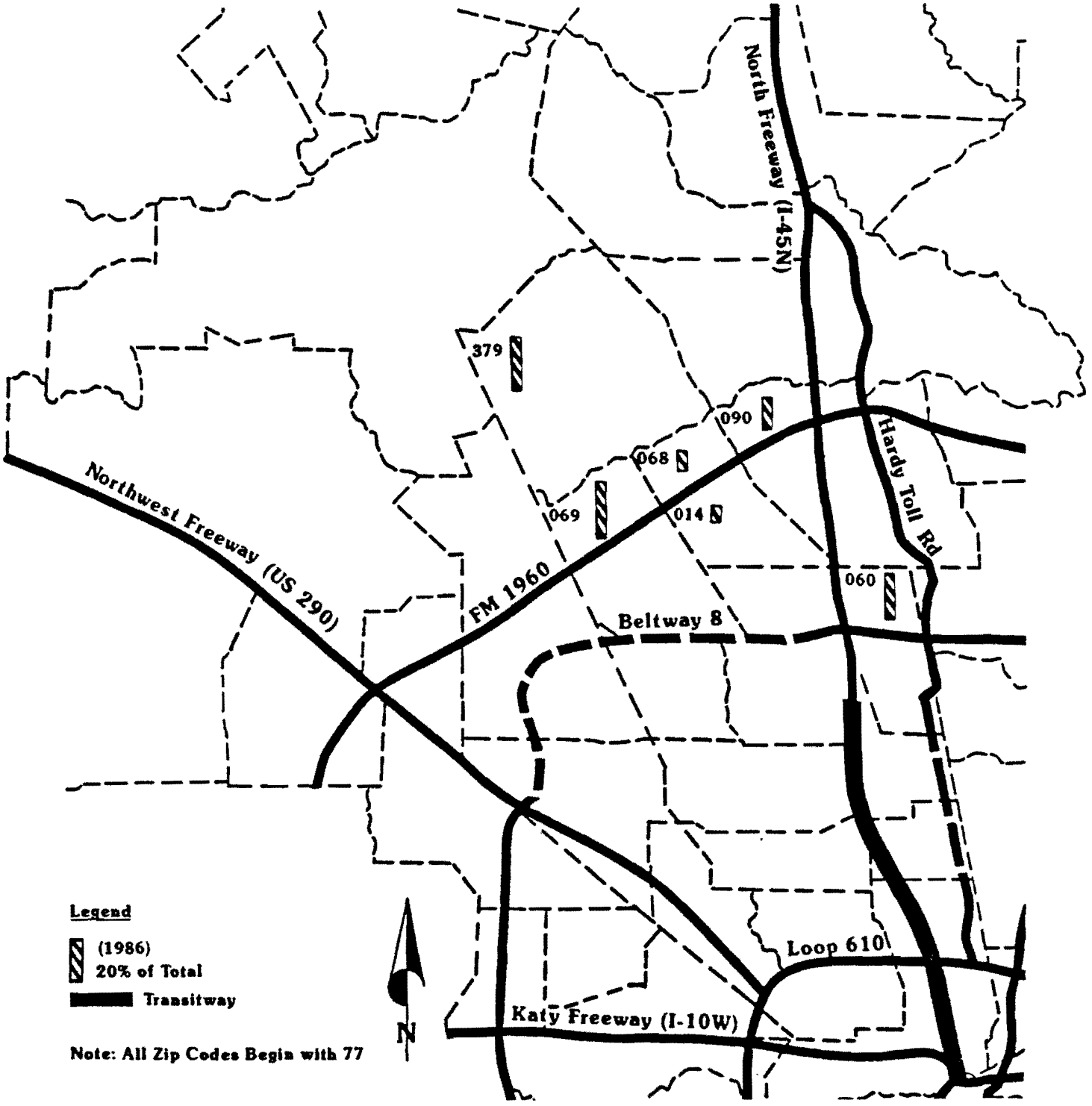


Figure 9.
Home Origins of Patrons of the FM 1960 Express Route

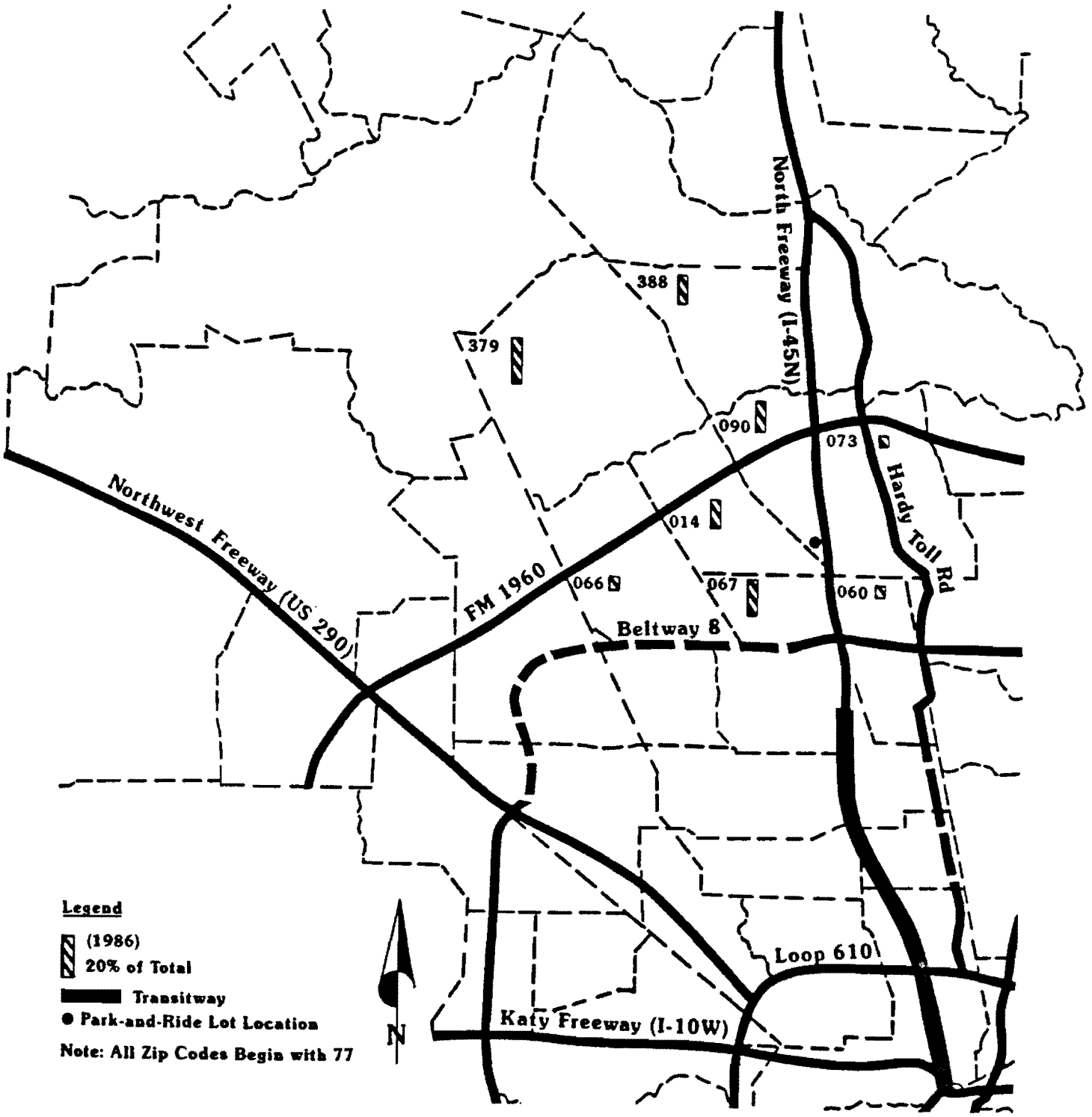


Figure 10.
Home Origins of Patrons of the Kuykendahl Park-and-Ride Service

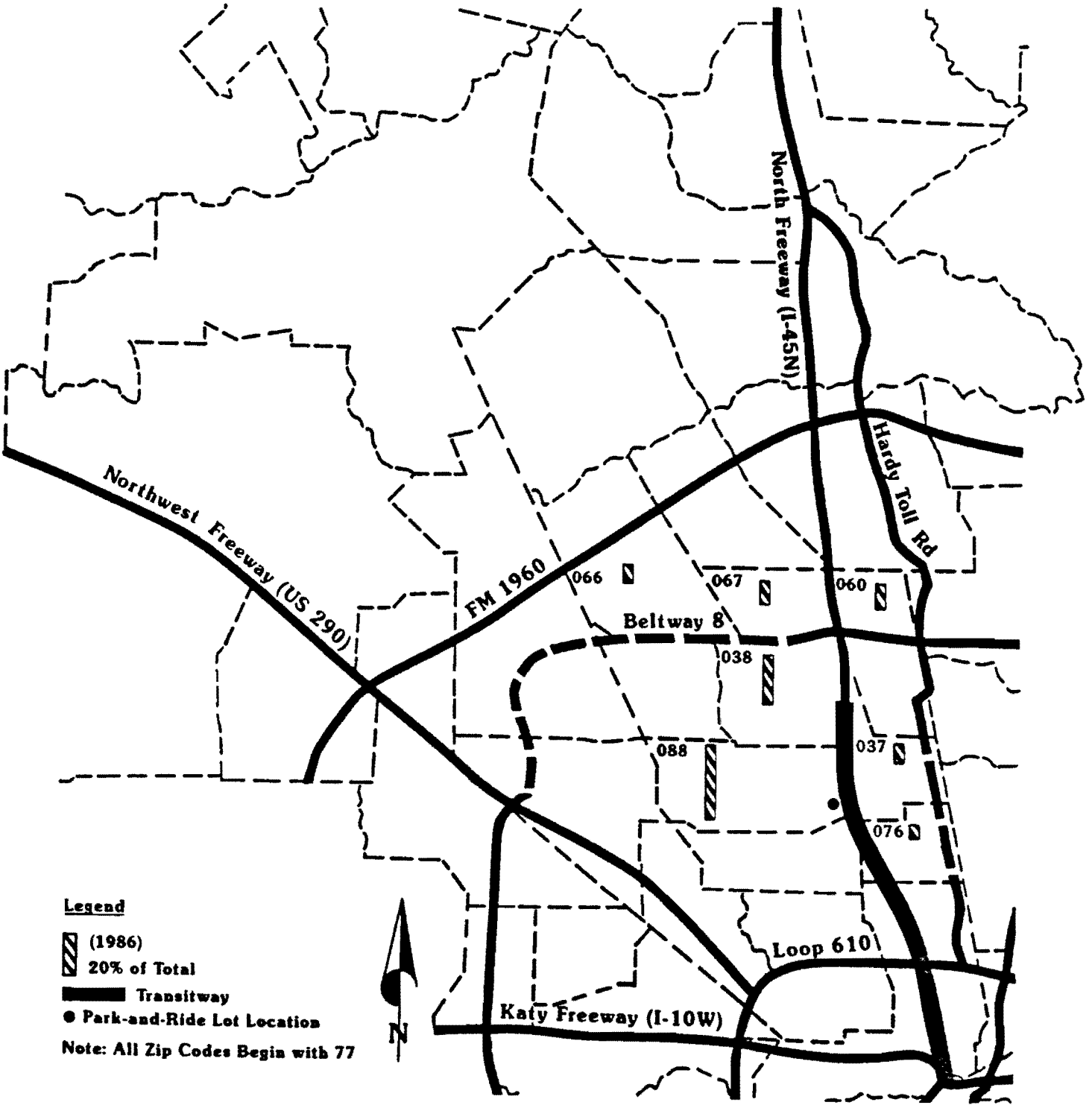


Figure 11.
Home Origins of Patrons of the North Shepherd Park-and-Ride Service

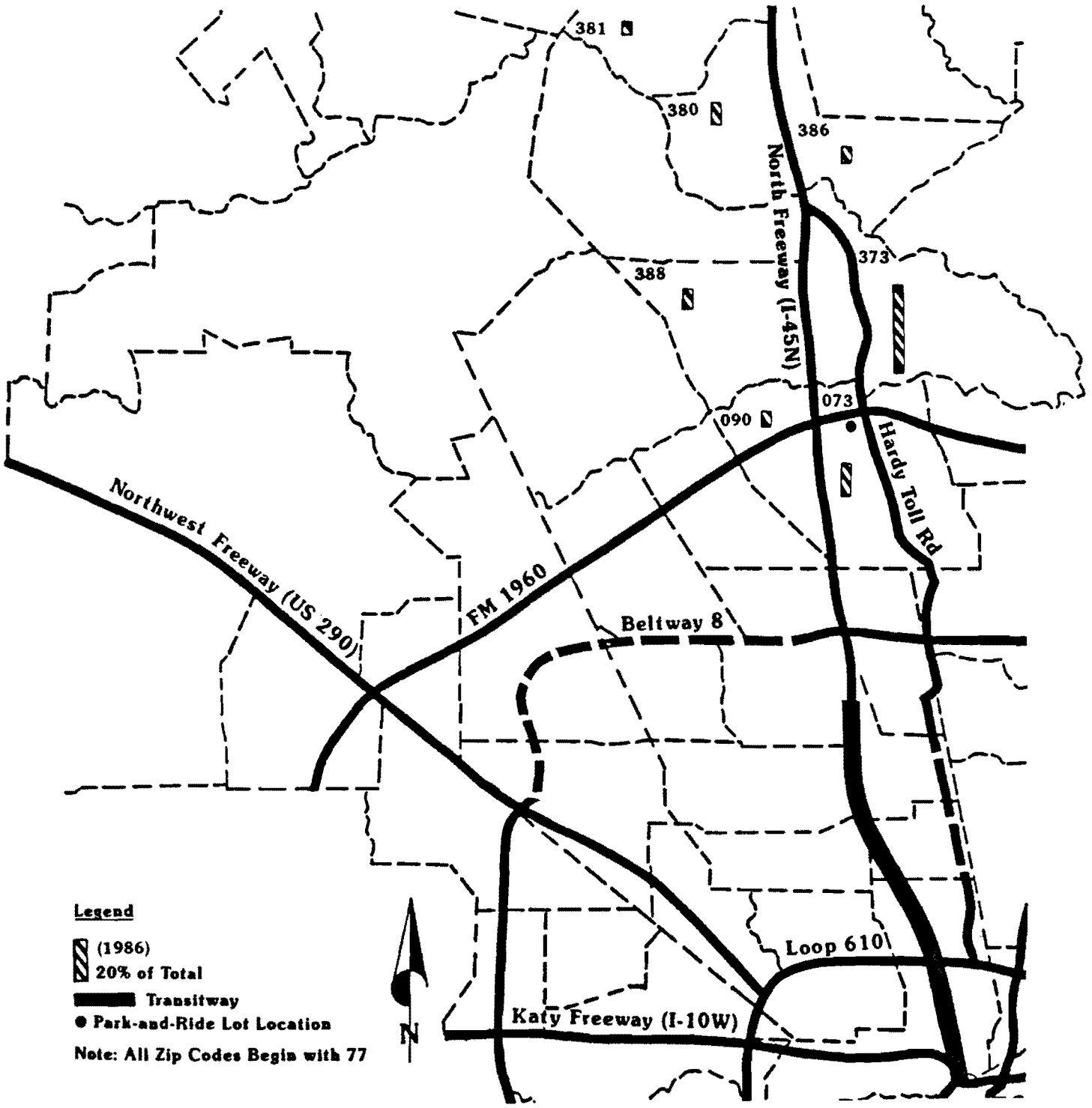


Figure 12.
Home Origins of Patrons of the Spring Park-and-Ride Service

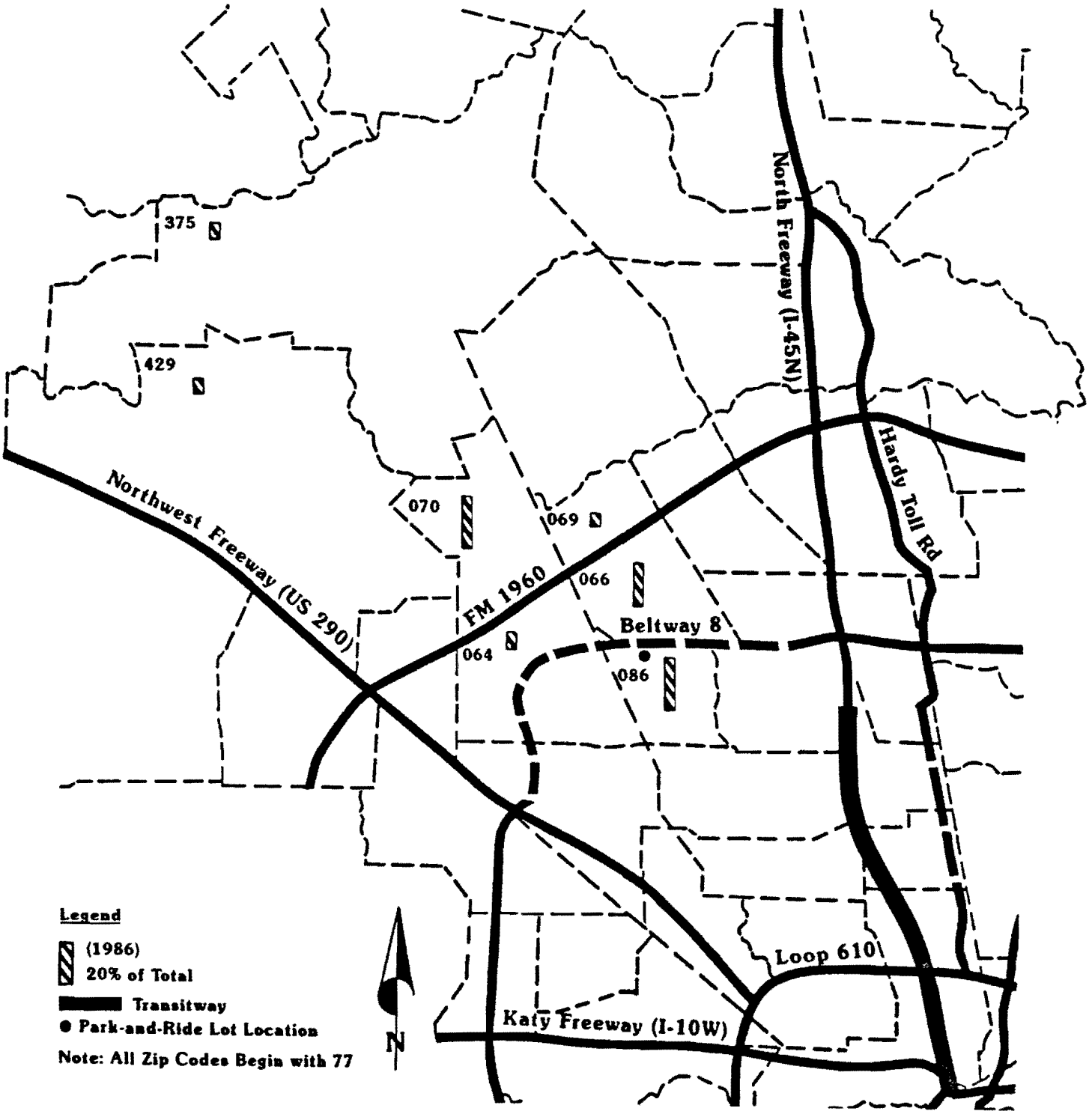


Figure 13.
Home Origins of Patrons of the Seton Lake Park-and-Ride Service

Table 7.
Zip Code Origins for North Transitway Transit Trips,
North Transitway Transit User Surveys

North Transitway Bus Route	Zip Code	Location Relative to North Freeway	% of Total Origins 1986
FM 1960 Express	77069	—	23%
	77379	—	22%
	77060	—	18%
	77090	—	13%
	77068	—	7%
	77014	—	6%
	Other	—	11%
Kuykendahl Park-and-Ride	77379	West	18%
	77067	West	14%
	77090	West	12%
	77388	West	11%
	77014	West	11%
	77066	West	5%
	77060	East	4%
	77073	East	4%
	Other	—	21%
North Shepherd Park-and-Ride	77088	West	30%
	77038	West	20%
	77060	East	9%
	77067	West	9%
	77066	West	7%
	77037	East	7%
	77076	East	5%
	Other	—	13%
Spring Park-and-Ride	77373	East	36%
	77073	East	13%
	77380	West	8%
	77388	West	8%
	77386	East	6%
	77090	West	6%
	77381	West	5%
	Other	—	18%
Seton Lake Park-and-Ride	77070	West	21%
	77086	West	21%
	77066	West	18%
	77064	West	7%
	77375	West	6%
	77429	West	6%
	77069	West	5%
	Other	—	16%

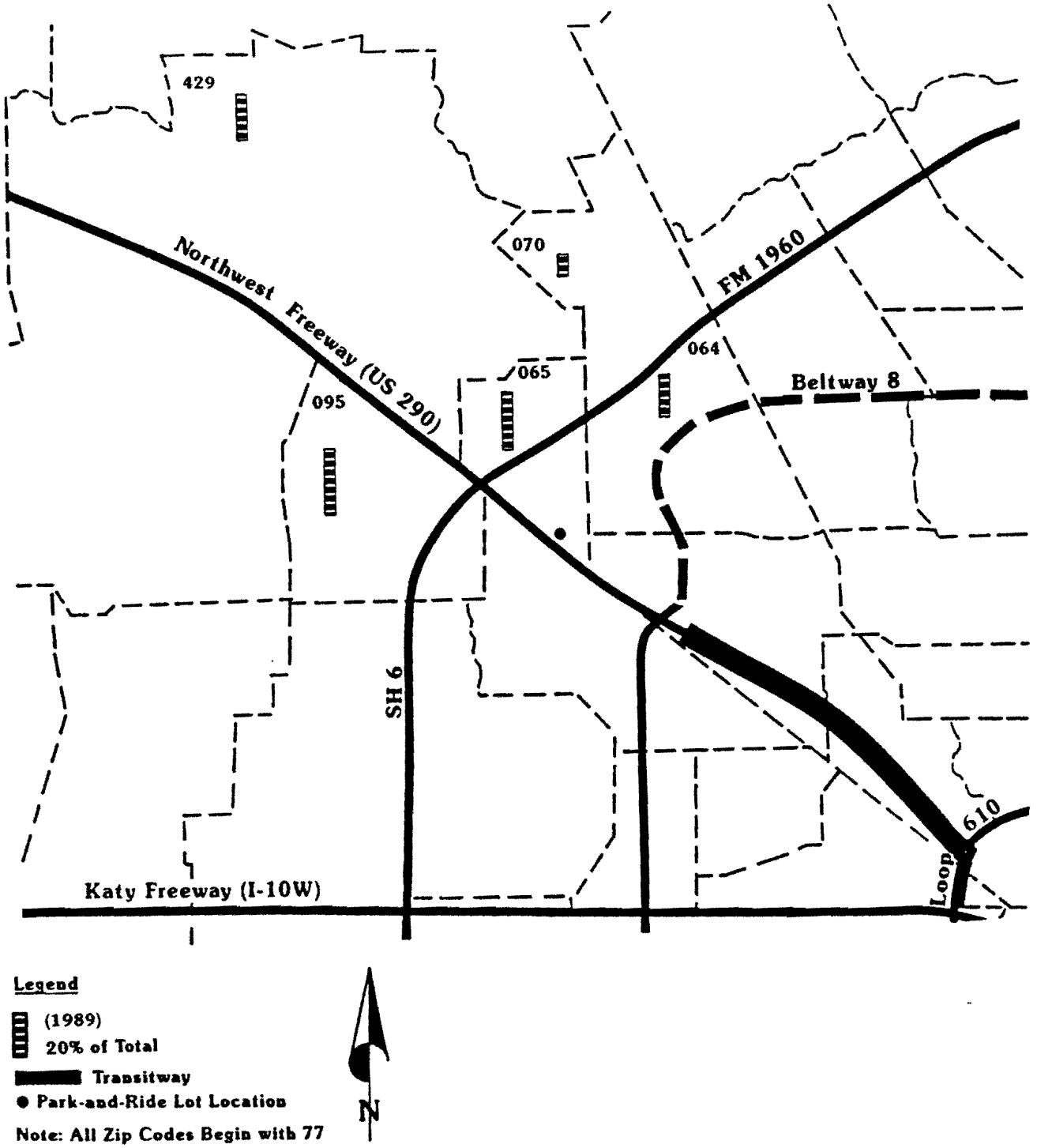


Figure 14.
Home Origins of Patrons of the Northwest Station Park-and-Ride Service

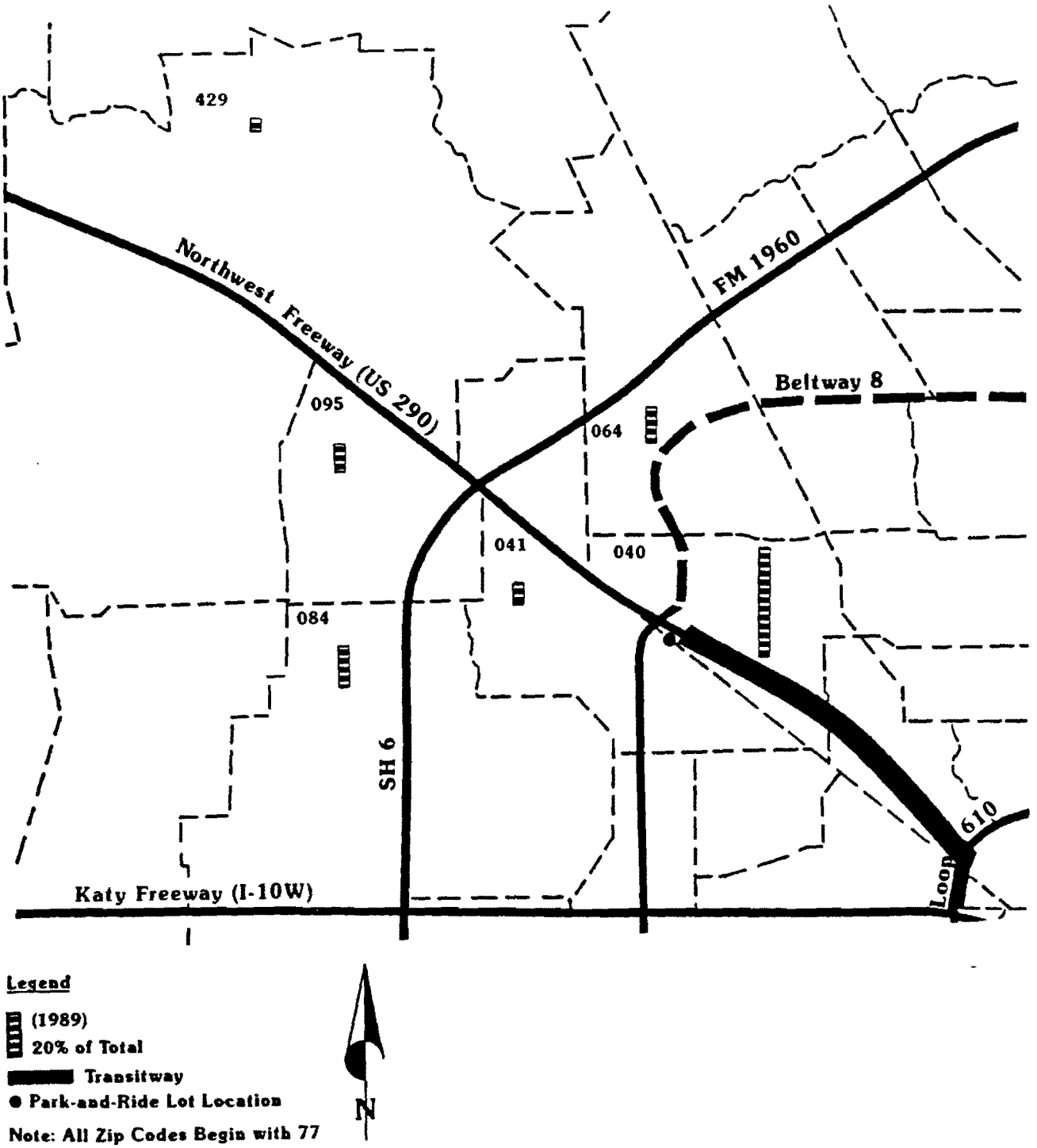


Figure 15.
Home Origins of Patrons of the West Little York Park-and-Ride Service

Table 8.
Zip Code Origins for Northwest Transitway Transit Trips,
Northwest Transitway Transit User Surveys

Northwest Transitway Bus Route	Zip Code	Location Relative to Northwest Freeway	% of Total Origins 1989
Northwest Station Park-and-Ride	77095	South	25%
	77065	North	22%
	77429	North	18%
	77064	North	16%
	77070	North	7%
	Other	—	12%
West Little York Park-and-Ride	77040	North	42%
	77084	South	15%
	77064	North	13%
	77095	South	10%
	77041	South	8%
	77429	North	4%
	Other	—	8%

Table 9.
Zip Code Origins for Gulf Transitway Transit Trips,
Gulf Transitway Transit User Surveys

Gulf Transitway Bus Route	Zip Code	Location Relative to Gulf Freeway	% of Total Origins 1989
South Belt Express	77089	West	76%
	77075	West	10%
	77581	West	3%
	Other	—	11%
Edgebrook Park-and-Ride	77089	West	26%
	77034	East	19%
	77075	West	13%
	77546	West	8%
	77502	East	4%
	77504	East	4%
	77505	East	4%
	77573	East	2%
	77581	West	3%
	77587	East	3%
	Other	—	14%
Bay Area Park-and-Ride			
	77062	East	27%
	77058	East	13%
	77598	West	13%
	77573	East	12%
	77546	West	8%
	77565	East	4%
	Other	—	23%

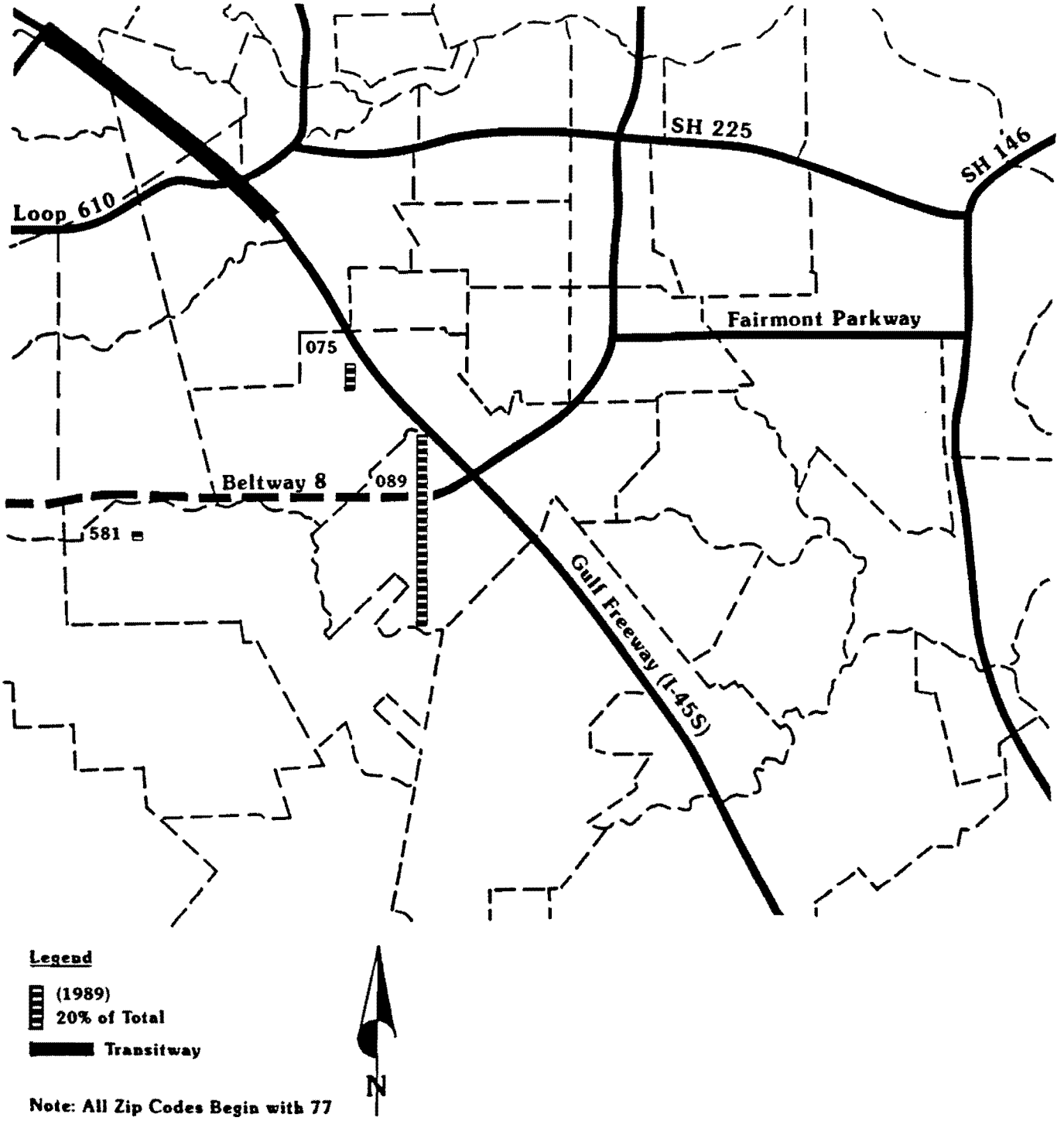


Figure 16.
Home Origins of Patrons of the South Belt Express Route

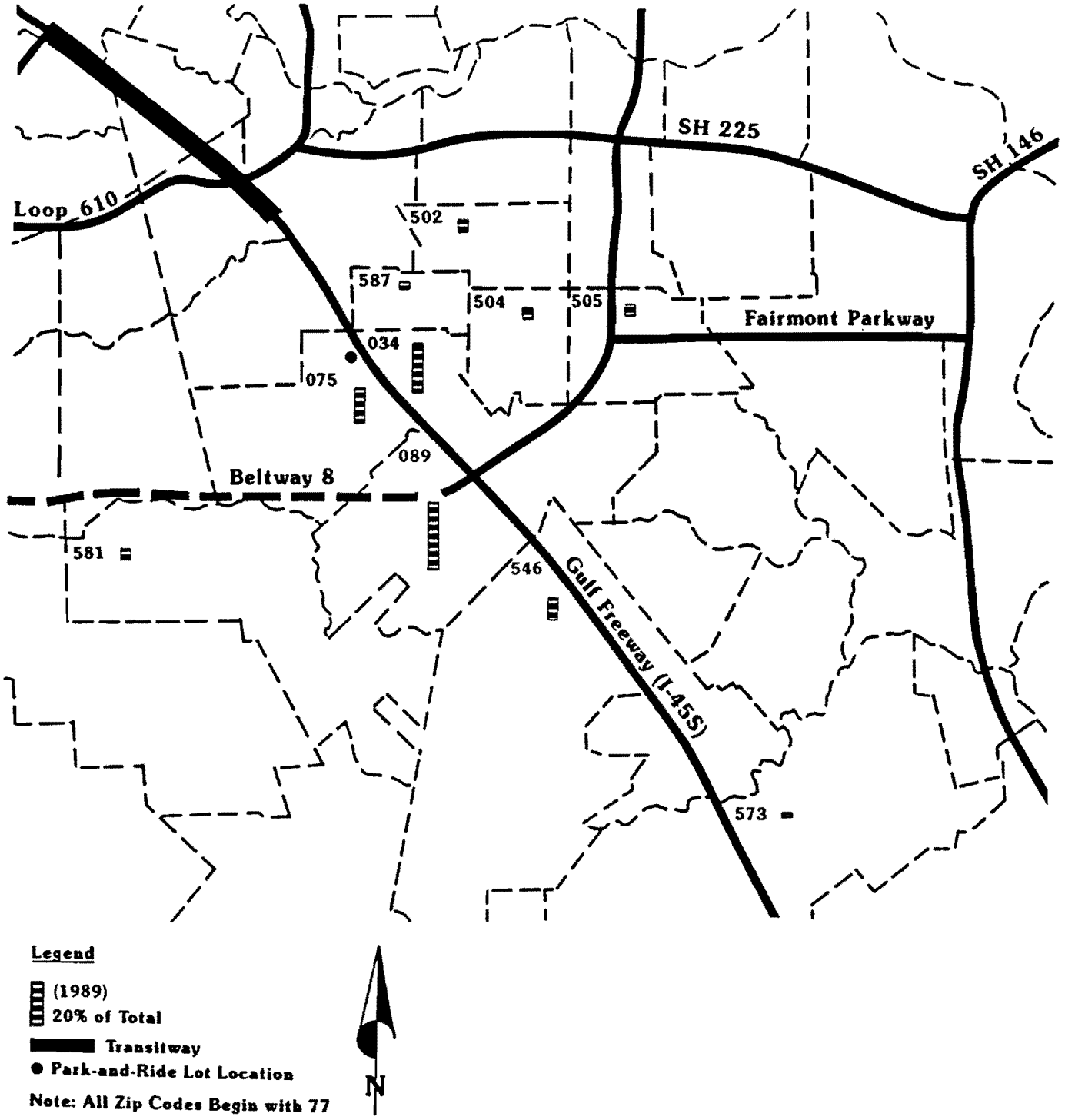


Figure 17.
Home Origins of Patrons of the Edgebrook Park-and-Ride Service

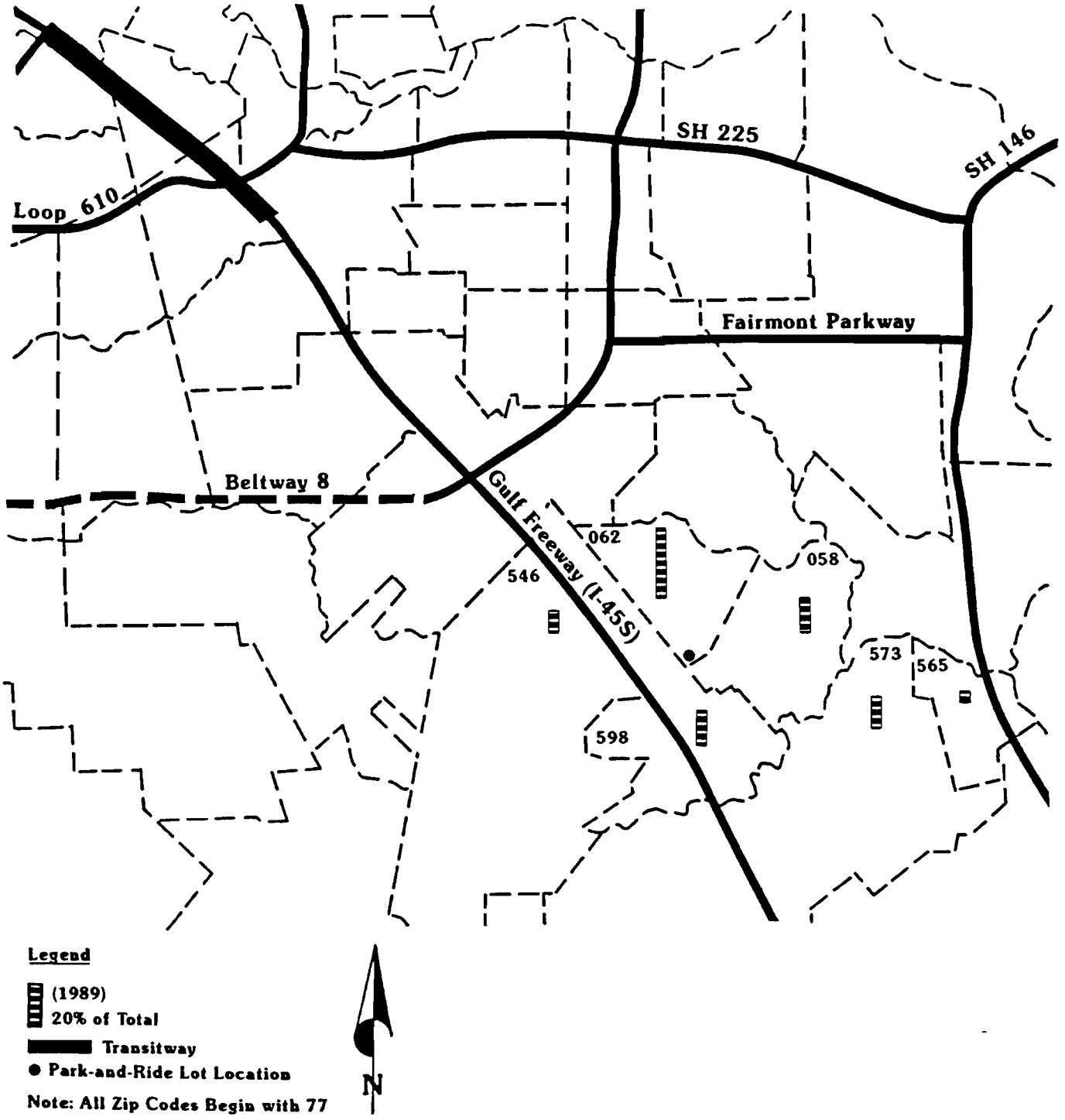


Figure 18.
Home Origins of Patrons of the Bay Area Park-and-Ride Service

The Katy-Fry Park-and-Ride route services both a park-and-ride lot located north of the Katy Freeway and a park-and-pool lot located on the south side of the freeway. Approximately 60% of the Katy-Fry route ridership originates from north of the freeway. The Katy-Mason Lot and the Kingsland Lot (which replaced the Katy-Mason Lot) are located south of the Katy Freeway. Each year, more than 60% of the ridership from this area originates from south of the freeway.

North Transitway Routes. As to be expected, the ridership on the FM 1960 Express route primarily originates from Zip Codes immediately adjacent to FM 1960.

The Kuykendahl, North Shepherd and Seton Lake Park-and-Ride Lots are located west of the North Freeway; and the vast majority of the transit ridership originates from Zip Codes west of the freeway. In fact, 100% of the Seton Lake ridership, more than 70% of the North Shepherd ridership and at least 75% of the Kuykendahl ridership originates from the west side of the freeway. The Spring Park-and-Ride Lot, located on the east side of the North Freeway, draws more than 62% of its ridership from east of the freeway.

Northwest Transitway Routes. Situated on the north side of the Northwest Freeway, the Northwest Station Park-and-Ride Lot attracts slightly more than two-thirds of its ridership from Zip Code areas north of the freeway. Although the West Little York Park-and-Ride Lot is located south of the Northwest Freeway, more than 60% of its patrons listed Zip Code origins north of the freeway.

Gulf Transitway Routes. More than 75% of the ridership on the South Belt Express route originates from the 77089 Zip Code area located just west of the Gulf Freeway.

The Edgebrook Park-and-Ride Lot, located on the west side of the Gulf Freeway, draws approximately 70% of its riders from Zip Code areas west of the freeway. The Bay Area Park-and-Ride Lot, situated on the east side of the Gulf Freeway, attracts approximately 80% of its patrons from the east side of the freeway.

Trip Destination

Since the only destination served directly by the Katy Transitway bus operation is the downtown area, it is to be expected that virtually all of Katy Transitway bus trips being served would be downtown trips. In fact, such was the case in 1985 through 1988. In 1989, however, 16% of the Katy Transitway bus trips were destined to locations other than downtown (Table 10). Although the North Transitway primarily serves the downtown area, limited service is also provided to the Texas Medical Center, the Galleria and Greenway Plaza. Nevertheless, more than 90% of the all transit trips being served by the North Transitway are downtown trips.

The only destination served directly by the Northwest Transitway bus service is the downtown area and 97% of the Northwest Transitway transit trips are downtown trips. Such is not the case in the Gulf Transitway corridor, however. Although more than 90% of the transitway park-and-ride trips have destinations in downtown Houston, less than half of the transitway trips served by South Belt Express route are downtown trips. An additional 18% of the express route passengers are destined to the Texas Medical Center and 32% are destined to other locations.

Trip Purpose and Auto Availability for Trip

Trip Purpose. The overwhelming majority of all the transitway transit trips surveyed are work trips (Table 10).

Auto Availability. In general, riders of the Katy, North and Northwest Transitway bus routes are "choice" riders; the vast majority have an auto available for the trip, but prefer to ride a bus instead (Table 11). The same is true for Gulf Transitway park-and-ride users. For approximately 29% of the Gulf Transitway express route riders, however, transit is the only means available for making the trip.

Table 10.
Trip Destination and Trip Purpose of Transitway Transit Users,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Trip Destination								
Total Sample	(n=357)	(n=575)	(n=632)	(n=776)	(n=641)	(n=1252)	(n=215)	(n=464)
Downtown	96%	95%	94%	97%	94%	94%	97%	86%
Galleria	—	0%	1%	0%	2%	1%	—	1%
Texas Medical Center	1%	1%	1%	1%	1%	1%	2%	5%
Greenway Plaza	0%	0%	1%	0%	0%	2%	—	0%
Other	3%	4%	3%	2%	3%	2%	1%	8%
Park-and-Ride Routes	(n=222)	(n=409)	(n=349)	(n=525)	(n=469)	(n=1149)	(n=215)	(n=402)
Downtown	97%	96%	96%	98%	97%	95%	97%	91%
Galleria	—	0%	—	—	1%	1%	—	1%
Texas Medical Center	1%	1%	1%	1%	1%	1%	2%	4%
Greenway Plaza	—	—	1%	—	0%	2%	—	0%
Other	2%	3%	2%	1%	1%	1%	1%	4%
Express Routes	(n=135)	(n=166)	(n=283)	(n=251)	(n=172)	(n=103)	—	(n=62)
Downtown	94%	90%	91%	95%	84%	91%	—	48%
Galleria	—	1%	2%	1%	4%	1%	—	1%
Texas Medical Center	1%	2%	2%	2%	2%	1%	—	18%
Greenway Plaza	1%	1%	—	0%	—	—	—	1%
Other	4%	6%	5%	2%	10%	7%	—	32%
Trip Purpose								
Total Sample	(n=358)	(n=580)	(n=634)	(n=777)	(n=644)	(n=1256)	(n=217)	(n=465)
Work	99%	97%	98%	98%	97%	99%	98%	96%
School	1%	2%	1%	1%	2%	1%	2%	4%
Other	0%	1%	1%	1%	1%	—	—	0%
Park-and-Ride Routes	(n=222)	(n=412)	(n=349)	(n=525)	(n=469)	(n=1152)	(n=217)	(n=403)
Work	100%	98%	100%	99%	98%	99%	98%	97%
School	0%	2%	0%	0%	2%	1%	2%	3%
Other	0%	0%	0%	1%	0%	—	—	—
Express Routes	(n=136)	(n=168)	(n=285)	(n=252)	(n=175)	(n=104)	—	(n=62)
Work	96%	96%	96%	96%	94%	97%	—	87%
School	3%	3%	3%	3%	2%	3%	—	8%
Other	1%	1%	1%	1%	4%	—	—	5%

Table 11.
Auto Availability and Employer Payment of Bus Fare for Transitway Transit Users, Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Auto Available for Trip								
Total Sample	(n=354)	(n=575)	(n=622)	(n=772)	(n=638)	(n=1246)	(n=216)	(n=457)
No	7%	7%	10%	6%	10%	5%	8%	13%
Yes, but inconvenient	10%	7%	8%	7%	7%	5%	10%	7%
Yes, but prefer bus	83%	86%	82%	87%	83%	90%	82%	80%
Park-and-Ride Routes	(n=220)	(n=410)	(n=343)	(n=522)	(n=467)	(n=1142)	(n=216)	(n=399)
No	5%	5%	7%	4%	8%	5%	8%	11%
Yes, but inconvenient	8%	6%	5%	4%	6%	4%	10%	7%
Yes, but prefer bus	87%	89%	88%	92%	86%	91%	82%	82%
Express Routes	(n=134)	(n=165)	(n=279)	(n=250)	(n=171)	(n=104)	—	(n=58)
No	11%	12%	14%	9%	15%	10%	—	29%
Yes, but inconvenient	13%	11%	11%	13%	8%	17%	—	7%
Yes, but prefer bus	76%	77%	75%	78%	77%	73%	—	64%
Employer Payment of Bus Fare								
Total Sample	(n=355)	(n=574)	(n=628)	(n=772)	(n=635)	(n=1247)	(n=211)	(n=453)
Pays all	19%	15%	13%	16%	14%	17%	15%	14%
Pays part	38%	41%	43%	47%	43%	46%	49%	48%
Pays none	43%	44%	44%	37%	43%	37%	36%	38%
Park-and-Ride Routes	(n=221)	(n=408)	(n=347)	(n=522)	(n=464)	(n=1144)	(n=211)	(n=393)
Pays all	21%	18%	18%	17%	17%	18%	15%	15%
Pays part	45%	46%	52%	52%	46%	47%	49%	51%
Pays none	34%	36%	30%	31%	37%	35%	36%	34%
Express Routes	(n=134)	(n=166)	(n=281)	(n=250)	(n=171)	(n=103)	—	(n=60)
Pays all	17%	7%	6%	14%	6%	9%	—	3%
Pays part	26%	31%	33%	38%	34%	39%	—	28%
Pays none	57%	62%	61%	48%	60%	52%	—	69%

Employer Contribution to Bus Fare

Most recent survey results show that, for 14%-16% of the transitway bus riders, the employer pays the entire cost of the transit fare (Table 11). An additional 43%-48% of the bus patrons have at least part of their fares paid by the employer.

Attitudes and Impacts Pertaining to the Transitways

At least half of the questions contained on the transitway transit user surveys focused on data concerning the transitways. For presentation purposes, these responses can be grouped into the following four categories:

- Perceived travel time savings and duration of transitway use;
- Modal selection and prior mode;
- Impacts of the transitway on mode choice; and
- Perception of the level of transitway utilization.

Perceived Travel Time Savings and Duration of Transitway Use

Travel Time Savings. The transitway transit users' perception of time saved by using the Katy, North, Northwest or Gulf Transitways is presented in Table 12. As indicated in this table, park-and-ride patrons using the Katy Transitway perceived a greater travel time savings in 1986 than 1985. This is probably the result of the western terminus of the transitway being extended 1.7 miles form Gessner to West Belt after the 1985 survey. Thus, park-and-ride users on the transitway during the 1986 survey were able to bypass a section of severe congestion on the freeway. Following the 1986 survey, the Katy Transitway was extended additional 5.1 miles from West Belt to State Highway 6. This extension did not increase the median travel time savings reported by park-and-riders during the 1987 survey, however. Median travel time savings for the a.m. did increase (by 5 minutes) in 1988,

Table 12.
Characteristics of Transitway Utilization,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Perceived Transitway Travel Time Savings (minutes)								
Total Sample	(n=328)	(n=530)	(n=590)	(n=726)	(n=588)	(n=1147)	(n=185)	(n=386)
a.m. (50th Percentile)	9	15	15	20	20	20	15	10
p.m. (50th Percentile)	13	20	15	20	20	25	15	15
Park-and-Ride Routes	(n=208)	(n=388)	(n=334)	(n=501)	(n=433)	(n=986)	(n=185)	(n=335)
a.m. (50th Percentile)	10	15	15	20	20	20	15	10
p.m. (50th Percentile)	15	20	20	20	20	25	15	15
Express Routes	(n=120)	(n=142)	(n=256)	(n=225)	(n=155)	(n=94)	—	(n=51)
a.m. (50th Percentile)	8	15	10	15	15	25	—	15
p.m. (50th Percentile)	7	15	15	17	20	20	—	15
Actual Transitway Travel Time Savings (minutes)[1]								
a.m. (6:00-9:30 a.m.)	6.8	3.0	4.4	5.1	7.9	4.2	-4.6	3.1
p.m. (3:30-7:00 p.m.)	5.5	4.0	1.0	2.7	1.1	8.0	-5.7	-3.1
Duration of Transitway Use								
Total Sample	(n=352)	(n=562)	(n=618)	(n=755)	(n=606)	(n=1240)	(n=212)	(n=456)
% of riders using transitway since opened	71%	40%	31%	20%	18%	75%	43%	57%
Park-and-Ride Routes	(n=222)	(n=405)	(n=345)	(n=514)	(n=448)	(n=1138)	(n=212)	(n=397)
% of riders using transitway since opened	68%	35%	28%	18%	17%	77%	43%	61%
Express Routes	(n=130)	(n=157)	(n=273)	(n=241)	(n=158)	(n=102)	—	(n=59)
% of riders using transitway since opened	75%	51%	35%	23%	21%	76%	—	31%

[1] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI travel time studies*

however. This increase may have been due to the fact that the 1988 survey was performed 3 weeks after the carpool occupancy requirement was raised during the a.m. peak; park-and-riders may have perceived fewer vehicles on the lane and thus a greater travel time savings. Travel time savings for 1989 remained at 20 minutes for both the a.m. and p.m.

Generally speaking, users of the Memorial Express route do not perceive as great a travel time savings as do the park-and-ride patrons (during any of the survey years). A possible explanation for differences in their perception of p.m. travel time savings may be the difference in the p.m. route configuration. Because there is not sufficient distance available to safely maneuver from the Gessner exit of the transitway (across three mainlanes) to the Gessner exit of the Katy Freeway, Memorial Express buses must exit the transitway at Gessner, exit the freeway at West Belt and "backtrack" to Gessner.

In general, users of the North Transitway perceive a greater travel time savings than do users of the Katy Transitway, even though the Katy Transitway was (at the time of the last two surveys) 1.9 miles longer than the North Transitway.

In the Northwest Transitway corridor, park-and-rider users perceive a median travel time savings of 15 minutes in both the morning and the afternoon. Median travel time savings reported by Gulf Transitway express route users also totals 15 minutes during both the a.m. and p.m. Similarly, Gulf Transitway park-and-ride users report a 15-minute time savings in the afternoon, but only a 10-minute savings in the morning.

Frequency distributions of perceived travel time savings along the Katy, North, Northwest and Gulf Transitways are presented in Figures 19, 20, 21 and 22, respectively.

Duration of Transitway Use. The percent of riders using the Katy, North, Northwest and Gulf Transitways since their opening dates is presented in Table 12. In 1985, approximately 71% of the Katy Transitway transit ridership had used the transitway since it opened (it had been open 5 months at the time of this survey). By 1989, this percentage dropped to 18% (after the transitway had been open 5 years).

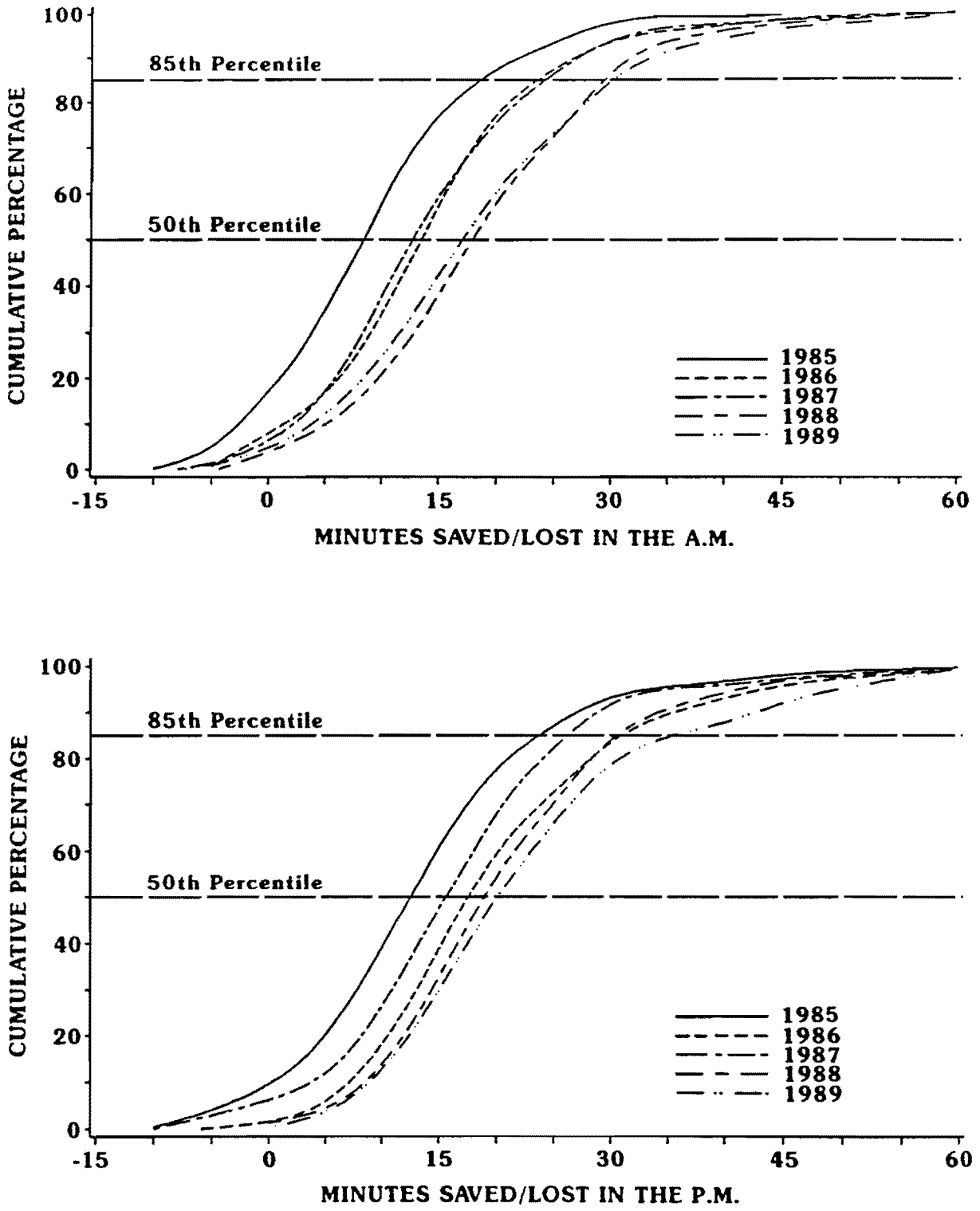
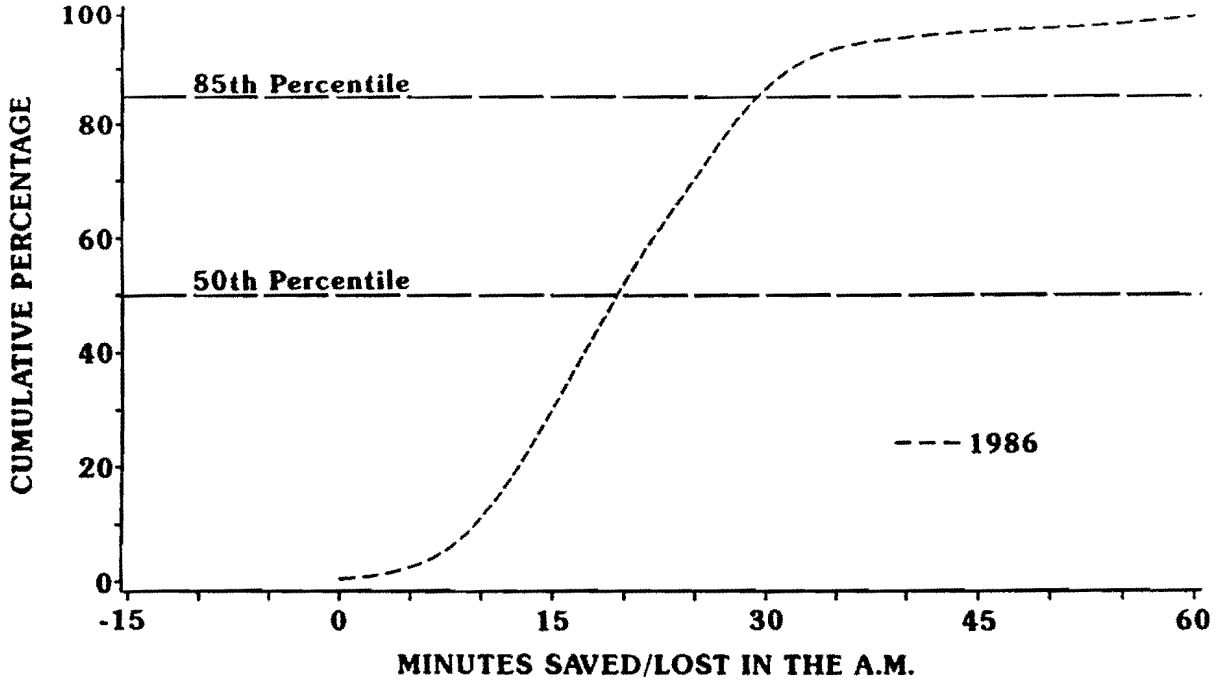


Figure 19.
Perceived Katy Transitway Travel Time Savings,
Katy Transitway Transit User Surveys



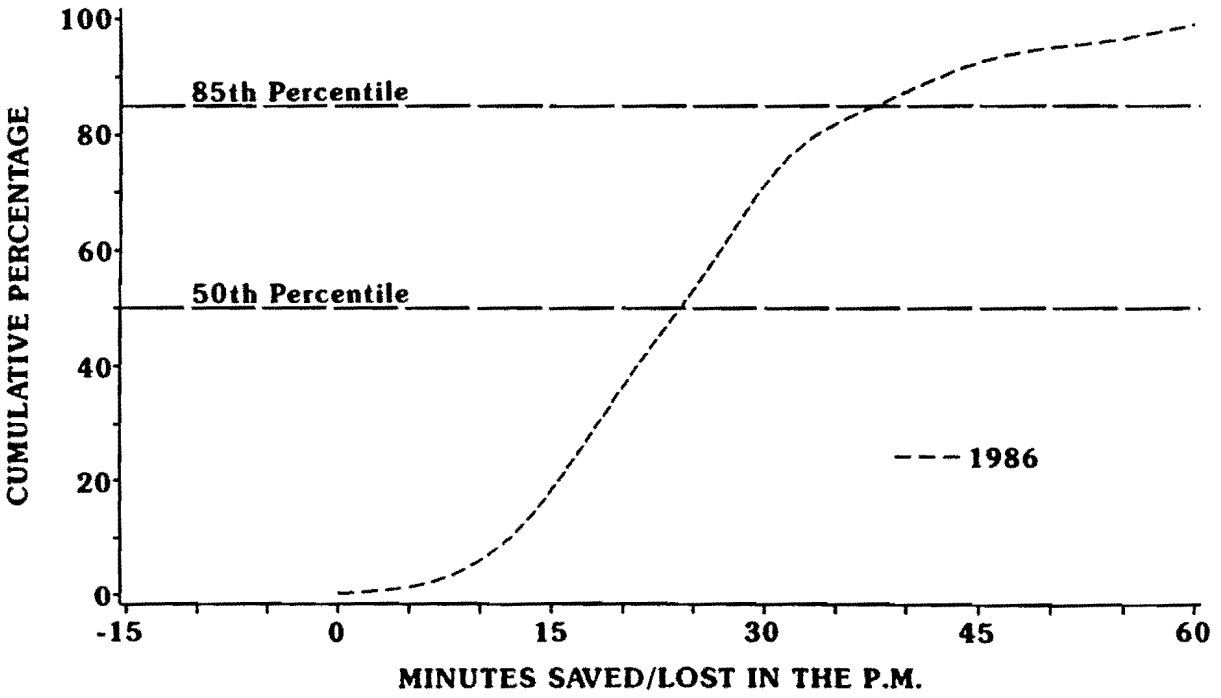
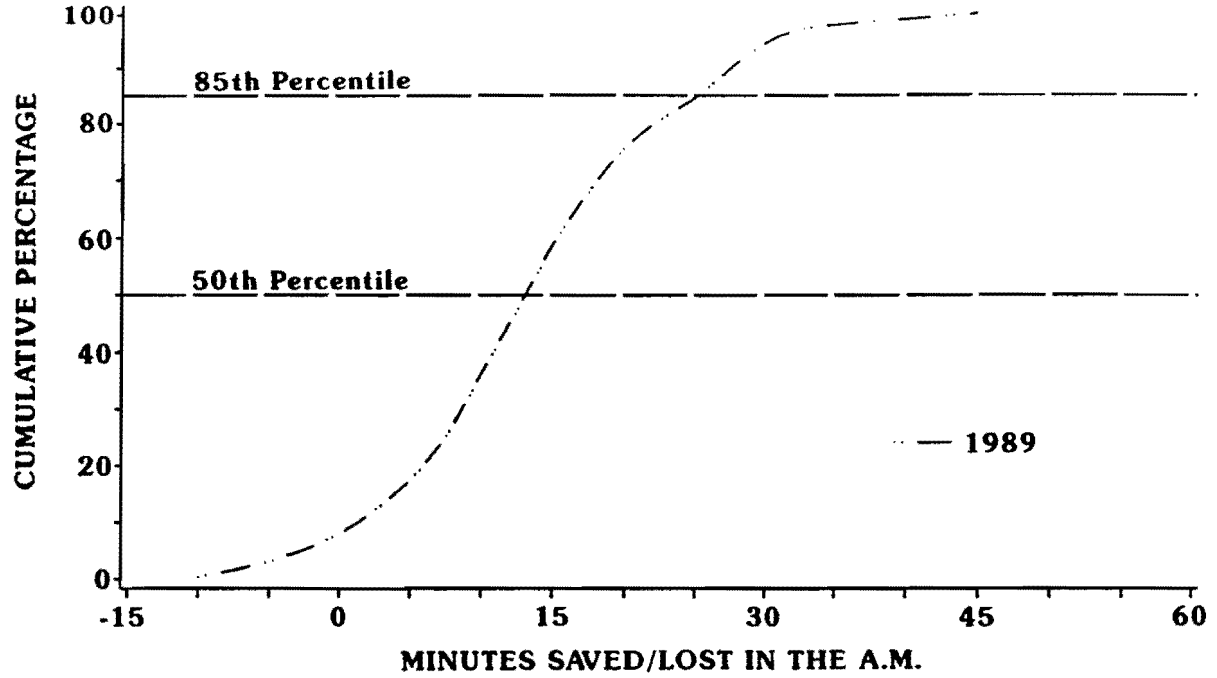


Figure 20.
Perceived North Transitway Travel Time Savings,
North Transitway Transit User Surveys



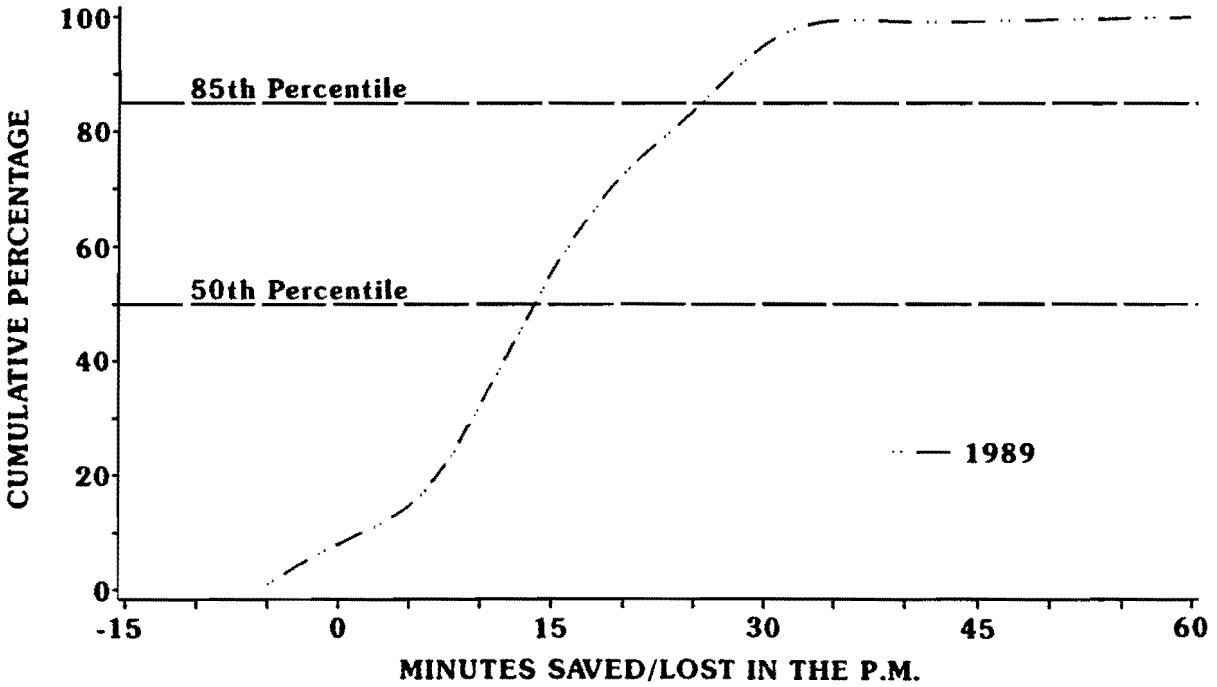


Figure 21.
Perceived Northwest Transitway Travel Time Savings,
Northwest Transitway Transit User Surveys

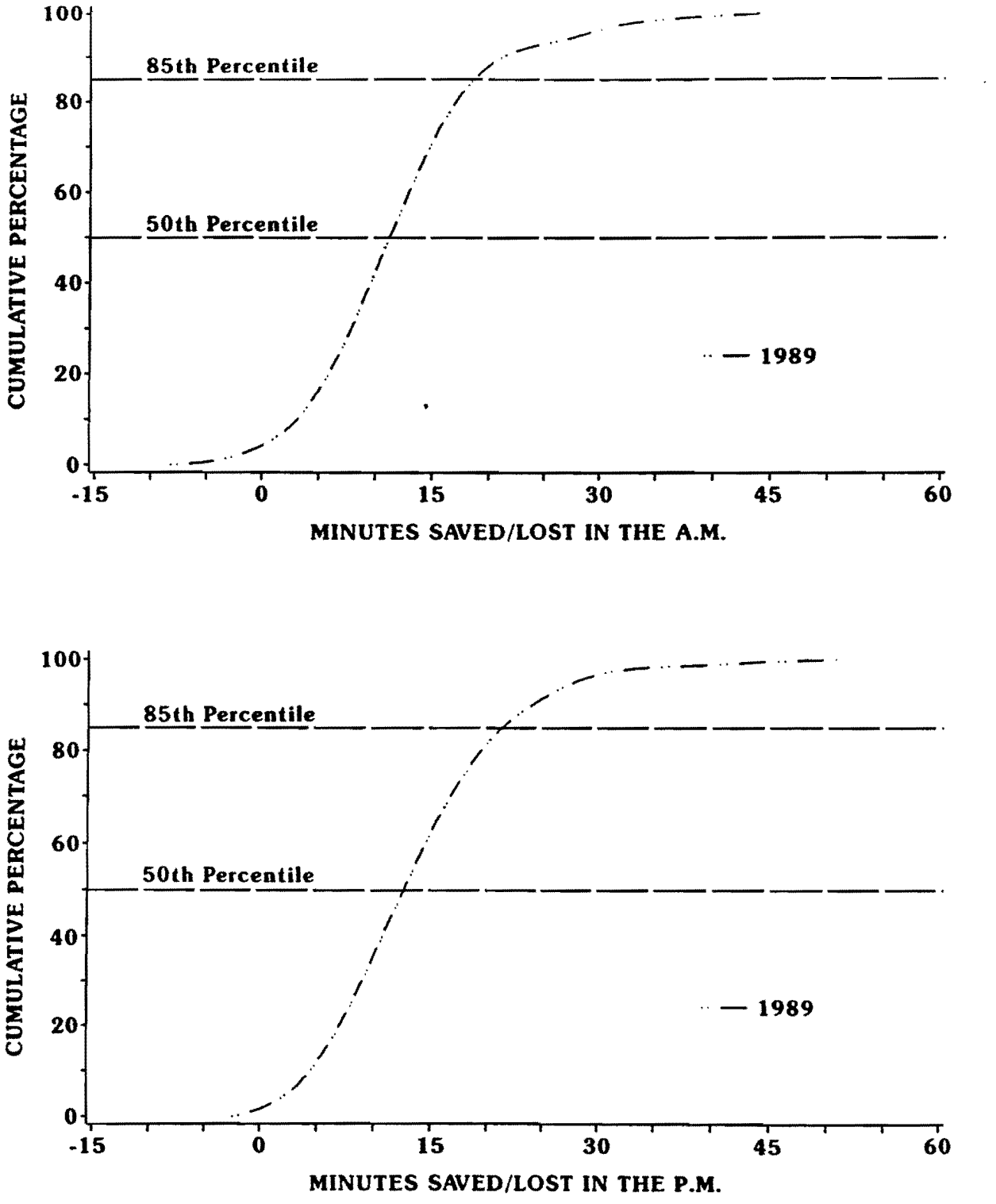


Figure 22.
Perceived Gulf Transitway Travel Time Savings,
Gulf Transitway Transit User Surveys

Approximately 75% of the North Transitway transit patrons have used this lane since opened (it had been open 16 months at the time of the survey). In the Northwest Transitway Corridor, 43% of the transit patrons have been using the transitway since it opened (it had been open 14 months at the time of the survey). Approximately 57% of the Gulf Transitway bus riders have been using the facility since opening day (the transitway had been open 1.5 years at the time of the survey).

Previous Travel Mode

Transit riders using the Katy, North, Northwest and Gulf Transitways were asked to identify how they normally made the trip prior to riding a bus on the transitway. Their responses are summarized in Table 13. On the Katy Transitway routes, approximately 33% of the 1985 ridership, 46% of the 1987 ridership and 51% of both the 1988 and 1989 ridership either drove alone, carpooled or vanpooled.

An additional 54% of the 1985 ridership, about one-third of the 1986 and 1987 ridership and about 20% of the 1988 and 1989 ridership either rode a park-and-ride, express route or regular route bus. (Note: Park-and-ride service was available in the Katy Freeway corridor prior to the opening of the transitway.)

On the North Transitway, slightly more than half of the transit patrons had previously driven alone, carpooled or vanpooled. Twelve percent reported that they traveled by transit, and 25% did not previously make the trip. (Note: Park-and-ride service in the North Freeway corridor did not exist prior to the opening of the North Freeway Contraflow Lane.)

Approximately 58% of the Northwest Transitway bus ridership and 52% of the Gulf Transitway ridership either drove alone, carpooled or vanpooled prior to using a bus on the transitway. An additional 21% of the Northwest Transitway bus patrons and 30% of those riding Gulf Transitway buses were already riding buses prior to opening of the transitways.

Table 13.
Previous Travel Mode of Transitway Transit Users,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Previous Travel Mode	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Total Sample	(n=355)	(n=573)	(n=630)	(n=771)	(n=631)	(n=1240)	(n=214)	(n=457)
Drove alone	24%	35%	34%	38%	37%	35%	46%	38%
Carpooled	5%	5%	9%	9%	10%	10%	9%	8%
Vanpooled	4%	6%	2%	4%	4%	7%	3%	6%
Park-and-ride bus	23%	18%	16%	12%	11%	18%	18%	28%
Regular/express bus	31%	16%	17%	9%	9%	4%	3%	2%
Did not make trip	12%	18%	21%	28%	29%	25%	18%	18%
Other	1%	2%	1%	0%	0%	1%	3%	0%
Park-and-Ride Routes	(n=222)	(n=409)	(n=348)	(n=523)	(n=466)	(n=1137)	(n=214)	(n=396)
Drove alone	30%	37%	34%	36%	37%	35%	46%	36%
Carpooled	4%	5%	8%	10%	11%	9%	9%	7%
Vanpooled	6%	7%	3%	4%	5%	8%	3%	6%
Park-and-ride bus	36%	23%	25%	15%	13%	19%	18%	31%
Regular/express bus	9%	6%	5%	4%	3%	3%	3%	1%
Did not make trip	14%	19%	23%	31%	31%	25%	18%	19%
Other	1%	3%	2%	—	—	1%	3%	—
Express Routes	(n=133)	(n=164)	(n=282)	(n=248)	(n=165)	(n=103)	—	(n=61)
Drove alone	14%	30%	33%	42%	34%	34%	—	51%
Carpooled	6%	6%	10%	8%	7%	19%	—	12%
Vanpooled	1%	3%	2%	3%	2%	1%	—	8%
Park-and-ride bus	1%	5%	6%	3%	5%	13%	—	11%
Regular/express bus	66%	42%	31%	20%	27%	8%	—	5%
Did not make trip	11%	13%	18%	23%	24%	25%	—	11%
Other	1%	1%	—	1%	1%	0%	—	2%

Impact of Transitway on Mode Choice

Transit riders were asked if they would be riding a bus if the transitway was not available. Their responses are included in Table 14.

In 1985, 69% of the Katy Transitway bus riders answered "yes." By 1989, however, only 32% said "yes" (and an additional 32% were "not sure"), indicating that the presence of the transitway has become significantly more important in recent years.

Elsewhere, 41% of the Northwest Transitway and 56% of the Gulf Transitway bus riders reported they would still be riding a bus if the transitway was not available. On the North Transitway, however, 41% of the bus riders stated that they would not ride the bus if the transitway had not opened, and an additional 36% were not sure.

A related question asked how important the transitway is in their decision to ride a bus. Their responses to this question (Table 14) are consistent with their responses to the previous question.

In 1985, 39% of the Katy Transitway bus riders indicated that the transitway was "very important" in their decision; in 1986, 1987 and 1988, this percentage continued to increase. By 1989, the percentage increased again (to 72%), further indicating that the transitway's role in mode choice decisions has become more important in recent years.

The presence of the transitway was "very important" to 54% of the bus riders on the Gulf Transitway, 71% of those on the Northwest Transitway and 76% of those on the North Transitway.

Table 14.
Importance of Transitway in Mode Choice Decisions,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Ride Bus If No Transitway								
Total Sample	(n=356)	(n=575)	(n=629)	(n=773)	(n=641)	(n=1247)	(n=215)	(n=457)
Yes	69%	43%	52%	35%	32%	23%	41%	56%
No	15%	26%	20%	33%	36%	41%	39%	22%
Not sure	16%	31%	28%	32%	32%	36%	20%	22%
Park-and-Ride Routes	(n=221)	(n=410)	(n=345)	(n=522)	(n=468)	(n=145)	(n=215)	(n=396)
Yes	62%	37%	52%	31%	27%	22%	41%	58%
No	22%	31%	24%	38%	41%	42%	39%	20%
Not sure	16%	32%	24%	31%	32%	36%	20%	22%
Express Routes	(n=135)	(n=165)	(n=284)	(n=251)	(n=173)	(n=102)	—	(n=61)
Yes	79%	56%	53%	46%	44%	34%	—	48%
No	5%	14%	15%	21%	22%	28%	—	31%
Not sure	16%	30%	32%	33%	34%	38%	—	21%
How Important Was Transitway in Decision to Ride Bus								
Total Sample	(n=357)	(n=573)	(n=626)	(n=774)	(n=634)	(n=1250)	(n=216)	(n=462)
Very important	39%	57%	54%	68%	72%	76%	71%	54%
Somewhat important	26%	27%	24%	18%	17%	17%	21%	22%
Not important	35%	16%	22%	14%	11%	7%	8%	24%
Park-and-Ride Routes	(n=222)	(n=409)	(n=345)	(n=522)	(n=464)	(n=1146)	(n=216)	(n=401)
Very important	47%	62%	57%	73%	75%	76%	71%	51%
Somewhat important	27%	25%	24%	17%	15%	17%	21%	23%
Not important	26%	13%	19%	10%	10%	7%	8%	26%
Express Routes	(n=135)	(n=164)	(n=281)	(n=252)	(n=170)	(n=104)	—	(n=61)
Very important	25%	44%	50%	58%	62%	72%	—	74%
Somewhat important	24%	30%	25%	20%	24%	12%	—	15%
Not important	51%	26%	25%	22%	14%	16%	—	11%

Perception of Transitway Utilization

One of the most important issues addressed in the transitway user (and nonuser) surveys involves commuter perception of transitway utilization. One of the main reasons for permitting carpools on the Katy Transitway (and later the Northwest and Gulf Transitways) was to increase the perception of utilization. Transit patrons were asked whether they felt the transitway is sufficiently utilized to justify the project. Their responses are presented in Table 15.

As to be expected, on the Katy Transitway, as actual transitway utilization has increased (1985-1987), so has the perception of utilization. In 1988 (after the utilization of the transitway was restricted to 3+ vehicles between 6:45 a.m. and 8:15 a.m.), both the actual and perceived utilization declined somewhat. By 1989, however, both the actual and perceived utilization increased once again; 85% of those surveyed in 1989 felt the transitway is sufficiently utilized.

Elsewhere, 72% of the Northwest Transitway bus riders, 75% of those using the Gulf Transitway and 81% of the North Transitway transit patrons stated their transitway is sufficiently utilized to justify the project.

In considering these responses, it must be noted, however, that the typical bus rider sees the transitway from inside a crowded bus. He does not have a clear idea of the number of vehicles traveling on the lane, and he is more likely to think in terms of the number of persons moved per bus.

Comments

Survey participants were encouraged to use the back of the forms for additional comments. Approximately 20%-25% of the participants did provide comments. These comments are summarized in Table 16.

Table 15.
Perception of Transitway Utilization,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Characteristic	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985[1]	1986[2]	1987[3]	1988[4]	1989[4]	1986[5]	1989[3]	1989[3]
Is the Transitway Sufficiently Utilized to Justify the Project								
Total Sample	(n=348)	(n=567)	(n=618)	(n=763)	(n=630)	(n=1230)	(n=207)	(n=450)
Yes	49%	66%	77%	72%	85%	81%	72%	75%
No	33%	14%	7%	8%	5%	6%	6%	9%
Not sure	18%	20%	16%	20%	10%	13%	22%	16%
Park-and-Ride Routes	(n=218)	(n=404)	(n=339)	(n=515)	(n=461)	(n=1129)	(n=207)	(n=391)
Yes	55%	71%	81%	77%	88%	81%	72%	65%
No	26%	11%	5%	6%	5%	6%	6%	9%
Not sure	19%	18%	14%	17%	7%	13%	22%	16%
Express Routes	(n=130)	(n=163)	(n=279)	(n=248)	(n=169)	(n=101)	—	(n=59)
Yes	37%	53%	72%	62%	78%	79%	—	75%
No	46%	21%	10%	12%	7%	5%	—	8%
Not sure	17%	26%	18%	26%	15%	16%	—	17%
Transitway Vehicle Volumes (A.M. Peak Period)[6]	138	256	2412	2032	2186	394	1464	1139

[1] *Authorized buses and vanpools only (before carpools were allowed)*
[2] *Authorized buses, vanpools and 3+ carpools*
[3] *2+ vehicles, no authorization*
[4] *3+ vehicles, no authorization between 6:45 a.m. and 8:15 a.m.; 2+ vehicles, no authorization at all other times*
[5] *Authorized buses and vanpools*
[6] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI transitway volume counts*

Table 16.
Additional Comments,
Katy, North, Northwest and Gulf Transitway Transit User Surveys

Comment	Percent of Total Comments							
	Katy Transitway					North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1989	1986	1989	1989
Extend the transitway	22%	5%	1%	—	—	23%	—	—
Provide more and/or bigger peak period buses	16%	13%	11%	21%	19%	14%	18%	9%
Poor entry/exit design	16%	7%	10%	8%	6%	—	2%	6%
Lose time due to bus routing on/off transitway	8%	7%	2%	1%	4%	—	5%	3%
Bus fare too high	7%	2%	1%	3%	3%	4%	1%	0%
Good job METRO/transitway is great	3%	13%	26%	23%	27%	14%	23%	25%
Transitway too crowded with 2+ carpools[1]	—	—	30%	20%	7%	—	—	—
Dislike old buses	—	—	—	—	0%	5%	1%	0%
Other	28%	53%	19%	24%	34%	40%	50%	57%

[1] *On the 1988 and 1989 Katy Transitway surveys, the comment was "Transitway was too crowded with 2+ carpools -- 3+ carpools between 6:45 a.m. and 8:15 a.m. is a good move."*

CHAPTER 3
TRANSITWAY CARPOOL/VANPOOL USER SURVEYS

As noted in Chapter 1, the surveys of transitway carpoolers and vanpoolers performed in 1985 and 1986 included both drivers and passengers, while the 1987, 1988 and 1989 surveys included drivers only.

Previous reports (TTI Research Reports 484-4 and 484-8) categorize the 1985 and 1986 survey data by vanpool driver, vanpool passenger, carpool driver and carpool passenger. In this report, however, carpool and vanpool responses have been combined. This was done for several reasons. First, 1987, 1988 and 1989 surveys included carpool/vanpool drivers only; therefore, no passenger data are available for these survey years. Second, since vanpools now comprise such a small percent of the total sample of poolers (less than 2%), presenting separate vanpool responses is not warranted. Third, current vanpool occupancies in the Katy, Northwest and Gulf Transitway corridors (typically 2 or 3 persons) suggest that these "vanpools" are really operating as carpools, rather than company sponsored or third-party vanpools.

As was the case with the transit user surveys, the carpool/vanpool user surveys primarily addressed:

- Personal characteristics;
- Travel Patterns and trip characteristics; and
- Attitudes and impacts pertaining to the transitways.

Personal Characteristics

Transitway carpoolers/vanpoolers were asked a series of questions concerning their age, sex, occupation and level of education. Their responses are presented in Table 17.

Age

The median age of transitway carpoolers/vanpoolers is in the mid to upper 30s.

Sex

At least half of the Katy, North and Northwest Transitway poolers surveyed most recently are male; whereas 59% of the current Gulf Transitway poolers are female.

Occupation

Most recent survey data indicate that 44% to 46% of the transitway poolers are employed in "professional" positions, between 15% and 24% are classified as "managerial" and between 14% and 26% are employed in "clerical" positions. The high percentage (26%) of clerical workers in the Gulf Transitway corridor is consistent with the high percentage (59%) of females.

Education

The average Katy and North Transitway carpooler/vanpooler has completed at least 3 years of college; the average Northwest and Gulf Transitway pooler has completed more than 2 years of college.

Table 17.
Personal Characteristics of Transitway Carpoolers/Vanpoolers,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Characteristic	Katy Transitway Carpools/Vanpools					North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Age (years)	(n=539)	(n=635)	(n=570)	(n=381)	(n=578)	(n=1532)	(n=255)	(n=249)	(n=121)	(n=119)
50th Percentile	38	38	36	36	38	39	35	36	35	37
Sex	(n=542)	(n=612)	(n=568)	(n=377)	(n=574)	(n=1538)	(n=253)	(n=247)	(n=118)	(n=118)
Male	55%	55%	58%	54%	55%	55%	53%	50%	42%	41%
Female	45%	45%	42%	46%	45%	45%	47%	50%	58%	59%
Occupation	(n=533)	(n=609)	(n=561)	(n=362)	(n=550)	(n=1512)	(n=239)	(n=239)	(n=117)	(n=118)
Professional	55%	54%	44%	44%	45%	45%	44%	44%	33%	46%
Managerial	20%	17%	19%	19%	18%	24%	17%	18%	14%	15%
Clerical	18%	21%	16%	12%	15%	23%	20%	18%	31%	26%
Sales	2%	4%	8%	8%	6%	7%	13%	9%	11%	4%
Student	0%	3%	5%	4%	4%	1%	0%	3%	1%	1%
Service Worker	-----	0%	1%	6%	2%	0%	2%	2%	4%	3%
Craftsman	0%	-----	3%	2%	3%	0%	2%	4%	4%	2%
Homemaker	0%	0%	2%	3%	4%	-----	1%	-----	-----	-----
Other	5%	1%	2%	2%	3%	0%	1%	2%	2%	3%
Education (years)	(n=535)	(n=615)	(n=561)	(n=371)	(n=565)	(n=1523)	(n=245)	(n=243)	(n=118)	(n=118)
Average	15.5	15.3	15.6	15.5	15.3	15.0	15.2	14.7	14.1	14.3

Travel Patterns and Trip Characteristics

Katy, North, Northwest and Gulf Transitway poolers were asked a series of questions pertaining to the formation and operation of the carpool/vanpool on the transitway. Responses to these questions are highlighted on the following pages.

Year Joined Carpool/Vanpool

The year transitway poolers joined their present carpool/vanpool is presented in Table 18. As to be expected, surveys performed shortly after each transitway opened showed markedly higher percentages of poolers joining their present carpool/vanpool before the transitway opened. However, most recent (1989) survey results show that 54% of the Gulf Transitway poolers, 65% of the Northwest Transitway poolers and 92% of the Katy Transitway poolers reported joining their present carpool/vanpool after the opening of the transitway.

Duration of Transitway Use

As shown in Table 18, more than three-fourths of the Katy Transitway poolers surveyed in 1985 reported using the priority lane since it opened (to vanpools in October 1984; to carpools in April 1985). By 1989, however, less than one-fourth of those surveyed had been using the lane since opening day. Similar occurrences were observed during surveys of Northwest and Gulf Transitway poolers; approximately 40% of the Northwest and 41% of the Gulf Transitway poolers surveyed in 1989 had used the transitway in their area since it opened (these figures are down from 77% in Northwest corridor and 67% in the Gulf corridor in 1988).

On the North Transitway, more than 90% of the vanpoolers surveyed in 1986 reported using that facility since opening day.

Table 18.
Travel Characteristics of Transitway Carpoolers/Vanpoolers,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Characteristic	Katy Transitway Carpools/Vanpools			North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1989	1986	1988	1989	1988	1989
Year Joined Present Carpool/Vanpool	(n=527)	(n=628)	(n=447)	(n=1600)	(n=222)	(n=199)	(n=111)	(n=102)
Before 1980	10%	10%	0%	10%	3%	1%	6%	5%
1980	10%	5%	1%	9%	2%	—	3%	1%
1981	10%	5%	1%	11%	2%	0%	1%	4%
1982	12%	4%	0%	11%	2%	—	2%	1%
1983	13%	8%	1%	10%	2%	2%	4%	1%
1984	28%	12%	5%	14%	4%	4%	1%	6%
1985	17%	38%	2%	32%	4%	3%	5%	4%
1986	—	18%	6%	3%	10%	4%	6%	3%
1987	—	—	16%	—	11%	8%	13%	8%
1988	—	—	31%	—	60%	27%	59%	22%
1989	—	—	37%	—	—	51%	—	45%
Joined Present Carpool/Vanpool	(n=549)	(n=646)	(n=453)	(n=1600)	(n=222)	(n=199)	(n=111)	(n=102)
Before Transitway Opened	75%	66%	8%	59%	66%	35%	51%	46%
After Transitway Opened	25%	34%	92%	41%	34%	65%	49%	54%
Number of Months Carpools/ Vanpools Have Existed	(n=521)	(n=599)	(n=430)	(n=1562)	(n=222)	(n=199)	(n=111)	(n=102)
Average	29	27	20	33	17	18	24	31
Number of Months Transitway Has Been Open	6	12	54	16	3	14	6	17
Duration of Transitway Use	(n=92)	(n=124)	(n=447)	(n=199)	(n=257)	(n=244)	(n=123)	(n=116)
% of Carpools/Vanpools Using Transitway Since Opening Day	76%	44%	23%	94%	77%	40%	67%	41%

Note: The Katy Transitway opened to vanpools in October 1984 and opened to carpools in April 1985.

Trip Purpose

It has been estimated that the majority of trips served by the transitways during the a.m. peak period are work or school trips. As shown below, the results of the 1989 transitway carpool/vanpool surveys confirm this theory.

Transitway	*Trip Purpose*
Katy	84% Work; 11% School; 5% Other
Northwest	93% Work; 6% School; 1% Other
Gulf	98% Work; 2% School

Home Zip Codes

An analysis of home Zip Code data for transitway carpoolers and vanpoolers indicate the following:

- The majority of Katy Transitway poolers reside in one of 5 Zip Code areas in west Houston (Table 19; Figure 23).

- Nearly 60% of the North Transitway vanpoolers reside in one of 8 Zip Code areas in north Houston (Table 19; Figure 24).

- More than three quarters of the Northwest Transitway carpoolers/vanpoolers reside in one of 7 Zip Code areas in northwest Houston (Table 19; Figure 25).

- Carpoolers and vanpoolers using the Gulf Transitway typically reside in one of 8 Zip Code areas in southeast Houston (Table 19; Figure 26).

Table 19.
Home Zip Codes of Carpoolers/Vanpoolers,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Home Zip Code	1985	1986	Spring 1987	Fall 1987	1988	1989
Katy Transitway Carpools/Vanpools	(n=649)	(n=621)	(n=134)	(n=570)	(n=384)	(n=576)
77079	18%	18%	23%	14%	11%	10%
77084	18%	15%	12%	14%	20%	18%
77450	14%	19%	10%	15%	21%	21%
77077	12%	11%	10%	9%	7%	8%
77449	12%	14%	10%	16%	12%	13%
77042	5%	3%	1%	4%	1%	3%
77043	5%	3%	5%	3%	2%	3%
77082	3%	2%	5%	4%	2%	3%
77083	4%	5%	2%	4%	4%	5%
Other	9%	10%	22%	17%	20%	16%
North Transitway Vanpools	—	(n=1554)	—	—	—	—
77373	—	11%	—	—	—	—
77380	—	10%	—	—	—	—
77379	—	9%	—	—	—	—
77381	—	8%	—	—	—	—
77388	—	8%	—	—	—	—
77090	—	5%	—	—	—	—
77066	—	4%	—	—	—	—
77073	—	3%	—	—	—	—
Other	—	42%	—	—	—	—
Northwest Transitway Carpools/Vanpools	—	—	—	—	(n=256)	(n=252)
77040	—	—	—	—	24%	16%
77095	—	—	—	—	14%	15%
77064	—	—	—	—	13%	12%
77065	—	—	—	—	8%	9%
77070	—	—	—	—	8%	5%
77429	—	—	—	—	8%	12%
77041	—	—	—	—	7%	7%
Other	—	—	—	—	18%	24%
Gulf Transitway Carpools/Vanpools	—	—	—	—	(n=122)	(n=120)
77089	—	—	—	—	17%	25%
77034	—	—	—	—	9%	9%
77061	—	—	—	—	7%	4%
77062	—	—	—	—	7%	6%
77546	—	—	—	—	7%	7%
77573	—	—	—	—	7%	2%
77598	—	—	—	—	6%	1%
77017	—	—	—	—	5%	3%
Other	—	—	—	—	35%	43%

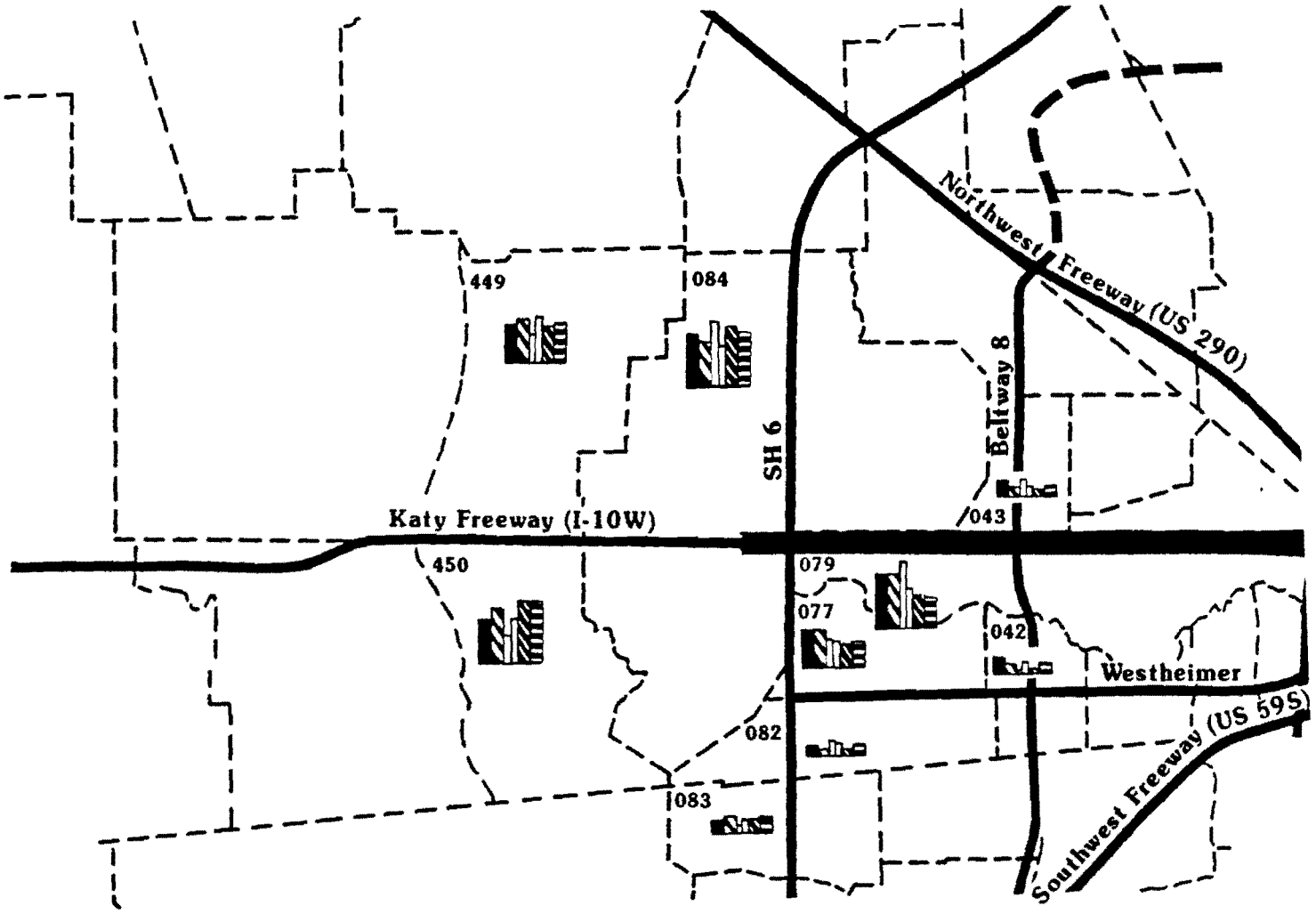


Figure 23.
Home Origins of Carpoolers and Vanpoolers Using the Katy Transitway

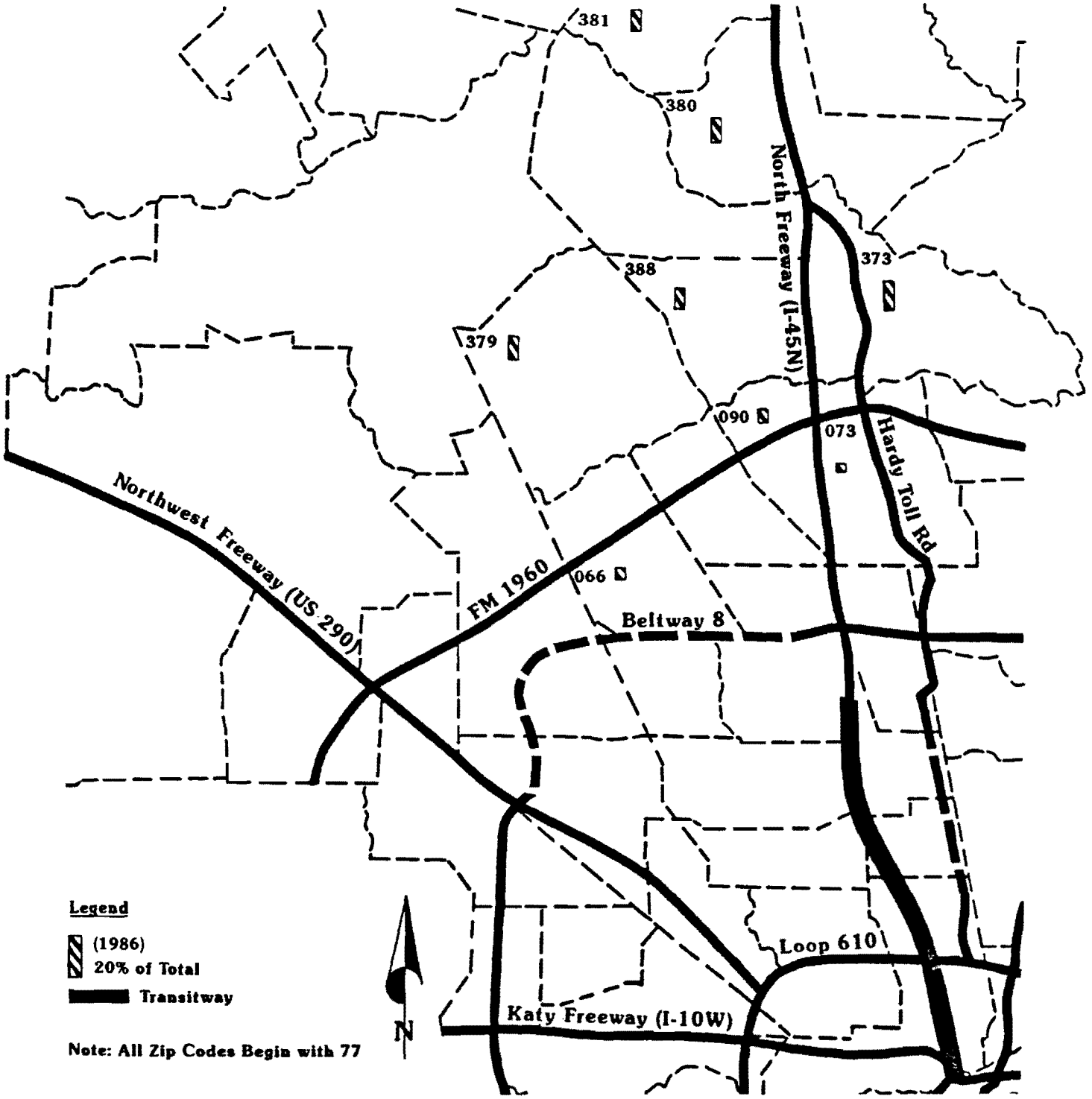


Figure 24.
Home Origins of Vanpoolers Using the North Transitway

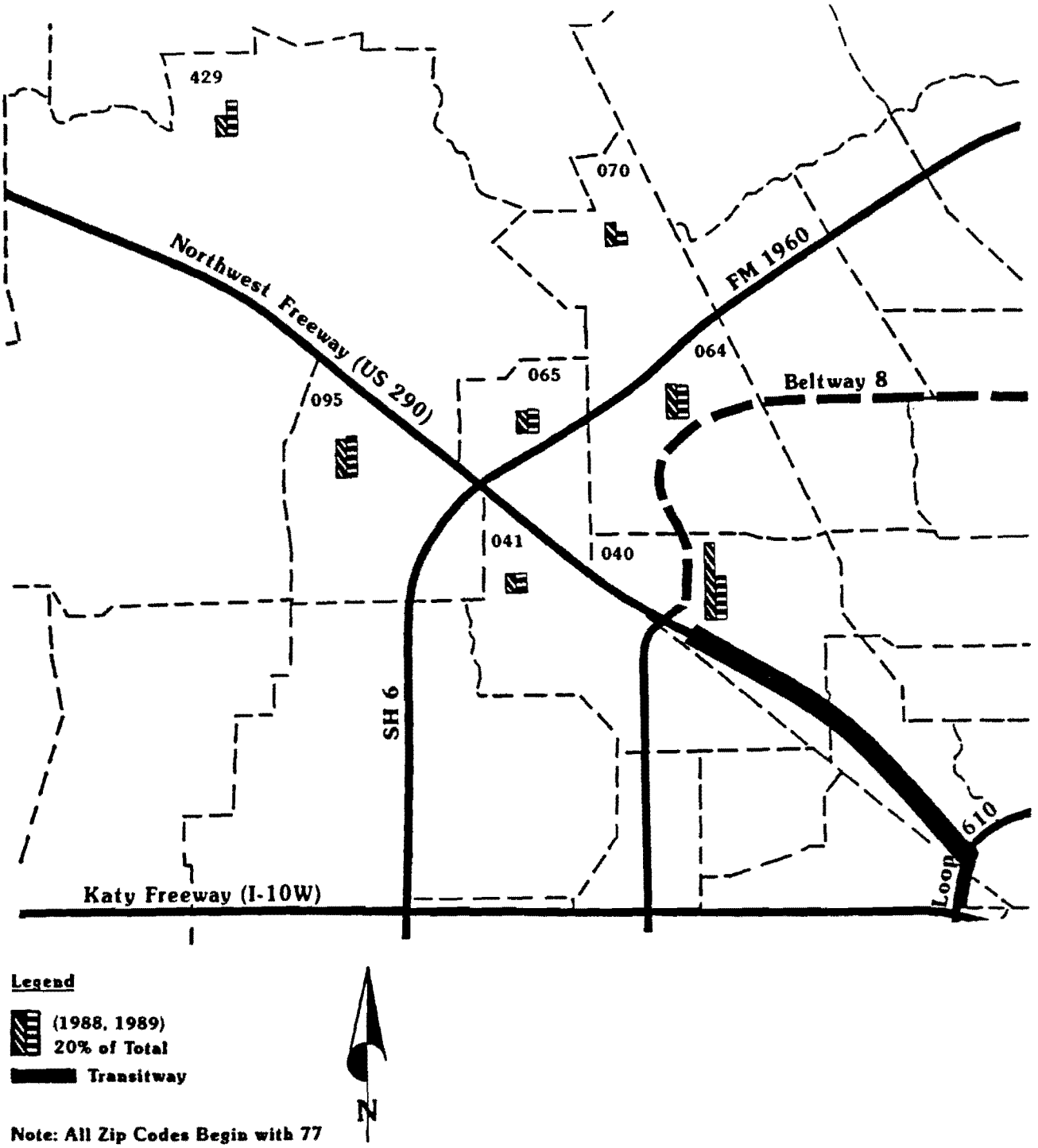


Figure 25.
Home Origins of Carpoolers and Vanpoolers Using the Northwest Transitway

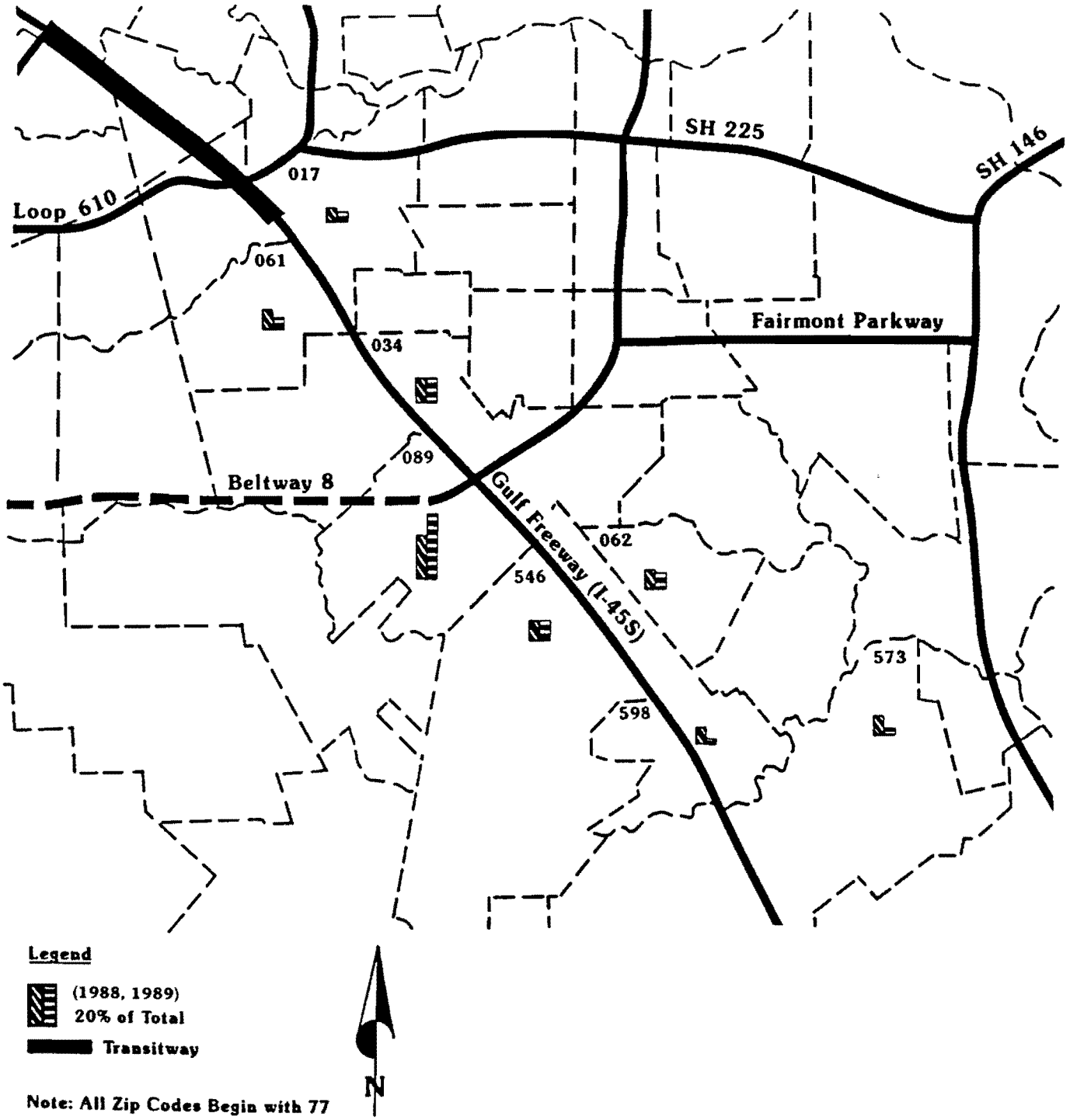


Figure 26.
Home Origins of Carpoolers and Vanpoolers Using the Gulf Transitway

Transitway Entrance Ramp

The Katy, Northwest and Gulf Transitways each have three entrances in the inbound direction (for the a.m. operation). Transitway poolers were asked which of the three entrances they typically use to access the transitway. Most recent survey results along the Katy Transitway indicate that 55% use the I-10 ramp just west of SH 6, 23% use the flyover ramp located at the Addicks Park-and-Ride Lot, and the remaining 22% enter the transitway via the Gessner slip ramp.

On the Northwest Transitway, approximately 84% reported they use the Little York flyover ramp and 16% enter via the Pinemont flyover ramp (less than 1% typically use the Dacoma entrance). On the Gulf Transitway, 62% of those surveyed enter the transitway via the Broadway ramp, 36% enter from the South Loop (I-610) and 1% use the Eastwood (Lockwood) ramp.

Vehicle Occupancies

Katy Transitway. At the time of the 1985 survey, utilization of the Katy Transitway was restricted to authorized carpools carrying 4 or more registered persons. During the 1986 survey, the minimum occupancy for authorized carpools had been lowered to 3 persons. By the time of the 1987 survey, the passenger requirement had been lowered to 2 persons and all authorization procedures were eliminated. Shortly before the 1988 survey, the minimum carpool passenger requirement was raised from 2 to 3 persons between the hours of 6:45 a.m. and 8:15 a.m. This 3+ operating restriction was also in effect during the 1989 survey.

The actual occupancies of the carpools/vanpools traveling on the Katy Transitway is shown in Table 20. The average occupancy of Katy Transitway carpools/vanpools was 6.8 persons in 1985, 6.0 persons in 1986, 2.3 persons in 1987, 2.5 persons in 1988 and 2.6 persons in 1989.

Table 20.
Vehicle Occupancies, Trip Destinations and Previous Travel Mode of Transitway Carpoolers/Vanpoolers, Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Characteristic	Katy Transitway Carpools/Vanpools					North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Vehicle Occupancy	(n=97)	(n=123)	(n=592)	(n=409)	(n=568)	(n=202)	(n=261)	(n=251)	(n=124)	(n=122)
2 or less	—	1%	78%	65%	60%	—	79%	80%	78%	74%
3	19%	30%	15%	24%	27%	—	17%	18%	13%	15%
4	15%	23%	4%	9%	10%	1%	3%	2%	6%	7%
5	4%	4%	1%	2%	2%	2%	1%	0%	2%	2%
6	10%	5%	1%	0%	1%	7%	—	—	1%	—
7	9%	3%	1%	—	0%	9%	—	—	—	—
8	15%	8%	0%	—	—	14%	—	—	—	—
9	15%	4%	—	—	—	13%	—	—	—	—
10	2%	6%	—	—	—	16%	—	—	—	—
11	5%	6%	—	—	—	9%	—	—	—	—
12	4%	5%	0%	—	0%	17%	—	—	—	1%
More than 12	2%	5%	—	—	0%	12%	—	—	—	1%
Average	6.8	6.0	2.3	2.5	2.6	9.7	2.3	2.2	2.3	2.5
Trip Destination	(n=95)	(n=123)	(n=597)	(n=404)	(n=567)	(n=199)	(n=268)	(n=250)	(n=123)	(n=122)
Downtown	57%	55%	39%	42%	39%	61%	38%	41%	81%	78%
Galleria	12%	14%	22%	19%	20%	7%	26%	22%	9%	6%
Greenway Plaza	6%	2%	6%	3%	5%	8%	4%	4%	3%	1%
Texas Medical Center	4%	5%	5%	5%	5%	4%	4%	2%	—	4%
Other	21%	24%	28%	31%	31%	20%	28%	31%	7%	11%
Previous Travel Mode	(n=549)	(n=624)	(n=588)	(n=391)	(n=552)	(n=1622)	(n=239)	(n=242)	(n=97)	(n=117)
Drove alone	36%	39%	50%	45%	51%	30%	34%	43%	28%	40%
Carpool	22%	17%	29%	33%	26%	21%	60%	45%	53%	44%
Vanpool	12%	9%	3%	3%	4%	12%	1%	3%	6%	7%
Bus	13%	13%	9%	7%	8%	14%	4%	4%	5%	4%
Didn't make trip	17%	22%	9%	12%	11%	23%	1%	5%	8%	5%

North Transitway. During the 1986 survey, vanpool utilization of the North Transitway was limited to authorized 8+ vanpools; reported vanpool occupancies are presented in Table 20. The average occupancy of North Transitway vanpools was 9.7 persons.

Northwest and Gulf Transitways. At the time of the 1988 and 1989 surveys along the Northwest and Gulf Transitways, both facilities were open to all 2+ vehicles; reported vehicle occupancies are presented in Table 20. The average occupancy of Northwest Transitway pools was 2.3 persons in 1988 and 2.2 persons in 1989. The average occupancy of Gulf Transitway pools was 2.3 persons in 1988 and 2.5 persons in 1989.

Carpool/Vanpool Make-Up

As part of the 1989 survey, transitway poolers were asked to identify who makes up their carpool/vanpool group. As indicated below, between 56% and 69% of those responding are carpooling with family members; an additional 24% to 32% are pooling with co-workers.

	Katy Transitway Carpools/Vanpools	*Northwest Transitway* Carpools/Vanpools	*Gulf Transitway* Carpools/Vanpools
Family Members	56%	69%	65%
Neighborhood Friends	12%	7%	8%
Co-Workers	32%	24%	27%

Trip Destinations

Since 1985, the downtown area has continued to be the single largest attractor of transitway carpool/vanpool trips (Table 20). In fact, most recent survey data show that 39% of the poolers using the Katy Transitway, 41% of those using the Northwest Transitway, 61% of those traveling the North Transitway and 78% of those using the Gulf Transitway are destined to the downtown area. In addition, carpools and vanpools have also demonstrated the capability of serving trips to numerous locations other than downtown, as evidenced by

the large number of trips to the Galleria, Texas Medical Center, Greenway Plaza and other locations.

Previous Travel Mode

Prior to traveling in a carpool or vanpool on the transitway, slightly more than half of the current Katy Transitway poolers drove alone. By contrast, 33% of the North Transitway vanpoolers, 48% of the Northwest Transitway poolers and 54% of the Gulf Transitway poolers were already carpooling or vanpooling prior to using the transitway (Table 21). Those traveling the Northwest Transitway were also asked if they had used the Katy Transitway on a regular basis prior to using the Northwest Transitway. Approximately 15% of the carpoolers/vanpoolers responding in 1988 and 14% of those responding in 1989 replied "yes."

Attitudes and Impacts Pertaining to the Transitways

A number of questions were intended to collect information concerning attitudes toward and impacts of implementing the transitways. The responses to these questions can be categorized as follows: 1) impacts of the transitway on modal selection; 2) perceived travel time savings as a result of using the transitway versus the regular freeway lanes; and 3) perception of transitway utilization.

Impacts of the Transitway on Mode Choice

A question was asked to determine whether individuals would be carpooling or vanpooling if the transitways had not opened. Responses to this question are summarized in Table 21. Initial surveys performed in the Katy, Northwest and Gulf Transitway corridors show strong similarities. Between 70% and 84% of the individuals surveyed in the Katy

Table 21.
Perceived Impacts of the Transitway on Mode Choice,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Impact	Katy Transitway Carpools/Vanpools					North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Would You Carpool/ Vanpool If No Transitway	(n=551)	(n=633)	(n=588)	(n=398)	(n=559)	(n=1632)	(n=255)	(n=247)	(n=122)	(n=120)
Yes	84%	68%	50%	54%	42%	43%	70%	52%	75%	68%
No	8%	16%	37%	35%	42%	27%	21%	30%	14%	20%
Not sure	8%	16%	13%	11%	16%	30%	9%	18%	11%	12%
How Important Was Transitway in Decision to Carpool/Vanpool	(n=547)	(n=632)	----	----	(n=557)	(n=1618)	(n=253)	(n=249)	(n=122)	(n=120)
Very Important	28%	46%	----	----	73%	68%	53%	56%	43%	49%
Somewhat Important	16%	16%	----	----	14%	18%	15%	20%	22%	18%
Not Important	56%	38%	----	----	13%	14%	32%	24%	35%	33%

Transitway corridor (in 1985) and in the Northwest and Gulf Transitway corridors (in 1988) responded "yes." Results of later surveys performed in the Katy Transitway corridor, however, showed that at least one-third of those responding in 1987 and 1988 and 42% of those responding in 1989 said they would not. Thus, it appears that the Katy Transitway has played a greater role in influencing mode choice in its later years of operation. This same trend is being observed in the Northwest and Gulf Transitway corridors.

In the North Transitway corridor, 27% of those surveyed said they would not be vanpooling if not for the transitway and an additional 30% were not sure.

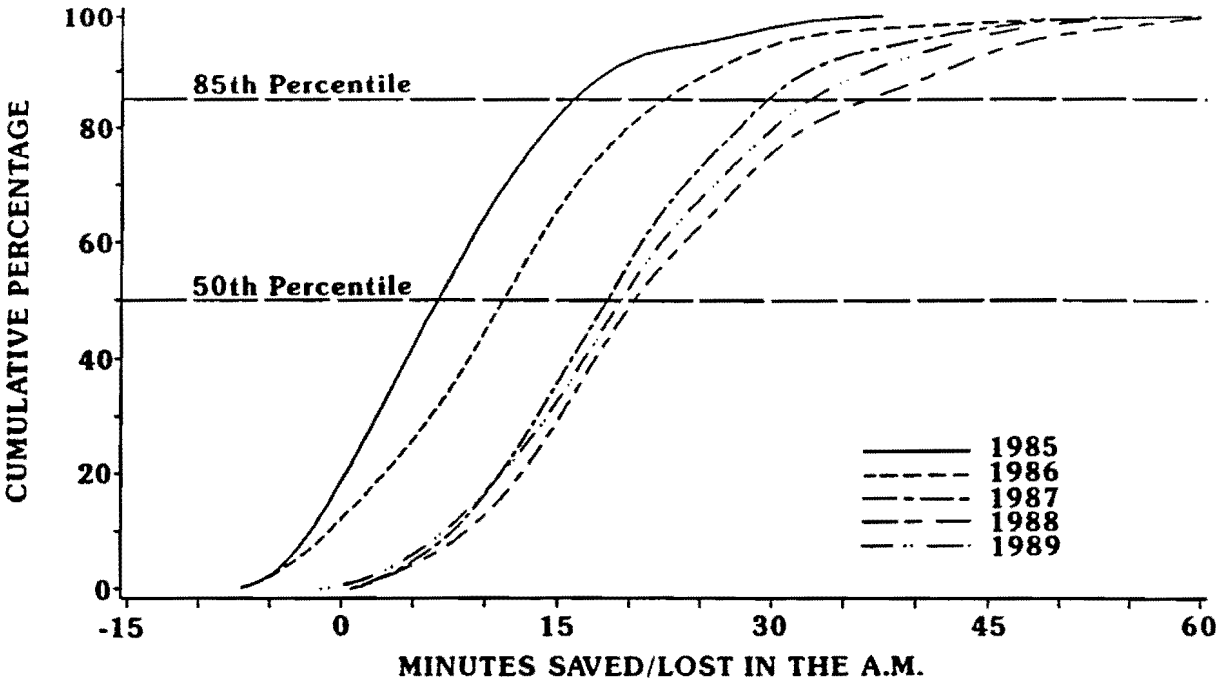
A related question asked how important is the transitway in the decision to carpool or vanpool. Most recent survey results in each transitway corridor show that between 67% and 87% of those surveyed said the transitway is either "very important" or "somewhat important" in their decision to carpool/vanpool (Table 21).

Perceived Transitway Travel Time Savings

Frequency distributions of carpooler/vanpooler perceived travel time savings for transitways are presented in Figures 27 - 30.

Katy Transitway. In 1985, 1986 and 1988, Katy Transitway poolers perceived a greater travel time savings in the afternoon than in the morning (Table 22). As to be expected, perceived travel time savings in 1986 (after the transitway was extended to West Belt) are greater than those in 1985. In addition, perceived travel time savings in 1987, 1988 and 1989 (after the transitway was extended to SH 6) are greater yet. Median perceived travel time savings in 1989 were 20 minutes for both the a.m. and p.m. The p.m. figure is down slightly from 1988.

North Transitway. Vanpoolers using the North Transitway apparently do not perceive a.m. freeway traffic congestion to be as severe as p.m. traffic congestion and,



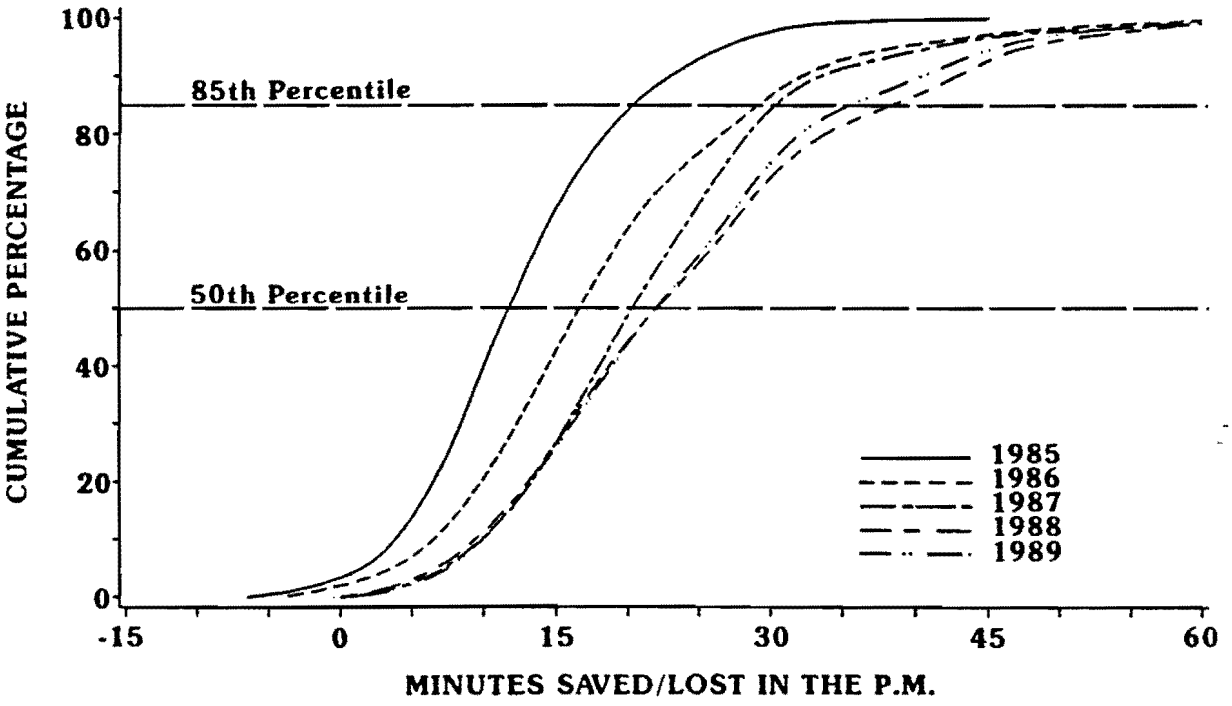
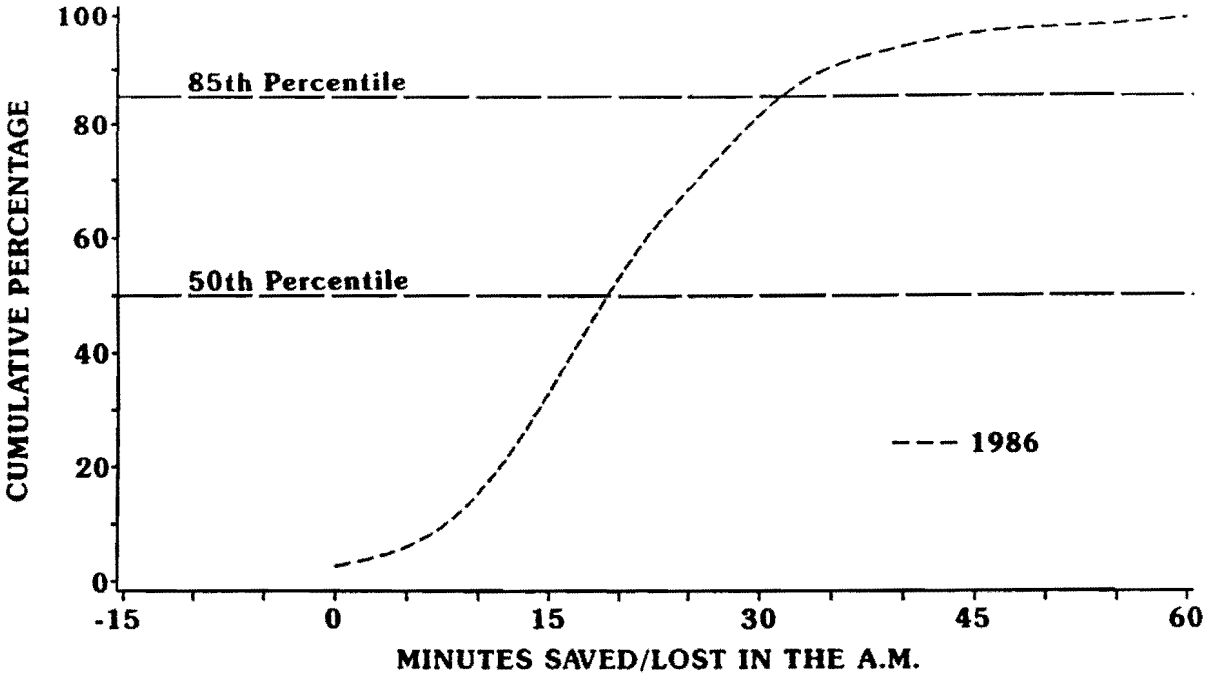


Figure 27.
Perceived Katy Transitway Travel Time Savings,
Katy Transitway Carpool/Vanpool Surveys



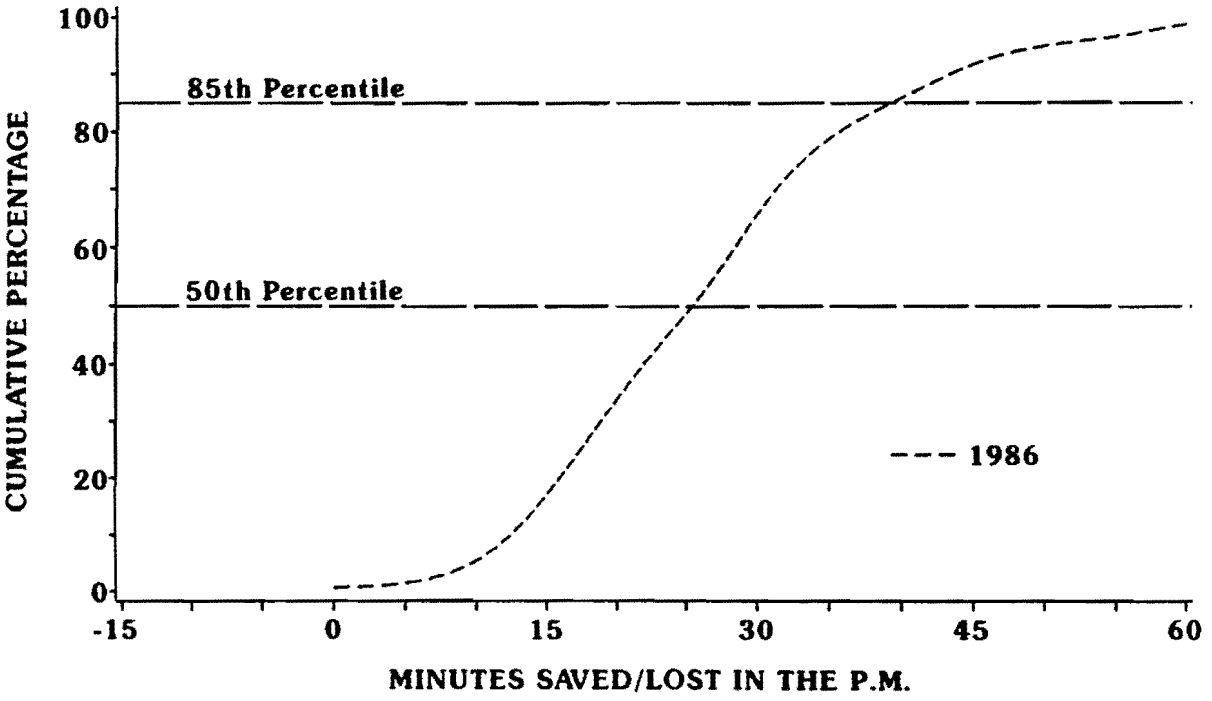
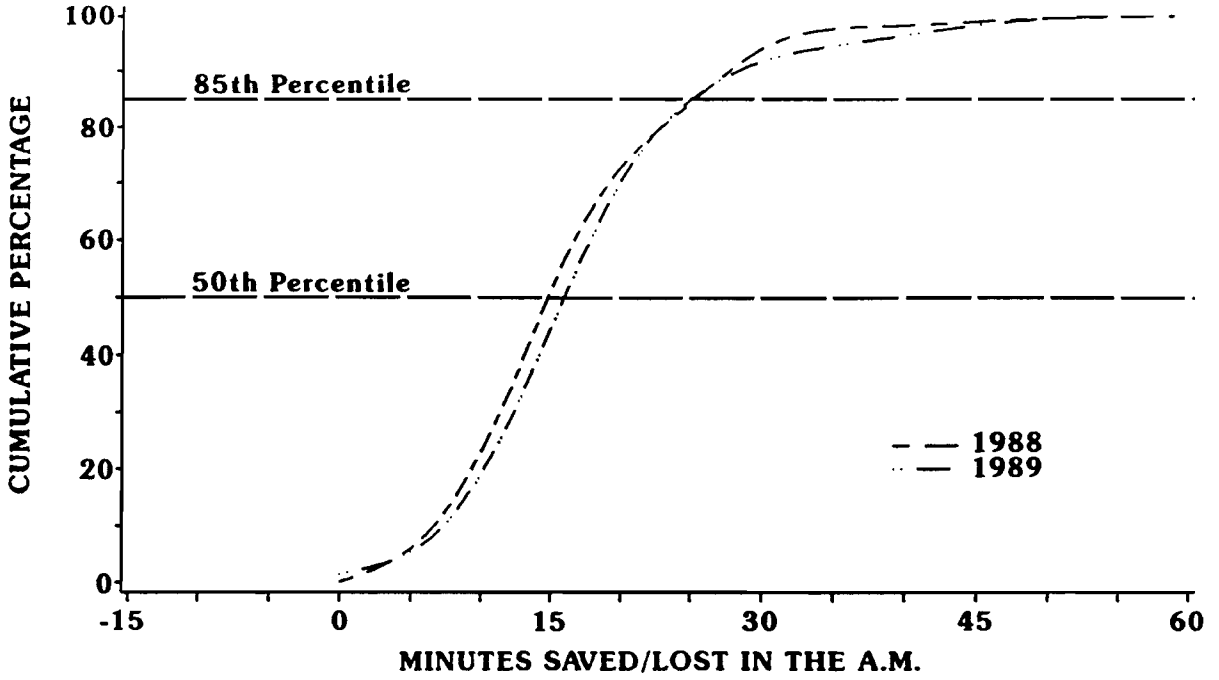


Figure 28.
Perceived North Transitway Travel Time Savings,
North Transitway Vanpool Survey



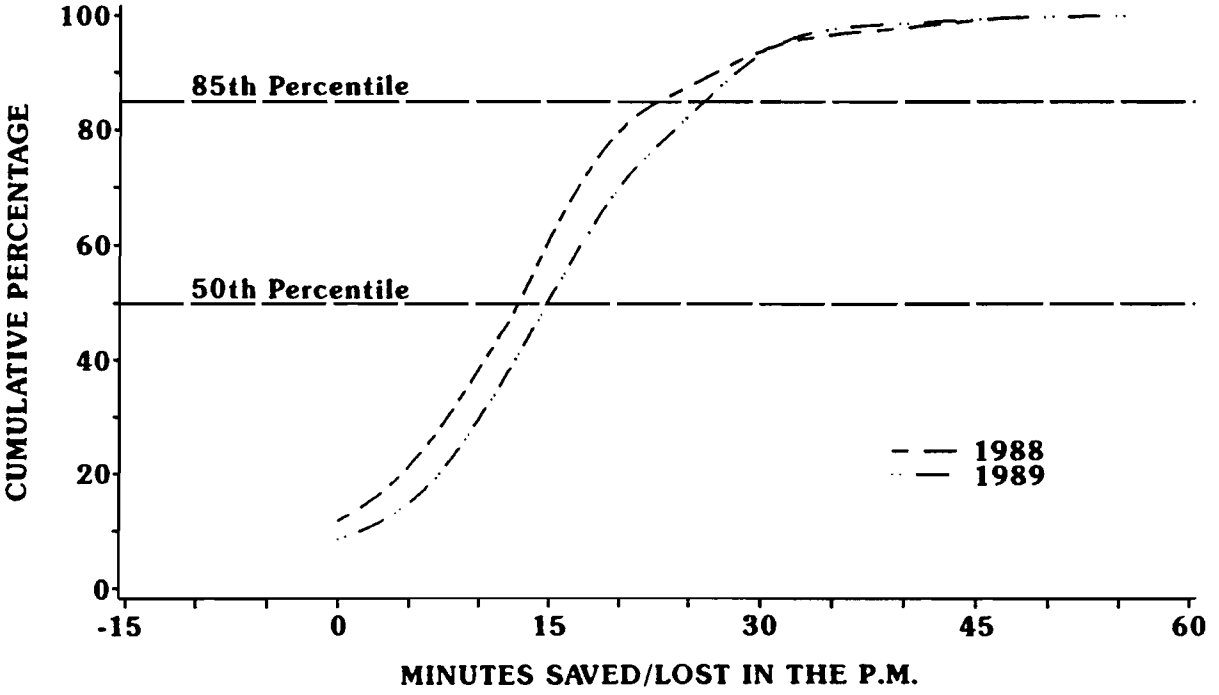
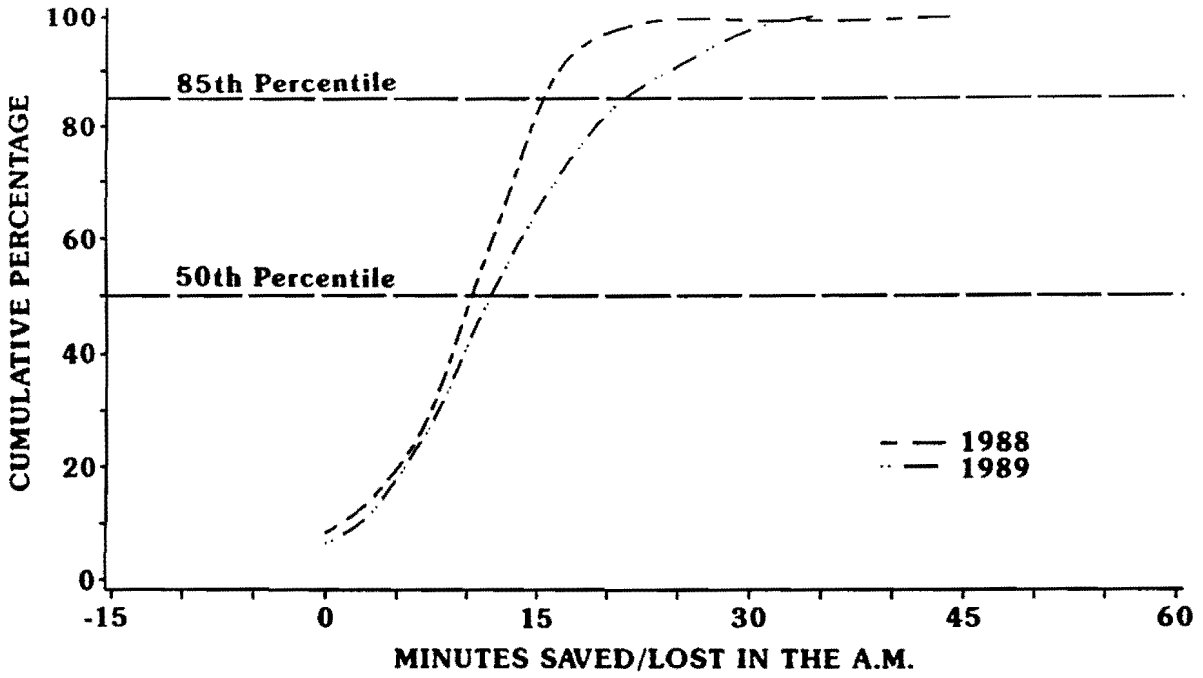


Figure 29.
Perceived Northwest Transitway Travel Time Savings, Northwest Transitway Carpool/Vanpool Surveys



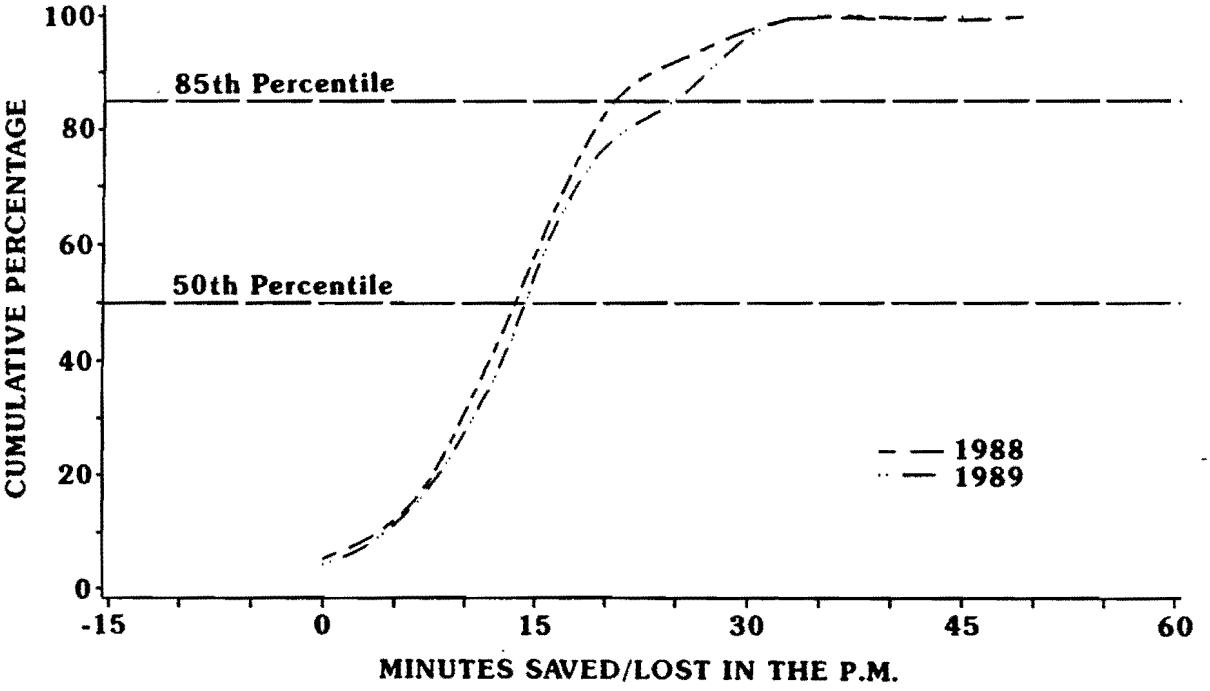


Figure 30.
Perceived Gulf Transitway Travel Time Savings,
Gulf Transitway Carpool/Vanpool Surveys

Table 22.
Perceived Impacts of the Transitway on Travel Time Savings,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Impact	Katy Transitway Carpools/Vanpools					North Transitway Vanpools 1986	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1987	1988	1989		1988	1989	1988	1989
Perceived Transitway Travel Time Savings (minutes)	(n=505)	(n=588)	(n=592)	(n=394)	(n=565)	(n=1595)	(n=256)	(n=245)	(n=121)	(n=121)
a.m. (50th Percentile)	8	10	20	20	20	20	15	15	15	12
p.m. (50th Percentile)	12	17	20	22	20	30	15	15	15	15
Actual Transitway Travel Time Savings (minutes)[1]										
a.m. (6:00-9:30 a.m.)	6.8	3.0	4.4	5.1	7.9	4.2	3.1	-4.6	3.3	3.1
p.m. (3:30-7:00 p.m.)	5.5	4.0	1.0	2.7	1.1	8.0	1.3	-5.7	7.7	-3.1

[1] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI travel time studies*

therefore, do not perceive as great a time savings in the a.m. as in the p.m. Median travel time savings reported by North Transitway vanpools (in 1986) was 20 minutes in the a.m. and 30 minutes in the p.m.

Northwest and Gulf Transitways. On the Northwest and Gulf Transitways, perceived travel time savings in the morning more closely approximate that of the afternoon. Median travel time savings perceived by Northwest Transitway poolers is 15 minutes for the a.m. and p.m.; median savings by Gulf Transitway poolers is 12 minutes in the a.m. and 15 minutes in the p.m.

Perception of Transitway Utilization

One of the primary reasons for permitting carpools to utilize the Katy, Northwest and Gulf Transitways is to maximize both the actual and perceived utilization of the facilities. Carpoolers and vanpoolers were asked whether they felt the transitway is sufficiently utilized to justify the project. Their responses are summarized in Table 23.

As to be expected, on the Katy Transitway, as actual transitway utilization has increased (1985-1987), so has the perception of utilization. In fact, in 1987 when a.m. peak period vehicular utilization was approximately 2400 vehicles, 82% of the poolers surveyed felt the transitway was sufficiently utilized. In 1988 (after the utilization of the transitway was restricted to 3+ vehicles between 6:45 a.m. and 8:15 a.m.), both the actual and perceived utilization of the transitway declined; less than half of those surveyed in 1988 felt the transitway was sufficiently utilized with the 3+ restriction. In 1989, however, both actual and perceived utilization increased; more than three-fourths of the Katy Transitway poolers now feel the transitway is sufficiently utilized to justify the project.

Most recent survey results in the other transitway corridors are also very favorable. Approximately three-fourths of the Northwest and Gulf Transitway carpoolers felt these facilities are sufficiently utilized to justify the projects. Furthermore, 84% of the North

Table 23.
Perception of Transitway Utilization,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Perception	Katy Transitway Carpools/Vanpools					North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985[1]	1986[2]	1987[3]	1988[4]	1989[4]	1986[5]	1988[3]	1989[3]	1988[3]	1989[3]
Is the Transitway Sufficiently Utilized to Justify the Project	(n=534)	(n=622)	(n=606)	(n=371)	(n=570)	(n=1616)	(n=257)	(n=246)	(n=118)	(n=118)
Yes	31%	42%	82%	47%	76%	84%	69%	75%	65%	72%
No	50%	33%	9%	27%	14%	7%	14%	12%	21%	14%
Not sure	19%	25%	9%	26%	10%	9%	17%	13%	14%	14%
Transitway Vehicle Volumes (a.m. peak period)[6]	138	256	2412	2032	2186	394	961	1464	681	1139

[1] *Authorized buses and vanpools only at the time of the 1985 vanpool survey; authorized buses, vanpools and 4+ carpools at the time of the 1985 carpool survey*
[2] *Authorized buses, vanpools and 3+ carpools*
[3] *2+ vehicles, no authorization*
[4] *3+ vehicles, no authorization between 6:45 a.m. and 8:15 a.m.; 2+ vehicles, no authorization at all other times*
[5] *Authorized buses and vanpools*
[6] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI transitway vehicle volume counts*

Transitway vanpoolers felt that transitway is sufficiently utilized even without the presence of carpools on that facility (Table 23).

Comments

During each survey effort, transitway carpoolers and vanpoolers were encouraged to offer additional comments and many did so. Carpooler/vanpooler comments are summarized in Table 24.

Table 24.
Additional Comments,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Comment	Katy Transitway Carpools/Vanpools					North Transitway Vanpools	Northwest Transitway Carpools/Vanpools		Gulf Transitway Carpools/Vanpools	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway is great	7%	20%	51%	24%	16%	16%	28%	18%	23%	15%
Extend the transitway	26%	13%	3%	—	2%	29%	27%	20%	43%	29%
Transitway is underutilized	5%	9%	2%	1%	2%	—	—	1%	—	2%
3-person carpools a good move	6%	2%	—	7%[1]	1%	—	—	—	—	—
Lower carpool occupancy requirement	1%	6%	—	—	—	—	—	—	—	—
Poor transitway entry/exit design	12%	8%	14%	13%	22%	—	11%	20%	8%	12%
Enforce 55 mph minimum speed	—	1%	12%	16%	5%	—	5%	8%	10%	12%
Keep carpool requirement at 2 +	—	—	7%	14%[2]	22%	—	8%	2%	—	1%
Need concrete median barriers entire length of transitway	—	—	—	—	—	8%	—	—	—	—
Allow carpools on transitway	—	—	—	—	—	5%	—	—	—	—
Keep transitway open longer hours	—	—	—	—	—	10%	—	—	—	—
Other	43%	41%	11%	25%	30%	32%	21%	31%	16%	29%

[1] *On this survey, the comment was "3-person carpools between 6:45 and 8:15 a.m. a good move."*
[2] *On this survey, the comment was "return carpool occupancy requirement to 2+ during all hours of operation."*

CHAPTER 4
FREEWAY MOTORIST SURVEYS

Surveys were conducted of motorists using the Katy, North, Northwest and Gulf Freeway mainlanes during the a.m. transitway operating periods. As was the case with the transitway user surveys, the motorist surveys primarily addressed:

- Personal characteristics;
- Travel patterns and trip characteristics; and
- Attitudes and impacts pertaining to the transitways.

Several of the questions contained on the these surveys are similar to questions asked in previous motorist surveys conducted before the Katy, North and Gulf Transitways were opened. When possible, for comparative purposes, data from the previous surveys are also presented in this section. In most instances the "before" and "after" data are similar.

Personal Characteristics

Questions were asked to identify age, sex, occupation and last year of school completed. The responses to these questions are summarized in Tables 25 - 27.

Age

Most recent survey data indicate that the median ages of freeway motorists vary from 36 on the North Freeway (in 1986), to 37 on the Northwest and Gulf Freeways (in 1989), to 40 on the Katy Freeway (in 1989).

Table 25.
Personal Characteristics of Motorists on the Katy Freeway,
Katy Freeway Motorist Surveys

Characteristic	Before Transitway 1984	After Transitway 1985	1986	1987	1988	1989
Age (years)	(n=81)	(n=445)	(n=726)	(n=1422)	(n=1056)	(n=1119)
50th Percentile	32-41	40	40	39	41	40
Sex	(n=81)	(n=437)	(n=706)	(n=1401)	(n=1037)	(n=1096)
Male	56%	64%	66%	62%	65%	61%
Female	44%	36%	34%	38%	35%	39%
Occupation	(n=80)	(n=431)	(n=711)	(n=1365)	(n=1023)	(n=1067)
Professional	39%	51%	42%	41%	44%	45%
Managerial	29%	19%	26%	23%	22%	21%
Clerical	11%	9%	9%	13%	9%	7%
Sales	14%	12%	14%	12%	13%	13%
Craftsman	3%	3%	1%	4%	2%	3%
Service Worker	3%	2%	2%	2%	2%	2%
Student	1%	2%	2%	2%	3%	2%
Other	—	2%	4%	3%	5%	7%
Education (years)	(n=80)	(n=439)	(n=715)	(n=1401)	(n=1048)	(n=1101)
Average	15.0	15.7	15.9	15.5	15.8	15.9

Table 26.
Personal Characteristics of Motorists on the North Freeway,
North Freeway Motorist Surveys

Characteristic	Before Transitway 1981	1984	After Transitway 1986
Age (years)	(n=449)	(n=52)	(n=404)
50th Percentile	40	32-41	36
Sex	(n=460)	(n=52)	(n=400)
Male	80%	56%	61%
Female	20%	44%	39%
Occupation	—	(n=51)	(n=392)
Professional	—	18%	38%
Managerial	—	10%	21%
Clerical	—	39%	15%
Sales	—	0%	13%
Craftsman	—	18%	3%
Service Worker	—	8%	3%
Student	—	2%	3%
Other	—	5%	4%
Education (years)	(n=444)	(n=52)	(n=397)
Average	15.4	14.5	14.8

Table 27.
Personal Characteristics of Motorists on the Northwest and Gulf Freeways,
Northwest and Gulf Freeway Motorist Surveys

Characteristic	Northwest Freeway	Gulf Freeway	
	After Transitway 1989	Before Transitway 1981	After Transitway 1989
Age (years)	(n=1124)	(n=182)	(n=648)
50th Percentile	37	36	37
Sex	(n=1105)	(n=179)	(n=632)
Male	61%	55%	49%
Female	39%	45%	51%
Occupation	(n=1081)	—	(n=625)
Professional	38%	—	30%
Managerial	25%	—	22%
Clerical	14%	—	20%
Sales	11%	—	6%
Craftsman	5%	—	8%
Service Worker	2%	—	3%
Student	1%	—	4%
Other	4%	—	7%
Education (years)	(n=1106)	(n=177)	(n=634)
Average	15.0	13.9	14.2

Sex

The majority (at least 61%) of the Katy, North and Northwest Freeway motorists are male; whereas, a slight majority (51%) of the Gulf Freeway motorists are female.

Occupation

As was the case with the transitway users, the majority of the motorists surveyed in 1985-1989 are employed in occupations which are classified as either "professional" or "managerial."

Education

Generally speaking, motorists traveling on the Katy, North, Northwest and Gulf Freeways are a well educated group. On the average, Katy and Northwest Freeway motorists have completed at least 3 years of college and North and Gulf Freeway users have completed more than 2 years of college.

Travel Patterns and Trip Characteristics

Motorists were asked a series of questions regarding the selection of the auto mode, trip purpose, usual travel mode, trip frequency, vehicle occupancy, trip origin and trip destination. Responses to these questions are highlighted in the following sections.

Trip Origin

Two questions were asked which were related to trip origin. The first requested the home Zip Code; the second asked for the freeway entrance ramp that was used in the a.m. The 1985 Katy Freeway motorist survey was conducted at locations between Campbell and Voss. Because the Katy Transitway had been extended prior to the other surveys, the 1986 - 1989 motorist surveys were conducted at locations between Wilcrest and Barker-Cypress. The North Freeway motorist survey was conducted between Greens Road and FM 1960. The Northwest Freeway motorist survey was performed at locations in the area of FM 529 and the Gulf Freeway motorist survey was conducted at locations between Monroe/SH 3 and Edgebrook.

Katy Freeway. Home Zip Codes listed by Katy Freeway motorists surveyed are summarized in Table 28 and illustrated in Figure 31; a.m. freeway entrance ramps used are also summarized in Table 28.

Table 28.
Characteristics of Trip Origins of Katy Freeway Motorists,
Katy Freeway Motorist Surveys

Characteristic	1985	1986	Spring 1987	Fall 1987	1988	1989
Home Zip Code	(n=444)	(n=729)	(n=944)	(n=1425)	(n=1058)	(n=1127)
77079	20%	35%	34%	24%	41%	40%
77024	12%	3%	3%	1%	1%	1%
77043	9%	9%	8%	6%	7%	6%
77077	7%	21%	20%	12%	14%	13%
77080	7%	1%	1%	0%	0%	1%
77084	6%	3%	3%	10%	7%	12%
77042	6%	9%	12%	3%	4%	3%
77055	5%	1%	—	0%	0%	1%
77450	5%	3%	2%	20%	6%	2%
77082	2%	5%	5%	3%	2%	4%
77449	4%	1%	1%	12%	3%	3%
Other	17%	9%	11%	9%	15%	14%
A.M. Freeway Entrance Ramp	(n=438)	(n=726)	—	(n=1045)	(n=1031)	(n=1099)
Gessner	13%	2%	—	3%	5%	4%
Wilcrest	12%	40%	—	19%	24%	18%
Blalock	10%	1%	—	0%	0%	0%
West Belt	9%	15%	—	—	3%	3%
Dairy Ashford	9%	20%	—	14%	13%	14%
Bunker Hill	9%	1%	—	1%	1%	1%
SH 6	8%	4%	—	5%	15%	24%
Kirkwood	8%	5%	—	12%	22%	21%
Fry Road	6%	3%	—	17%	3%	2%
Mason	4%	1%	—	13%	4%	1%
Barker-Cypress	3%	1%	—	9%	1%	2%
Other	9%	7%	—	7%	9%	10%

Home Zip Codes

Katy Freeway motorists listed 50 different Zip Codes in 1985, 42 in 1986, 70 in 1987, 66 in 1988 and 61 different Zip Codes in 1989. In all 5 survey years, the most commonly listed Zip Code was 77079; between 20% and 41% of the Katy Freeway motorists surveyed reside in this Zip Code area.

A.M. Freeway Entrance Ramps

In 1985-1988, the most common entrance ramp used by motorists to access the Katy Freeway in the a.m. was the Wilcrest ramp. In 1989, however, the SH 6 and Kirkwood ramps were used the most often, with the Wilcrest ramp coming in third. A total of 63% of the motorists responding to the 1989 survey entered at either SH 6, Kirkwood or Wilcrest.

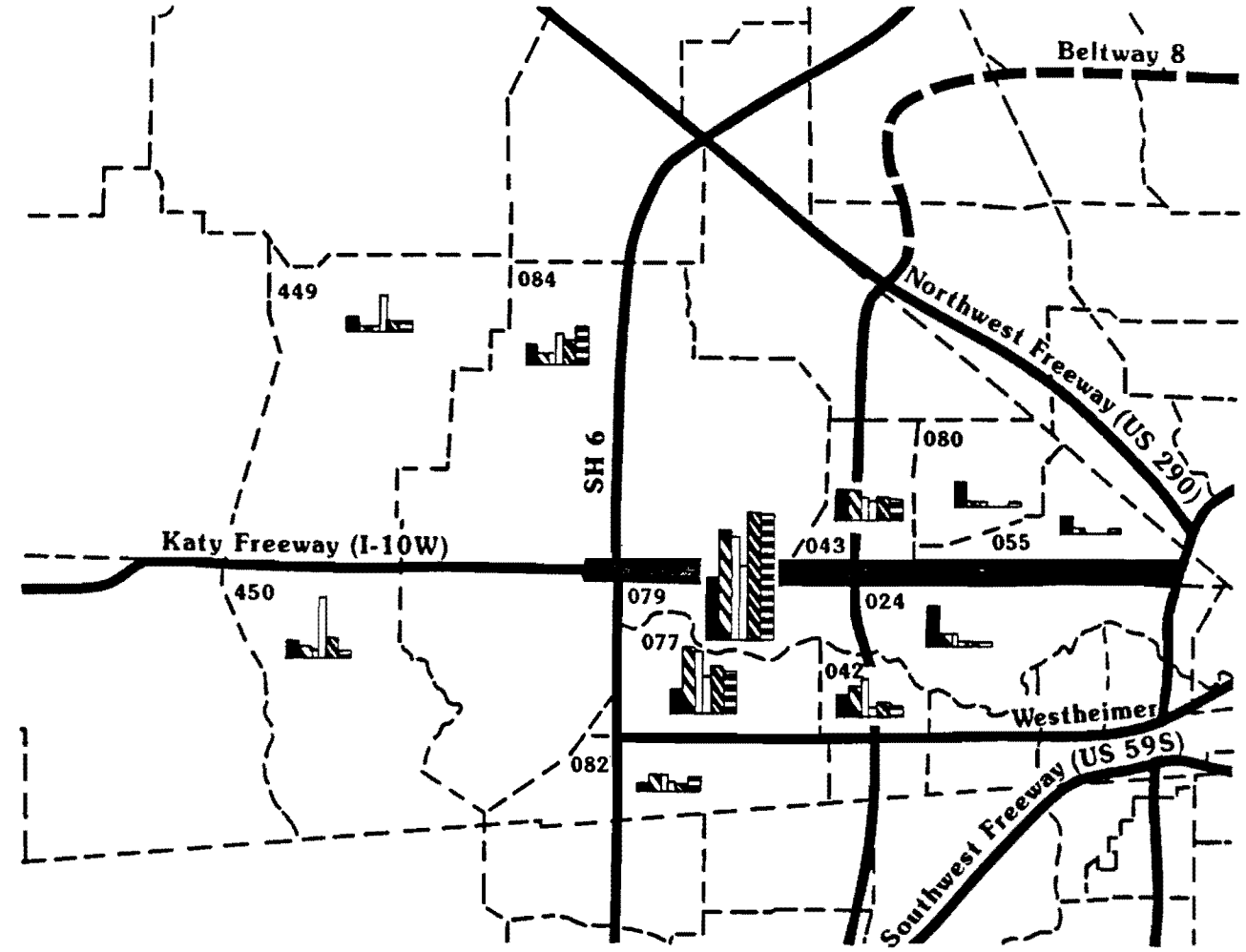


Figure 31.
Home Origins of Katy Freeway Motorists

North Freeway. Home Zip Code data and a.m. freeway entrance ramps used by North Freeway motorists are summarized in Table 29; North Freeway motorist home Zip Code data are also presented graphically in Figure 32.

Home Zip Codes

A total of 65 different Zip Codes were listed by North Freeway motorists. The most frequently listed North Freeway area Zip Codes were 77090 and 77067.

A.M. Freeway Entrance Ramps

The most common entrance ramps used by motorists entering the North Freeway in the morning were FM 1960, FM 149 and Greens Road.

Table 29.
Characteristics of Trip Origins of North Freeway Motorists, North Freeway Motorist Survey

Characteristic	1986
Home Zip Code	(n=407)
77090	14%
77067	13%
77373	10%
77073	8%
77088	5%
77060	5%
77070	5%
77379	3%
77069	3%
Other	34%
A.M. Freeway Entrance Ramp	(n=406)
FM 1960	32%
FM 149	21%
Greens Road	16%
Kuykendahl	5%
North Belt	4%
West Belt	3%
FM 2920	3%
Hidden Valley	3%
Other	13%

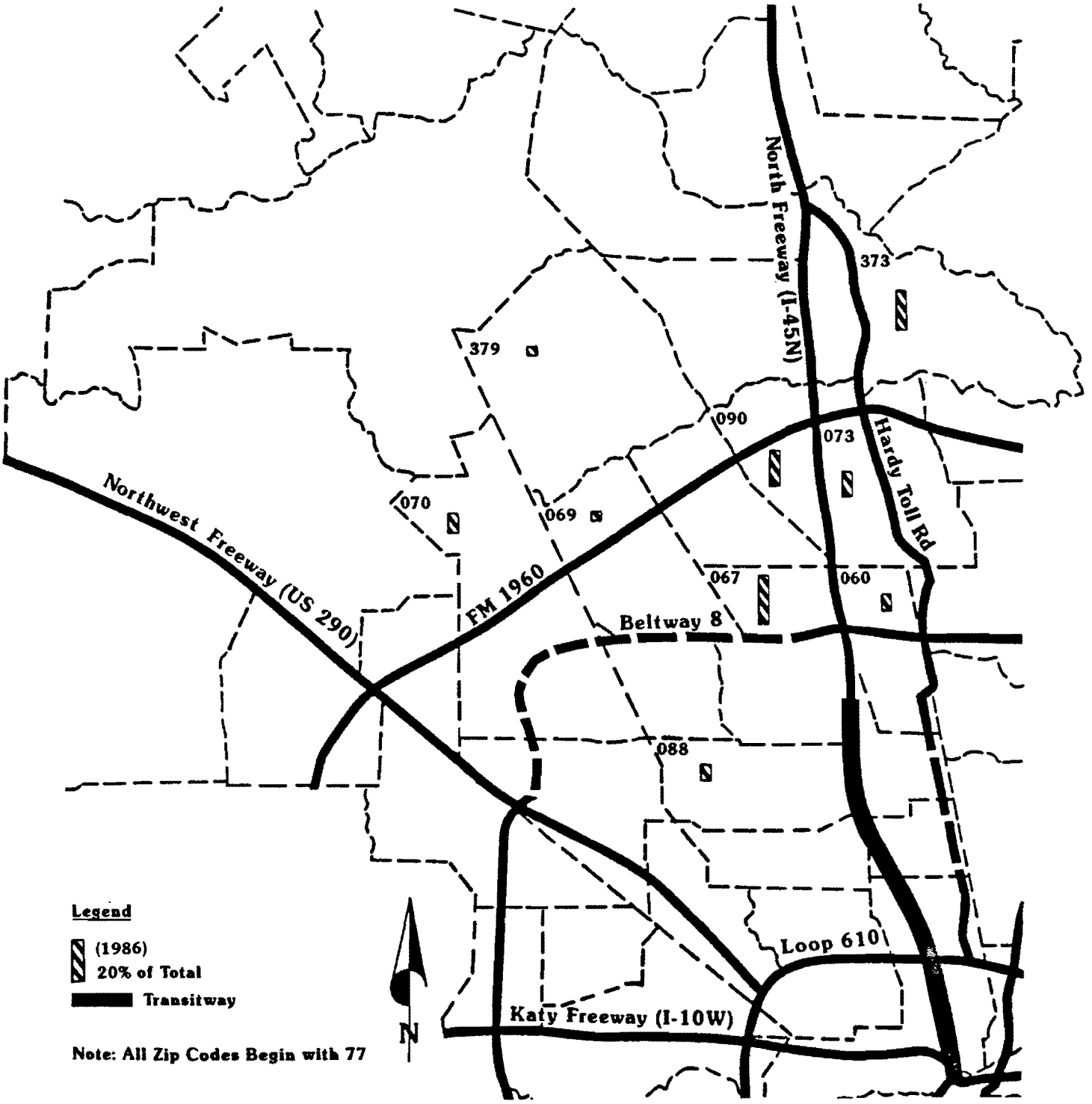


Figure 32.
Home Origins of North Freeway Motorists

Northwest Freeway. Home Zip Codes of North Freeway motorists are summarized in Table 30 and illustrated in Figure 31; a.m. freeway entrance ramps used by motorists are outlined in Table 30.

Home Zip Codes

Although the Northwest Freeway motorists listed 55 different Zip Codes, more than half resided in one of three Zip Code areas: 77429, 77065 or 77095.

A.M. Freeway Entrance Ramps

The Jones Road and Huffmeister entrance ramps were the two most commonly used to gain access to the Northwest Freeway in the morning.

Table 30.
Characteristics of Trip Origins of Northwest Freeway Motorists,
Northwest Freeway Motorist Survey

Characteristic	1989
Home Zip Code	(n = 1129)
77429	19%
77065	19%
77095	18%
77064	14%
77070	10%
Other	20%
A.M. Freeway Entrance Ramp	(n = 1077)
Jones Road	18%
Huffmeister	18%
SH 6/FM 1960	12%
West Road	10%
Telge Road	8%
Eldridge	7%
Little York	7%
Other	20%

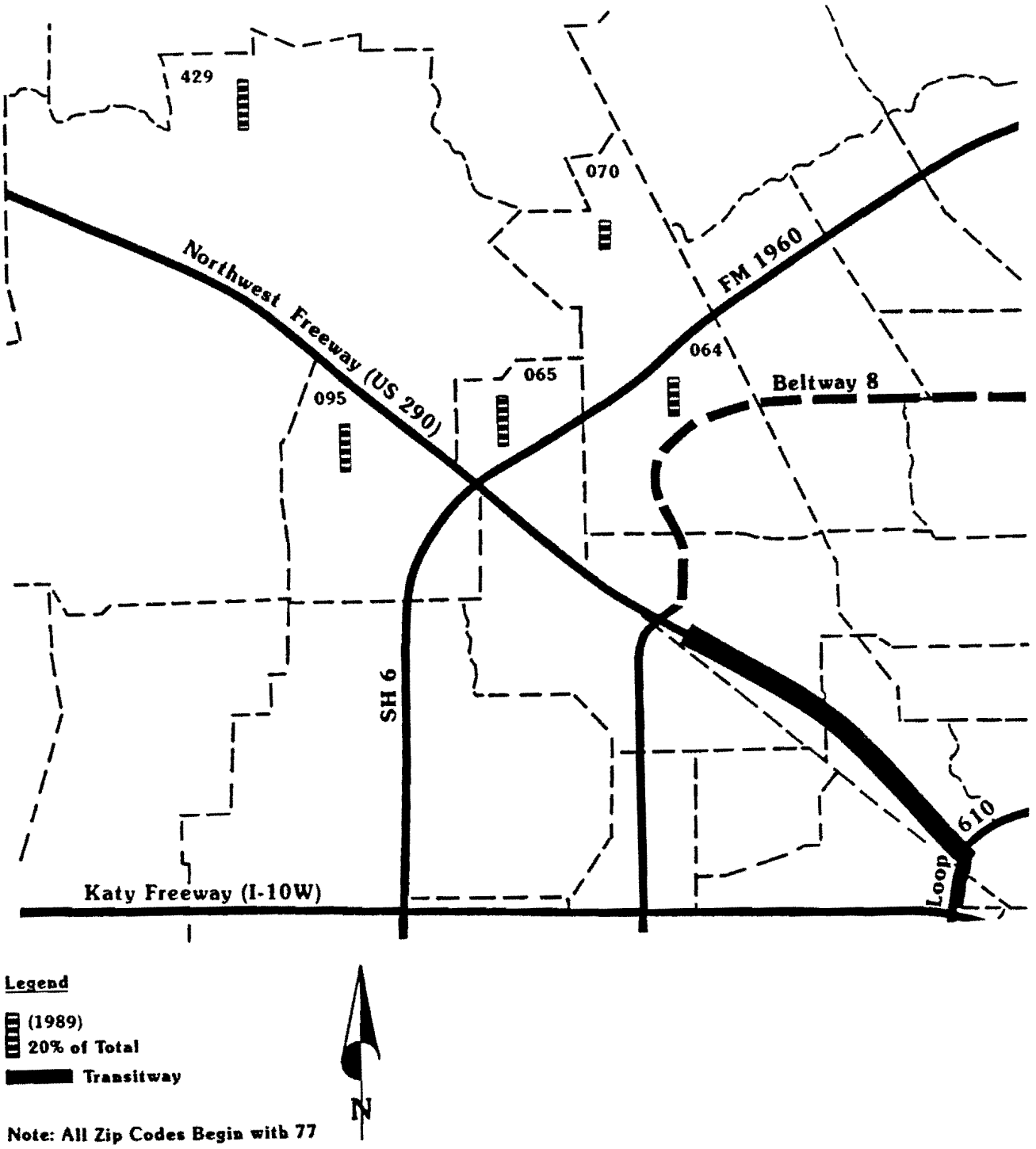


Figure 33.
Home Origins of Northwest Freeway Motorists

Gulf Freeway. Home Zip Codes of Gulf Freeway motorists are illustrated in Figure 34 and summarized in Table 31.

Home Zip Codes

Sixty-five different home Zip Code areas were listed by motorists traveling the Gulf Freeway; 31% of those responding listed 77034 as their home Zip Code.

A.M. Freeway Entrance Ramp

More than half of the Gulf Freeway motorists typically enter the freeway at either Edgebrook or Monroe in the mornings (Table 31).

Table 31.
Characteristics of Trip Origins of Gulf Freeway Motorists, Gulf Freeway Motorist Survey

Characteristic	1989
Home Zip Code	(n=647)
77034	31%
77075	14%
77089	14%
77504	5%
77587	4%
77062	4%
Other	28%
A.M. Freeway Entrance Ramp	(n=633)
Edgebrook	37%
Monroe	20%
College-Airport	8%
FM 3251	4%
Fuqua	4%
Almeda-Genoa	4%
El Dorado	2%
Other	21%

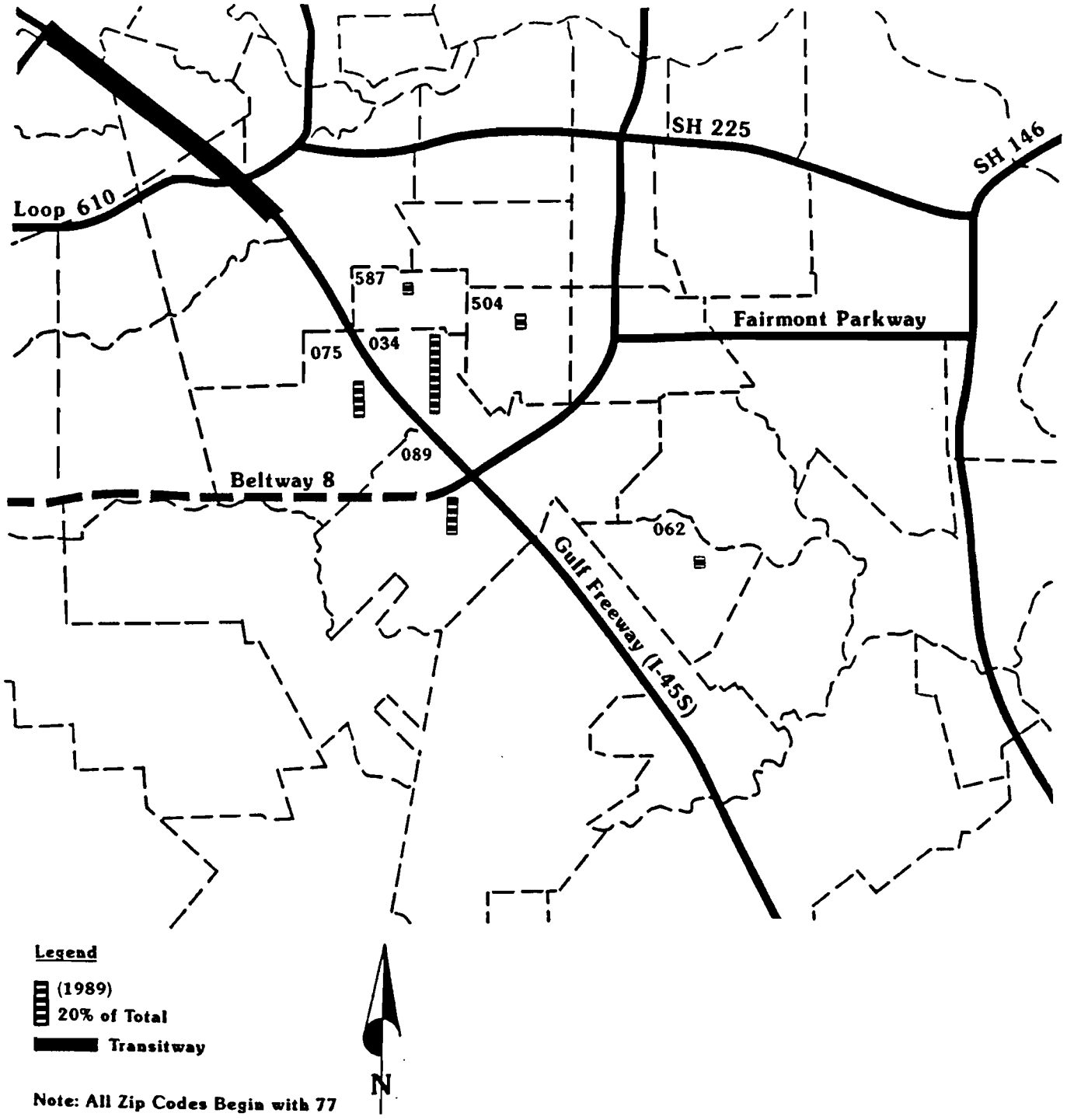


Figure 34.
Home Origins of Gulf Freeway Motorists

Trip Purpose

Trip purpose data for the transitway motorists are presented in Table 32. As was the case with the transit and carpool/vanpool surveys, the vast majority of peak period motorist trips are work trips.

Trip Frequency

At least three-fourths of the freeway motorist trips surveyed occurred 5 or more days per week (Table 32).

Vehicle Occupancy

On the Katy Freeway, peak period vehicle occupancies (persons per vehicle) averaged 1.2 all 5 survey years (1985-1989). On the North, Northwest and Gulf Freeways, vehicle occupancies also averaged 1.2 persons per vehicle (Table 32).

Reasons for Choosing the Auto Mode

The reasons most often given for using an auto in the mixed-flow lanes of the freeway rather than a high-occupancy vehicle in the transitway are summarized in Tables 33 and 34.

In general, most individuals stated they used an auto because of the following reasons: 1) need car for job; 2) convenience and flexibility; 3) no convenient bus, carpool or vanpool available; and 4) work irregular hours. Furthermore, of those freeway motorists surveyed between 1985 and 1989, at least 85% drove alone on a regular basis (Tables 33 and 34).

Table 32.
Trip Characteristics of Motorists on the Katy, North, Northwest and Gulf Freeways,
Katy, North, Northwest and Gulf Freeway Motorist Surveys

Characteristic	Katy Freeway						North Freeway 1986	Northwest Freeway 1989	Gulf Freeway 1989
	1985	1986	Spring 1987	Fall 1987	1988	1989			
Trip Purpose	(n=451)	(n=741)	(n=950)	(n=1431)	(n=1064)	(n=1131)	(n=425)	(n=1122)	(n=655)
Work	94%	91%	90%	92%	90%	86%	90%	95%	87%
School	3%	2%	3%	3%	4%	3%	3%	2%	4%
Other	3%	7%	7%	5%	6%	11%	7%	3%	9%
Trip Frequency (days/week)	(n=442)	(n=722)	—	(n=1417)	(n=1049)	(n=1110)	(n=415)	(n=1115)	(n=644)
0-1	5%	6%	—	9%	7%	9%	9%	3%	6%
2	4%	3%	—	3%	4%	4%	2%	1%	2%
3	3%	3%	—	3%	5%	5%	3%	2%	4%
4	4%	4%	—	2%	4%	4%	3%	2%	2%
5 or more	84%	84%	—	83%	80%	78%	83%	92%	86%
Vehicle Occupancy (persons/vehicle)	(n=445)	(n=734)	—	(n=1434)	(n=1065)	(n=1133)	(n=420)	(n=1131)	(n=654)
1	83%	89%	—	84%	87%	84%	84%	84%	83%
2	12%	7%	—	13%	10%	12%	13%	13%	14%
3	3%	2%	—	2%	2%	2%	2%	3%	2%
4 or more	2%	2%	—	1%	1%	2%	1%	0%	1%
Average	1.2	1.2	—	1.2	1.2	1.2	1.2	1.2	1.2

Table 33.
Reasons for Selecting the Auto Mode,
Katy Freeway Motorist Surveys

Characteristic	Before Transitway 1984	After Transitway 1985	1986	1987	1988	1989
Why Did You Choose Auto[1]	—	(n=564)	(n=838)	(n=2121)	(n=1655)	(n=1776)
Need car for job	—	22%	25%	21%	23%	24%
Convenience/flexibility	—	17%	26%	21%	23%	21%
No bus/carpool/vanpool available	—	22%	21%	18%	18%	16%
Work odd hours	—	10%	10%	25%	24%	22%
Don't work in CBD	—	6%	3%	8%	7%	4%
Other	—	23%	15%	7%	5%	13%
Usual Mode of Travel	(n=81)	(n=445)	(n=738)	(n=1424)	(n=1053)	(n=1122)
Drive alone	83%	88%	90%	85%	91%	89%
Carpool	10%	8%	6%	12%	8%	9%
Vanpool	6%	1%	1%	0%	0%	0%
Other	1%	3%	3%	3%	1%	2%

[1] *Respondents were able to give more than one reason. Thus, the "n" value refers to the number of reasons given, not the number of surveys completed.*

Table 34.
Reasons for Selecting the Auto Travel Mode,
North, Northwest and Gulf Freeway Motorist Surveys

Characteristic	North Freeway Before Transitway 1981	North Freeway Before Transitway 1984	North Freeway After Transitway 1986	Northwest Freeway After Transitway 1989	Gulf Freeway After Transitway 1989
Why Did You Choose Auto[1]	—	—	(n=498)	(n=1629)	(n=934)
Need car for job	—	—	15%	19%	17%
Convenience/flexibility	—	—	16%	22%	27%
No bus/vanpool available	—	—	20%	21%	20%
Work odd hours	—	—	9%	21%	21%
Don't work in CBD	—	—	7%	5%	3%
Other	—	—	33%	12%	12%
Usual Mode of Travel	(n=482)	(n=52)	(n=423)	(n=1130)	(n=651)
Drive alone	56%	58%	87%	85%	88%
Carpool	15%	27%	8%	13%	9%
Vanpool	11%	9%	1%	0%	0%
Other	19%	6%	4%	2%	3%

[1] *Respondents were able to give more than one reason. Thus, the "n" value refers to the number of reasons given not the number of surveys completed.*

Trip Destination

Although the downtown area was the predominant destination for transitway users, less than 40% of the motorists surveyed on the Katy, North, Northwest and Gulf Freeways

are destined to downtown (Table 35). In fact, only 17% of those traveling on the Northwest Freeway, 28% of those on the Katy and Gulf Freeways and 31% of those using the North Freeway reported downtown trip destinations. A significant number of trips are also destined to the Galleria, Greenway Plaza and the Texas Medical Center.

Attitudes and Impacts Pertaining to the Transitways

A final set of survey questions was designed to identify attitudes towards the transitways.

Perception of Transitway Utilization

The perception of whether or not the transitways are sufficiently utilized is a major concern of METRO and the SDHPT. This is particularly true of the Katy Transitway since fewer than 150 vehicles per peak period used the priority lane during its first 6 months of operation.

Katy, North, Northwest and Gulf Freeway motorists were asked whether, in terms of both person movement and vehicle movement, they felt the transitway was sufficiently utilized. Their responses are summarized in Table 36. On the Katy Freeway, the responses were overwhelmingly negative -- both before and one year after carpools were allowed (no carpools were present on the transitway at the time of the 1985 survey; approximately 100 carpools typically used the transitway at the time of the 1986 survey). Responses from Katy Freeway motorists were significantly more favorable in 1987, however.

In the spring of 1987, 36% of the Katy Freeway motorists felt the transitway was sufficiently utilized in terms of vehicle movement and 30% thought it was sufficiently utilized in terms of person movement. In the fall of 1987, 44% of the motorist felt there was sufficient vehicle utilization of the transitway and 36% stated there was sufficient person

Table 35.
A.M. Trip Destination of Motorists on the Katy, North, Northwest and Gulf Freeways,
Katy, North, Northwest and Gulf Freeway Motorist Surveys

Trip Destination	Katy Freeway						North Freeway	Northwest Freeway	Gulf Freeway
	1985	1986	Spring 1987	Fall 1987	1988	1989	1986	1989	1989
	(n=302)	(n=728)	(n=944)	(n=1418)	(n=1056)	(n=1126)	(n=421)	(n=1118)	(n=648)
Downtown	38%	33%	34%	23%	30%	28%	31%	17%	28%
Galleria	24%	10%	14%	13%	12%	13%	7%	19%	9%
Greenway Plaza	8%	4%	3%	5%	4%	4%	4%	4%	5%
Texas Medical Center	9%	3%	4%	3%	4%	4%	4%	4%	9%
Other	21%	50%	45%	56%	50%	51%	54%	56%	49%

Table 36.
Perceptions of Utilization and Desirability of Transitway Improvement, Katy, North, Northwest and Gulf Freeway Motorist Surveys

Measure of Effectiveness or Success	Katy Freeway						North Freeway	Northwest Freeway	Gulf Freeway
	1985[1]	1986[2]	Spring 1987[3]	Fall 1987[3]	1988[4]	1989[4]	1986[5]	1989[3]	1989[3]
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=1123)	(n=418)	(n=1109)	(n=643)
Yes	3%	3%	36%	44%	31%	30%	26%	22%	21%
No	90%	92%	55%	42%	55%	53%	56%	58%	61%
Not sure	7%	5%	9%	14%	14%	17%	18%	20%	18%
Transitway Vehicle Volumes (A.M. Peak Period)[6]	138	256	2412	2854	2032	2186	393	1463	1139
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=1126)	(n=422)	(n=1121)	(n=652)
Yes	4%	4%	30%	36%	24%	26%	23%	19%	21%
No	85%	86%	58%	46%	58%	54%	57%	57%	55%
Not sure	11%	10%	12%	18%	18%	20%	20%	24%	24%
Transitway Persons Moved (A.M. Peak Period)[6]	2456	3156	7769	8599	7210	7801	6647	4098	3956
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=1110)	(n=417)	(n=1109)	(n=647)
Yes	41%	36%	56%	64%	64%	66%	62%	71%	63%
No	35%	43%	29%	20%	22%	20%	20%	13%	21%
Not sure	24%	21%	15%	16%	14%	14%	18%	16%	16%

[1] *Authorized buses and vanpools (before carpools were allowed)*
[2] *Authorized buses, vanpools and 3+ carpools*
[3] *2+ vehicles, no authorization*
[4] *3+ vehicles, no authorization between 6:45 a.m. and 8:15 a.m., 2+ vehicles, no authorization at all other times*
[5] *Authorized buses and vanpools*
[6] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI transitway vehicle volume and occupancy counts*

utilization. (Note: By the time of the 1987 surveys, the passenger requirement for carpools had been lowered to 2 persons. Carpool utilization of the transitway averaged just under 2300 vehicles during the a.m. peak at the time of the spring 1987 survey and more than 2700 vehicles at the time of the fall 1987 survey.)

By the time of the 1988 survey, however, both actual and perceived utilization of the Katy Transitway had declined. In 1988, less than one-third of the Katy Freeway motorists felt the transitway was sufficiently utilized in terms of vehicle movement and less than one-fourth thought a sufficient number of persons was being transported (Table 36).

At the time of the 1989 survey, utilization of the transitway had increased only slightly from the 1988 level and the perception of utilization remained virtually the same.

On the North Freeway, 26% of the motorists perceived there was sufficient person utilization of the transitway and 23% stated there was sufficient vehicle utilization. On the Northwest and Gulf Freeways, approximately one-fifth of the motorists felt there was sufficient person and vehicular utilization of the respective transitways.

Motorists in each freeway corridor were also asked if they felt the transitway is a good transportation improvement. The percentage of Katy Freeway motorists who responded "yes" fluctuated from a low of 36% in 1986 to a high of 66% in 1989. In the other freeway corridors, 62% of the North Freeway motorists, 63% of the Gulf Freeway motorists and 71% of the Northwest Freeway motorists indicated that the transitway in their area is a good transportation improvement.

Comments

Motorists traveling Katy, North, Northwest and Gulf Freeways were encouraged to offer comments. A summary of the comments received is presented in Table 37.

Table 37.
Additional Comments,
Katy, North, Northwest and Gulf Freeway Motorist Surveys

Comment	Katy Freeway						North Freeway 1986	Northwest Freeway 1989	Gulf Freeway 1989
	1985	1986	Spring 1987	Fall 1987	1988	1989			
Transitway is a waste of money	14%	13%	10%	4%	5%	5%	3%	4%	6%
Transitway is underutilized	12%	20%	9%	4%	9%	5%	6%	6%	7%
Open transitway to all	8%	6%	10%	7%	5%	6%	6%	5%	4%
Allow carpools on transitway	7%	5%[1]	6%[2]	3%[2]	10%[3]	12%[3]	10%	1%[3]	0%[3]
Ban/restrict trucks on freeway	5%	4%	2%	2%	4%	2%	2%	0%	1%
Transitway is a good idea	5%	6%	12%	16%	8%	11%	11%	16%	12%
Need more freeway lanes	4%	10%	9%	9%	10%	9%	5%	3%	5%
Provide more bus routes	3%	3%	2%	3%	4%	4%	3%	9%	5%
Congestion on freeway no better	3%	5%	4%	3%	9%[4]	6%[4]	5%	4%	4%
Poor transitway entry/exit design	0%	0%	9%	17%	18%	13%	—	8%	7%
Promote transitway & ridesharing	3%	2%	2%	2%	1%	2%	—	4%	4%
Complete freeway/transitway const.	—	—	—	—	—	1%	8%	20%	11%
Extend/expand transitway	1%	1%	—	—	—	0%	1%	1%	6%
Need a rail system	0%	0%	0%	0%	0%	3%	4%	1%	4%
Other	35%	25%	25%	30%	17%	21%	36%	18%	24%

[1] *Allow 2+ carpools on transitway*
[2] *Allowing 2+ carpools on transitway is a good move*
[3] *Allow 2+ carpools on all transitways at all times*
[4] *Congestion on freeway is worse since transitway is limited to 3+ vehicles between 6:45 a.m. and 8:15 a.m.*

CHAPTER 5
SUMMARY OF MAJOR FINDINGS AS OF OCTOBER 1989

In October 1984, the first of Houston's transitways opened along the Katy Freeway. At the time the Katy Transitway opened, only buses and 8+ vanpools authorized by METRO and the SDHPT were allowed to use the priority lane. To address a perception that the transitway was underutilized, authorized 4+ carpools were allowed to begin using the facility in April 1985. Six months later (October 1985), authorized 3+ carpools were permitted to use the transitway. In August 1986, the minimum passenger requirement for vehicles was lowered to 2 persons and all authorization requirements were eliminated. By the fall of 1988, however, a.m. peak-hour vehicle volumes were exceeding capacity. As a result, the minimum carpool passenger occupancy requirement was raised from 2 to 3 persons between 6:45 a.m. and 8:15 a.m. effective October 17, 1988; 2-person carpools are still permitted to use the facility during all other operating hours.

In addition to changes in the types of vehicles which have been permitted to use the transitway, there have also been changes in the Katy Transitway configuration. When the transitway opened in October 1984, it extended from Post Oak to Gessner, a distance of 4.7 miles. The only access point on the western terminus was at Gessner. In May 1985, the transitway was extended 1.7 miles from Gessner to West Belt and an additional access point was temporarily provided at West Belt. By June 1987, the transitway had been extended from West Belt to SH 6, a distance of 5.1 miles. The West Belt access point was closed and two additional access points were opened -- a flyover ramp which provided a direct link to/from the Addicks Park-and-Ride Lot and an access point located just west of SH 6.

Because of the changing conditions on the Katy Transitway and the changes in the types of vehicles which were permitted to use the facility, several survey efforts were performed in order to assess the impacts of these changes.

In the North Freeway corridor, the North Transitway replaced the North Freeway Contraflow Lane in November 1984. The North Transitway extends from downtown to North Shepherd, a distance of 9.6 miles. Access from the north is via one of two points. Since the North Transitway opened, usage has been limited to buses and authorized 8+ vanpools. Because the operating conditions have remained relatively stable on the North Transitway, no additional surveys have been performed since the 1986 effort.

Because of the success of permitting carpools on the Katy Transitway, the decision was made to permit 2+ carpools on the Gulf and Northwest Transitways when they become operational in May 1988 and August 1988, respectively. The Northwest Transitway extends from Little York to the Northwest Transit Center, a distance of 9.5 miles. Access to the transitway from the northwest is possible from one of three points: 1) the Little York flyover ramp; 2) the Pinemont flyover ramp; or 3) the Dacoma entrance.

The Gulf Transitway extends from Broadway to downtown, a distance of 6.5 miles. This facility may be accessed from the southeast via the Broadway ramp, from the South Loop (I-610) ramp or by using the Eastwood (Lockwood) ramp. Survey efforts along the Gulf and Northwest Transitway corridors were performed in 1988 and 1989.

The preceding chapters of this report present considerable data derived from surveys of both transitway users and nonusers in the transitway corridors. Those data are cross-classified in a variety of manners. For the purposes of this study, perhaps the most important are the data that relate to trip destination, choice of commuting mode and perceptions of the transitways.

Trip Destinations

During the a.m. peak period, less than half of the total trips (transitway user and nonuser) are destined to downtown Houston (Table 38). Yet, essentially all bus service caters to trips downtown. Vanpools and carpools continue to demonstrate more capability

Table 38.
Trip Destinations of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1989

A.M. Trip Destination	Katy Corridor					North Corridor	Northwest Corridor		Gulf Corridor	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=357)	(n=575)	(n=632)	(n=776)	(n=641)	(n=1252)	—	(n=215)	—	(n=464)
Downtown	96%	95%	94%	97%	94%	94%	—	97%	—	86%
Galleria	—	0%	1%	0%	2%	1%	—	—	—	1%
Greenway Plaza	1%	1%	1%	1%	1%	1%	—	2%	—	5%
Texas Medical Center	0%	0%	1%	0%	0%	2%	—	—	—	0%
Other	3%	4%	3%	2%	3%	2%	—	1%	—	8%
Transitway Carpools/Vanpools	(n=95)	(n=123)	(n=597)	(n=404)	(n=567)	(n=199)	(n=268)	(n=250)	(n=123)	(n=122)
Downtown	57%	55%	39%	42%	39%	61%	38%	41%	81%	78%
Galleria	12%	14%	22%	19%	20%	7%	26%	22%	9%	6%
Greenway Plaza	6%	2%	6%	3%	5%	8%	4%	4%	3%	1%
Texas Medical Center	4%	5%	5%	5%	5%	4%	4%	2%	—	4%
Other	2%	25%	28%	31%	31%	20%	28%	31%	7%	11%
Freeway Motorists	(n=302)	(n=728)	(n=1418)	(n=1056)	(n=1126)	(n=1126)	—	(n=1118)	—	(n=648)
Downtown	38%	33%	23%	30%	28%	28%	—	17%	—	28%
Galleria	24%	10%	13%	12%	13%	13%	—	19%	—	9%
Greenway Plaza	8%	4%	5%	4%	4%	4%	—	4%	—	5%
Texas Medical Center	9%	3%	3%	4%	4%	4%	—	4%	—	9%
Other	21%	50%	56%	50%	51%	51%	—	56%	—	49%

of serving trips to destinations other than downtown. In fact, 59% of the 1989 Northwest Transitway carpool/vanpool trips and 61% of the Katy Transitway carpool/vanpool trips were destined to locations other than downtown.

Mode Choice Considerations

Previous Mode of Travel

One of the primary reasons for implementing the transitways is to influence mode choice decisions. By offering an attractive alternative to traveling in heavily congested freeway mainlanes, it is hoped that the transitways will: 1) encourage drivers of single-occupant vehicles on the freeway to switch to a high-occupancy vehicle on the transitway; and 2) encourage commuters making new trips in the corridor to choose a transitway mode. In looking at the previous travel modes of the transitway users, significant percentages reported that they either drove alone or did not make the trip prior to using the transitway (Table 39).

A review of the most current survey data from each corridor shows that in the Katy Freeway corridor, 37% of the transitway bus users and 51% of the carpoolers and vanpoolers previously drove alone. An additional 29% of the bus riders and 11% of the carpoolers and vanpoolers did not make the trip prior to using the transitway.

In the North Freeway corridor, 35% of the transitway bus users and 30% of the vanpoolers drove alone prior to using a transitway mode. In addition, 25% of bus trips and 23% of the vanpool trips were new trips made on the transitway. Similar trends were also observed in the other two freeway corridors. A total of 64% of the bus users and almost half of the carpoolers/vanpoolers using the Northwest Transitway either previously drove alone or didn't make the trip prior to using the transitway; and 56% of the bus users and 45% of the poolers on the Gulf Transitway previously drove alone or didn't make the trip.

Table 39.
Previous Travel Mode of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1989

Previous Travel Mode	Katy Corridor					North Corridor	Northwest Corridor		Gulf Corridor	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=255)	(n=573)	(n=630)	(n=771)	(n=631)	(n=1240)	—	(n=214)	—	(n=457)
Drove alone	24%	35%	34%	38%	37%	35%	—	46%	—	38%
Carpool	5%	5%	9%	9%	10%	10%	—	9%	—	8%
Vanpool	4%	6%	2%	4%	4%	7%	—	3%	—	6%
Bus	43%	34%	38%	37%	20%	29%	—	21%	—	30%
Didn't make trip	12%	18%	21%	28%	29%	25%	—	18%	—	18%
Transitway Carpoolers/Vanpoolers	(n=549)	(n=624)	(n=588)	(n=391)	(n=552)	(n=1622)	(n=239)	(n=242)	(n=97)	(n=117)
Drove alone	36%	39%	50%	45%	51%	30%	34%	43%	28%	40%
Carpool	22%	17%	29%	33%	26%	21%	60%	45%	5%	44%
Vanpool	12%	9%	3%	3%	4%	12%	1%	3%	6%	7%
Bus	13%	13%	9%	7%	8%	14%	4%	4%	5%	4%
Didn't make trip	17%	22%	9%	12%	11%	23%	1%	5%	8%	5%
Freeway Motorists[1]	(n=445)	(n=738)	(n=1424)	(n=1053)	(n=1122)	(n=423)	—	(n=1130)	—	(n=651)
Drive alone	88%	90%	85%	91%	89%	87%	—	85%	—	88%
Carpool	8%	6%	12%	8%	9%	8%	—	13%	—	9%
Vanpool	1%	1%	0%	0%	0%	1%	—	0%	—	0%
Other	3%	3%	3%	1%	2%	4%	—	2%	—	3%

[1] *For the motorists, this is the current mode they normally use.*

A major concern of permitting carpools (particularly 2-person carpools) to use the transitways was that they would simply attract riders from buses or vans, thereby moving no more people but requiring many more vehicles. Such does not appear to be the case, however; recent data show that only 6% of the Gulf Transitway carpoolers, 7% of the Northwest Transitway carpoolers, and 11% of the Katy Transitway carpoolers formerly used vans or buses.

Impacts of the Transitways on Mode Choice

From all appearances, the Katy, North, Northwest and Gulf Transitways have had a definite effect on mode choice (Table 40). While sizable percentages of the transitway users indicated that they would be using their current mode even if there was no transitway, more than one-third of the current Katy Transitway users said they would not.

On the North Transitway, 27% of the vanpoolers and 41% of the bus riders stated they would not be using their current mode if not for the transitway. In addition, 39% of the Northwest Transitway bus riders and 30% of the carpoolers and vanpoolers on that lane would not be using their current mode if not for the transitway and at least 20% of the Gulf Transitway users would not riding in buses, carpools, or vanpools if not for that transitway. Accordingly, it follows that the transitways can be credited with encouraging individuals to switch travel modes.

Perceived Transitway Travel Time Savings

One of the primary reasons for implementing the transitways is to offer riders of high-occupancy vehicles a travel time advantage and travel time reliability over traveling in the regular freeway lanes. Transitway users generally do perceive a travel time savings as a result of being able to use a priority lane (Table 41).

Table 40.
Use of Current Mode by Transitway Users if Transitway Had Not Opened, 1985-1989

Use Current Mode if No Transitway	Katy Transitway					North Transitway	Northwest Transitway		Gulf Transitway	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Transitway Bus Users	(n=356)	(n=575)	(n=629)	(n=773)	(n=641)	(n=1247)	—	(n=215)	—	(n=457)
Yes	69%	43%	52%	35%	32%	23%	—	41%	—	56%
No	15%	26%	20%	33%	36%	41%	—	39%	—	22%
Not sure	16%	31%	28%	32%	32%	36%	—	20%	—	22%
Transitway Carpoolers/Vanpoolers	(n=551)	(n=633)	(n=588)	(n=398)	(n=559)	(n=1632)	(n=255)	(n=247)	(n=122)	(n=120)
Yes	84%	68%	50%	54%	42%	43%	70%	52%	54%	68%
No	8%	16%	37%	35%	42%	27%	21%	30%	14%	20%
Not sure	8%	16%	13%	11%	16%	39%	9%	18%	11%	12%

Table 41.
Perceived Transitway Travel Time Savings, 1985-1989

Travel Time Savings	Katy Transitway					North Transitway	Northwest Transitway		Gulf Transitway	
	1985	1986	1987	1988	1989	1986	1988	1989	1988	1989
Perceived Transitway Travel Time Savings (minutes)										
Transitway Bus Users	(n=328)	(n=530)	(n=590)	(n=726)	(n=588)	(n=1147)	—	(n=115)	—	(n=386)
a.m. (50th Percentile)	9	15	15	20	20	20	—	15	—	10
p.m. (50th Percentile)	13	20	15	20	20	25	—	15	—	15
Transitway Carpoolers/Vanpoolers	(n=505)	(n=588)	(n=592)	(n=394)	(n=245)	(n=1595)	(n=256)	(n=245)	(n=121)	(n=121)
a.m. (50th Percentile)	8	10	20	20	15	20	15	15	15	12
p.m. (50th Percentile)	12	17	20	22	15	30	15	15	15	15
Actual Peak Period Transitway Travel Time Savings (minutes)[1]										
a.m. (6:00-9:30 a.m.)	6.8	3.0	4.4	5.1	7.9	4.2	3.1	-4.6	3.3	3.1
p.m. (3:30-7:00 p.m.)	5.5	4.0	1.0	2.7	1.1	8.0	1.3	-5.7	7.7	-3.1

[1] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI travel time studies*

In the Katy Transitway corridor, the median travel time savings by current bus, carpool and vanpool users is 20 minutes in both the a.m. and p.m.

North Transitway users also perceive a significant travel time savings. Median travel time savings reported by bus users is 20 minutes in the a.m. and 25 minutes in the p.m. Vanpoolers generally perceive a 20-minute savings in the a.m. and a 30-minute savings in the p.m.

Median travel time savings reported by Northwest Transitway bus users, carpoolers and vanpoolers is 15 minutes in the a.m. and p.m. In the Gulf corridor, transitway users also perceive a 15-minute travel time savings in the p.m. with an a.m. savings in the range of 10 to 12 minutes.

Motorists' Attitudes Concerning the Transitways

In the North, Northwest, and Gulf Freeway corridors, less than one-third of the motorists traveling on the freeway mainlanes (non transitway users) felt the transitways are sufficiently utilized to justify the projects. Nevertheless, between 62% and 71% of the motorist did feel the transitways are good transportation improvements.

In the Katy Freeway corridor, as transitway utilization has increased, acceptance of the transitway by the freeway motorists has also increased significantly (Table 42). In 1985 (before carpools were allowed on the transitway) and again in 1986 (when only authorized 3+ carpool were permitted on the lane), only 3% of the non transitway motorists felt the lane was sufficiently utilized to justify the project. However, by the fall of 1987 (after 2+ unauthorized carpools were permitted), 44% of the motorist surveyed felt the transitway was sufficiently utilized. In 1988 (after the use of lane was restricted to 3+ carpools between 6:35 a.m. and 8:15 a.m.), both the actual and perceived utilization of the lane dropped somewhat. Even so, 64% of the motorists surveyed in 1988 still felt the transitway was a good transportation improvement. In 1989, that percentage further increased to 66%. Thus,

Table 42.
Motorists' Attitudes Toward the Transitways

Measure of Effectiveness or Success	Katy Freeway						North Freeway	Northwest Freeway	Gulf Freeway
	1985[1]	1986[2]	Spring 1987[3]	Fall 1987[3]	1988[4]	1989[4]	1986[5]	1989[3]	1989[3]
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=1123)	(n=418)	(n=1109)	(n=643)
Yes	3%	3%	36%	44%	31%	30%	26%	22%	21%
No	90%	92%	55%	42%	55%	53%	56%	58%	61%
Not sure	7%	5%	9%	14%	14%	17%	18%	20%	18%
Transitway Vehicle Volumes (A.M. Peak Period)[6]	138	256	2412	2854	2032	2186	393	1463	1139
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=1126)	(n=422)	(n=1121)	(n=652)
Yes	4%	4%	30%	36%	24%	26%	23%	19%	21%
No	85%	86%	58%	46%	58%	54%	57%	57%	555
Not sure	11%	19%	12%	18%	18%	20%	20%	24%	24%
Transitway Persons Moved (A.M. Peak Period)[6]	2456	3156	7769	8599	7210	7801	6647	4098	3956
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=1110)	(n=417)	(n=1109)	(n=647)
Yes	41%	36%	56%	64%	64%	66%	62%	71%	63%
No	35%	43%	29%	20%	22%	20%	20%	13%	21%
Not sure	24%	21%	15%	16%	14%	14%	18%	16%	16%

[1] *Authorized buses and vanpools (before carpools were allowed)*
[2] *Authorized buses, vanpools and 3+ carpools*
[3] *2+ vehicles, no authorization*
[4] *3+ vehicles, no authorization between 6:45 a.m. and 8:15 a.m., 2+ vehicles, no authorization at all other times*
[5] *Authorized buses and vanpools*
[6] *Source: TTI Research Report 484-7, TTI Research Report 339-12 and TTI transitway vehicle volume and occupancy counts*

appears that permitting carpools to utilize the facility has had a positive effect on both the actual and perceived utilization of the facility.

APPENDIX

Presented in this appendix are examples of the survey instruments and cover letters used in the surveys of Katy, North, Northwest and Gulf Transitway users and nonusers.

KATY TRANSITWAY TRANSIT USER SURVEY

This survey is being undertaken by the Texas Transportation Institute, the Texas State Department of Highways and Public Transportation and METRO in order to obtain information about your use of the Katy Transitway. Please take a few minutes to answer the questions below and return this form to the survey taker before leaving the bus.

1. **What is the purpose of your bus trip this morning?** ___Work ___School ___Other

2. **What is the Zip Code of the area where this trip began?** (For example, if this trip began from your home this morning, you would list your home Zip Code.) _____

3. **What is your final destination on this trip?** ___Downtown ___Galleria/City Post Oak/Uptown
___Texas Medical Center ___Greenway Plaza ___Other (specify Zip Code_____)

4. **Have you ever carpooled or vanpooled on the transitway?** ___Yes, carpooled ___Yes, vanpooled ___No

5. **How important was the opening of the Katy Transitway in your decision to ride the bus?**
___Very important ___Somewhat important ___Not important

6. **If the Katy Transitway had <u>not</u> opened, would you be riding a bus now?**
___Yes ___No ___Not sure

7. **How many minutes, if any, do you believe this bus presently saves by using the Katy Transitway instead of the regular traffic lanes?** _____Minutes in the morning _____Minutes in the evening

8. **How long have you been a regular bus rider on the Katy Transitway?** _____

9. **Does your employer pay for any part of your bus pass?**
___Yes, my employer pays $_____ toward the cost of my bus pass and I pay $_____.
___No, I pay the entire amount

10. **Was a car (or other vehicle) available to you for this trip? (check one)**
___No, bus was only practical means
___Yes, but with considerable inconvenience to others
___Yes, but I prefer to take the bus

11. **Before you began riding a bus on the Katy Transitway, how did you <u>normally</u> make this trip? (check one)**
___Drove alone
___Carpooled
___Vanpooled
___Rode a park-and-ride bus on the regular freeway lanes
___Rode a regular route or express bus
___Did not make this trip prior to using the Katy Transitway
___Other (specify_____)

12. **Do you feel that the Katy Transitway is, at present, being sufficiently utilized to justify the project?**
___Yes ___No ___Not sure

13. **What is your . . . Age?**_____ **Sex?**_____ **Occupation?**_____

14. **What is the last level of school you have completed?** _____

Comments:_____

_____

_____

_____

THANK YOU FOR YOUR COOPERATION.

METRO

Metropolitan Transit Authority
500 Jefferson Street
P.O. Box 61429
Houston, Texas 77208-1429

713 739-4000

Dear Carpooler/Vanpooler:

Your vehicle was observed traveling eastbound on the Katy Transitway the week of September 11. Since you have first-hand knowledge of the transitway, we need your help in a special study being conducted by the Texas Transportation Institute, a transportation research agency of the Texas A&M University System. Because the Katy Transitway is one of the first transitways to operate in Texas, it is extremely important that we determine what effect it has had on your travel.

Please take a few minutes to answer the enclosed questionnaire. Your answers will provide valuable information concerning carpooling/vanpooling on the Katy Transitway. Because of the small number of poolers contacted, your specific reply is essential to ensure the success of the project. All information you provide will remain strictly confidential.

Your cooperation and timely return of the completed questionnaire in the enclosed postage-paid envelope will be greatly appreciated. Thank you for your time and assistance in this important undertaking.

METRO

Enclosures

KATY TRANSITWAY CARPOOL/VANPOOL SURVEY

Undertaken by the Texas Transportation Institute, The Texas A&M University System in cooperation with the Texas State Department of Highways and Public Transportation, the Metropolitan Transit Authority of Harris County and the U.S. Department of Transportation

1. **Is your vehicle a carpool or a vanpool?** ____Carpool ____Vanpool

2. **What is the primary purpose of your a.m. carpool/vanpool trip?** ____Work ____School ____Other

3. **How many members are regularly in your carpool/vanpool (including yourself)?** _____

4. **Who makes up your carpool/vanpool group?** ____Family Members ____Neighborhood friends ____Co-Workers

5. **Does your carpool/vanpool use a park-and-ride or park-and-pool lot as a staging area?**
   ____Yes (please specify which lot you typically use _____) ____No

6. **How long have you been a regular user of the Katy Transitway?** _____

7. **Which transitway entrance do you normally use to access the Katy Transitway in the morning?**
   ____I-10 West of SH 6 ____Addicks Park-and-Ride Flyover Ramp ____Gessner

8. **What time do you normally enter the transitway in the morning?** _____a.m.

9. **What is your a.m. carpool/vanpool destination?** ____Downtown ____Galleria/City Post Oak/Uptown
   ____Greenway Plaza ____Texas Medical Center ____Other (specify Zip Code_____)

10. **When did you join your present carpool/vanpool?** Month:_____ Year:_____

11. **How important was the Katy Transitway in your decision to carpool/vanpool?**
    ____Very important ____Somewhat important ____Not important

12. **If the Katy Transitway had not opened to carpools/vanpools, would you be carpooling/vanpooling now?**
    ____Yes ____No ____Not sure

13. **Prior to carpooling/vanpooling on the Katy Transitway, how did you normally make this trip?**
    ____On the transitway
    ____Bus ____Vanpool ____Carpool

    ____On the Katy Freeway general purpose lanes
    ____Bus ____Vanpool ____Carpool ____Drove Alone

    ____On a parallel street or highway (Street Name_____)
    ____Bus ____Vanpool ____Carpool ____Drove Alone

    ____Did not make this trip

14. **How many minutes, if any, do you believe your carpool/vanpool saves by using the Katy Transitway instead of the regular traffic lanes?** _____Minutes in the morning _____Minutes in the evening

15. **Do you feel that the Katy Transitway is, at present, sufficiently utilized to justify the project?**
    ____Yes ____No ____Not sure

16. **What is your . . .** **Age?**_____ **Sex?**_____ **Occupation?**_____

17. **What is the last level of school you have completed?** _____

18. **What is your home Zip Code?** _____

We would appreciate your additional comments: _____

_____

_____

THANK YOU FOR YOUR COOPERATION.
Please return this form at your earliest convenience in the postage-paid envelope provided.

Metropolitan Transit Authority
500 Jefferson Street
P.O. Box 61429
Houston, Texas 77208-1429

713 739-4000

Dear Motorist:

Your vehicle was observed traveling eastbound on the Katy Freeway between 6:00 and 9:00 a.m. the week of October 9. Since you have first-hand knowledge of traffic conditions on the Katy Freeway, we need your help in a special study being conducted by the Texas Transportation Institute, a research agency of the Texas A&M University System.

To help serve the travel demand, the State Department of Highways and Public Transportation and the Metropolitan Transit Authority have constructed the Katy Transitway for use by buses, carpools and vanpools. Vehicles using the transitway travel inbound toward downtown in the morning and outbound in the afternoon. The Katy Transitway has been constructed within the median of the freeway and is protected from other traffic by concrete barriers. The location of the transitway in the median has not reduced the number of general traffic lanes available to motorists.

Because the Katy Transitway is one of the first transitways to operate in Texas, we need your help to determine how it is working. Please take a few minutes to answer the enclosed questionnaire. The questions on this survey concern your routine trips made on the Katy Freeway in the morning, from 6:00 a.m. to 9:00 a.m. Because of the small number of motorists contacted, your specific reply is essential to ensure the success of the project. Your answers will remain strictly confidential.

Your cooperation and timely return of the completed questionnaire in the enclosed postage-paid envelope will be greatly appreciated. Thank you for your time and assistance in this important undertaking.

METRO

Enclosures

KATY FREEWAY MOTORIST SURVEY

Undertaken by the Texas Transportation Institute, The Texas A&M University System in cooperation with the Texas State Department of Highways and Public Transportation, the Metropolitan Transit Authority of Harris County and the U.S. Department of Transportation

1. **What was the purpose of your trip?** ____Work ____School ____Other

2. **What are your reasons for driving your car on the freeway mainlanes rather than traveling in a high-occupancy vehicle on the transitway?**
   ____Need car for job
   ____Car is more convenient and flexible
   ____No convenient bus, vanpool or carpool available
   ____Work irregular hours
   ____Other (specify_____)

3. **How many days per week do you normally make this trip?** _____

4. **How do you usually make this trip?**
   ____Drive alone ____Vanpool ____METRO regular route or express bus
   ____Carpool ____METRO park-and-ride bus ____Other (specify_____)

5. **How many people (including yourself) were in your vehicle for this trip?** _____

6. **Which on-ramp did you use to enter the Katy Freeway for this trip?** _____

7. **What was the destination of your trip?**
   ____Downtown ____Texas Medical Center ____Other (specify Zip Code below)
   ____Greenway Plaza ____Galleria/City Post Oak/Uptown _____

8. **Based on your observation of the number of vehicles currently using the Katy Transitway, do you feel that it is being sufficiently utilized?** ____Yes ____No ____Not sure

9. **Based on your perception of the number of persons currently being moved on the Katy Transitway, do you feel that it is being sufficiently utilized?** ____Yes ____No ____Not sure

10. **Do you feel that the Katy Transitway is a good transportation improvement?**
    ____Yes ____No ____Not sure

11. **What is your . . . Age?**_____ **Sex?**_____ **Occupation?**_____

12. **What is the last level of school you have completed?**_____

13. **What is your home Zip Code?**_____

We would appreciate your additional comments:_____

_____

_____

_____

THANK YOU FOR YOUR COOPERATION.
Please return this form at your earliest convenience in the postage-paid envelope provided.