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16. Abstract In order to improve mobility 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 implement an extensive system of transitways in the medians of the city's existing freeway system. 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 presents the results of transitway user and nonuser surveys performed in the Katy, North, Northwest and Gulf Transitway corridors. In addition to obtaining socio-economic, demographic and travel information, the surveys were designed to: 1) determine perceptions of transitway utilization; 2) identify why individuals have chosen their present travel mode; and 3) assess commuter attitudes and impacts pertaining to the transitways. This report covers the time period from April 1985 through November 1988.					
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**A SUMMARY OF SURVEY DATA FROM THE
KATY, NORTH, NORTHWEST AND GULF TRANSITWAYS
APRIL 1985 THROUGH NOVEMBER 1988**

By

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Associate Research Planner

Research Report 484-10

**An Evaluation of the Impact of Permitting Carpools
to Use the Houston Transitways
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 University System
College Station, Texas 77843-3135

August 1989

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	millimetres	mm
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	millimetres squared	mm 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 m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi

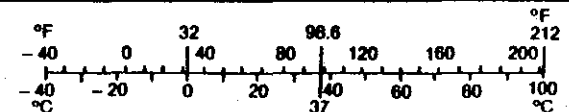
AREA				
mm ²	millimetres squared	0.0016	square inches	in ²
m ²	metres squared	10.764	square feet	ft ²
km ²	kilometres squared	0.39	square miles	mi ²
ha	hectares (10 000 m ²)	2.53	acres	ac

MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 g)	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)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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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 order to improve mobility 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 implement an extensive system of transitways in the medians of the city's existing freeway system. 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 presents the results of transitway user and nonuser surveys performed in the Katy, North, Northwest and Gulf Transitway corridors. In addition to obtaining socio-economic, demographic and travel information, the surveys were designed to: 1) determine perceptions of transitway utilization; 2) identify why individuals have chosen their present travel mode; and 3) assess commuter attitudes and impacts pertaining to the transitways. This report covers the time period from April 1985 through November 1988.

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

IMPLEMENTATION STATEMENT

When this study was initiated, relatively little experience with operating exclusive, reversible high-occupancy vehicle (HOV) lanes existed. As a result, many of the operating procedures and approaches being used in Houston have been developed through experience. A major issue that is being addressed is the determination of the types of vehicles that will be permitted to use the HOV facilities (known locally as transitways).

Texas Transportation Institute is currently monitoring the impacts of 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

The contents of this report reflect the views of the author who is responsible for the opinions, findings and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Texas State Department of Highways and Public Transportation, the Metropolitan Transit Authority of Harris County, or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

SUMMARY

In Houston, the Metropolitan Transit Authority of Harris County and the Texas State Department of Highways and Public Transportation have joined together to implement a plan of physically separated 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 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 transitway user and nonuser surveys performed in the Katy, North, Northwest and Gulf Transitway corridors. 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. The data in this report cover the time period from April 1985 through November 1988.

The Katy Transitway was opened to authorized buses and 8+ vanpools in October 1984. To encourage increased vehicular utilization of the facility, authorized 4+ carpools were allowed to begin using the transitway in April 1985. A few months later, 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 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 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. Specifically, comprehensive Katy Transitway user and nonuser surveys were performed in:

- 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 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.

In the North Freeway corridor, the North Transitway replaced the North Freeway Contraflow Lane in September 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 (approximately 18 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 Northwest and Gulf Transitways when they became 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 Gulf Transitway became operational and 6 months after the Northwest Transitway became operational).

Some of the more important data from these 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, 58% of the 1988 Katy

Transitway carpool/vanpool trips and 67% of the Northwest 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, 1985-1988

A. M. Trip Destination	Katy Corridor				North Corridor	Northwest Corridor	Gulf Corridor
	1985	1986	1987	1988	1986	1988	1988
Transitway Bus Users	(n=357)	(n=575)	(n=632)	(n=776)	(n=1252)	---	---
Downtown	96%	95%	94%	97%	94%	---	---
Galleria/City Post Oak/Uptown	---	0%	1%	0%	1%	---	---
Greenway Plaza	0%	0%	1%	0%	2%	---	---
Texas Medical Center	1%	1%	1%	1%	1%	---	---
Other	3%	4%	3%	2%	2%	---	---
Transitway Carpools/Vanpools	(n=95)	(n=123)	(n=597)	(n=404)	(n=199)	(n=268)	(n=123)
Downtown	57%	55%	39%	42%	61%	38%	81%
Galleria/City Post Oak/Uptown	12%	14%	22%	19%	7%	26%	9%
Greenway Plaza	6%	2%	6%	3%	8%	4%	3%
Texas Medical Center	4%	5%	5%	5%	4%	4%	---
Other	21%	24%	28%	31%	20%	28%	7%
Freeway Carpoolers/Vanpoolers	---	---	---	(n=617)	---	---	---
Downtown	---	---	---	41%	---	---	---
Galleria/City Post Oak/Uptown	---	---	---	20%	---	---	---
Greenway Plaza	---	---	---	6%	---	---	---
Texas Medical Center	---	---	---	6%	---	---	---
Other	---	---	---	27%	---	---	---
Freeway Motorists	(n=302)	(n=728)	(n=1418)	(n=1056)	(n=421)	---	---
Downtown	38%	33%	23%	30%	31%	---	---
Galleria/City Post Oak/Uptown	24%	10%	13%	12%	7%	---	---
Greenway Plaza	8%	4%	5%	4%	4%	---	---
Texas Medical Center	9%	3%	3%	4%	4%	---	---
Other	21%	50%	56%	50%	54%	---	---

Mode Choice Considerations

Previous Mode of Travel

In looking at the previous travel modes of the transitway users, a significant percentage drove alone (Table S-2).

In the Katy Freeway corridor, the park-and-ride and express bus service (which utilizes the transitway) also attracted 9% of its 1985 ridership, 11% of its 1986 and 1987 ridership and 13% of its 1988 ridership from carpools and vanpools.

The carpools and vanpools attracted 13% of their 1985 and 1986 ridership, 9% of their 1987 ridership and 7% of their 1988 ridership from buses.

Table S-2.
Previous Travel Mode of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1988

Trip Destination	Katy Corridor				North Corridor	Northwest Corridor	Gulf Corridor
	1985	1986	1987	1988	1986	1988	1988
Transitway Bus Users	(n=255)	(n=573)	(n=630)	(n=771)	(n=1240)	-----	-----
Drove alone	24%	35%	34%	38%	35%	-----	-----
Carpool	5%	5%	9%	9%	10%	-----	-----
Vanpool	4%	6%	2%	4%	7%	-----	-----
Bus	43%	34%	38%	37%	29%	-----	-----
Didn't make trip	12%	18%	21%	28%	25%	-----	-----
Transitway Carpoolers/Vanpoolers	(n=549)	(n=624)	(n=588)	(n=391)	(n=1622)	(n=239)	(n=97)
Drove alone	36%	39%	50%	45%	30%	34%	28%
Carpool	22%	17%	29%	33%	21%	60%	53%
Vanpool	12%	9%	3%	3%	12%	1%	6%
Bus	13%	13%	9%	7%	14%	4%	5%
Didn't make trip	17%	22%	9%	12%	23%	1%	8%
Freeway Motorists¹	(n=445)	(n=738)	(n=1424)	(n=1053)	(n=423)	-----	-----
Drive alone	88%	90%	85%	91%	87%	-----	-----
Carpool	8%	6%	12%	8%	8%	-----	-----
Vanpool	1%	1%	0%	0%	1%	-----	-----
Other	3%	3%	3%	1%	4%	-----	-----

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

In the North Freeway corridor, transit service had attracted 17% of its ridership from carpools or vanpools. The vanpools had attracted 14% of their members from transit and 21% from carpools.

In the Northwest and Gulf Freeway corridors, carpools/vanpools have attracted only 4% to 5% of their ridership from transit.

Impacts of the Transitways on Mode Choice

The Katy, North, Northwest and Gulf Transitways all appear to have had a definite effect on mode choice (Table S-3).

Table S-3.
Use of Current Mode by Transitway Users If Transitway Had Not Opened, 1985-1988

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

While sizable percentages of the transitway users indicated that they would be using their current mode even if there was no transitway, at least 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, 14% of the Gulf Transitway poolers and 21% of the Northwest Transitway poolers would not be carpooling or vanpooling if not for the 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 S-4).

In the Katy Freeway corridor, the median travel time savings reported by current bus users is 20 minutes in both the a.m. and the p.m. Carpoolers and vanpoolers responding to the most recent survey also perceive a significant travel time savings (20 minutes in the a.m. and 22 minutes in the p.m.).

Table S-4.
Perceived Transitway Travel Time Savings, 1985-1988

Travel Time Savings	Katy Transitway				North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1986	1988	1988
Perceived Transitway Travel Time Savings (minutes)							
<u>Transitway Bus Users</u>	(n=328)	(n=530)	(n=590)	(n=726)	(n=1147)	-----	-----
a.m. (50th Percentile)	9	15	15	20	20	-----	-----
p.m. (50th Percentile)	13	20	15	20	25	-----	-----
<u>Transitway Carpoolers/Vanpoolers</u>	(n=505)	(n=588)	(n=592)	(n=394)	(n=1595)	(n=256)	(n=121)
a.m. (50th Percentile)	8	10	20	20	20	15	15
p.m. (50th Percentile)	12	17	20	22	30	15	15
Actual Transitway Travel Time Savings (minutes)¹							
a.m. (50th Percentile)	6.8	3.0	4.4	5.1	4.2	3.1	3.3
p.m. (50th Percentile)	5.5	4.0	1.0	2.7	8.0	1.3	7.7

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

North Transitway users perceive an even greater travel time savings. Median travel time savings reported by bus users were 20 minutes in the a.m. and 25 minutes in the p.m. Vanpoolers generally perceived a 20-minute savings in both the a.m. and p.m.

Median time savings reported by carpoolers and vanpoolers traveling the Northwest and Gulf Transitways totaled 15 minutes in both the morning and afternoon. It is interesting to note the extent to which perceived travel time savings exceed actual transitway travel time savings in all four study corridors.

Motorists' Attitudes Concerning the Transitways

In the North Freeway corridor, only 26% of the motorists operating in the freeway mainlanes (non transitway users) felt the North Transitway was sufficiently utilized to justify the project (Table S-5). Nevertheless, 62% of the motorists did feel the transitway was a good transportation improvement.

Table S-5.
Motorists' Attitudes Toward the Transitways, 1885-1988

Attitude	Katy Freeway					North Freeway
	1985 ¹	1986 ²	Spring 1987 ³	Fall 1987 ³	1988 ⁴	1986 ⁵
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=418)
Yes	3%	3%	36%	44%	31%	26%
No	90%	92%	55%	42%	55%	56%
Not Sure	7%	5%	9%	14%	14%	18%
Transitway Vehicle Volumes (A.M. Peak Period)⁶	138	256	2412	2854	2032	393
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=422)
Yes	4%	4%	30%	36%	24%	23%
No	85%	86%	58%	46%	58%	57%
Not Sure	11%	10%	12%	18%	18%	20%
Transitway Persons Moved (A.M. Peak Period)⁶	2465	3156	7769	8599	7210	6647
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=417)
Yes	41%	36%	56%	64%	64%	62%
No	35%	43%	29%	20%	22%	20%
Not Sure	24%	21%	15%	16%	14%	18%

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

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 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 the lane was restricted to 3+ carpools between 6:45 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. 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.

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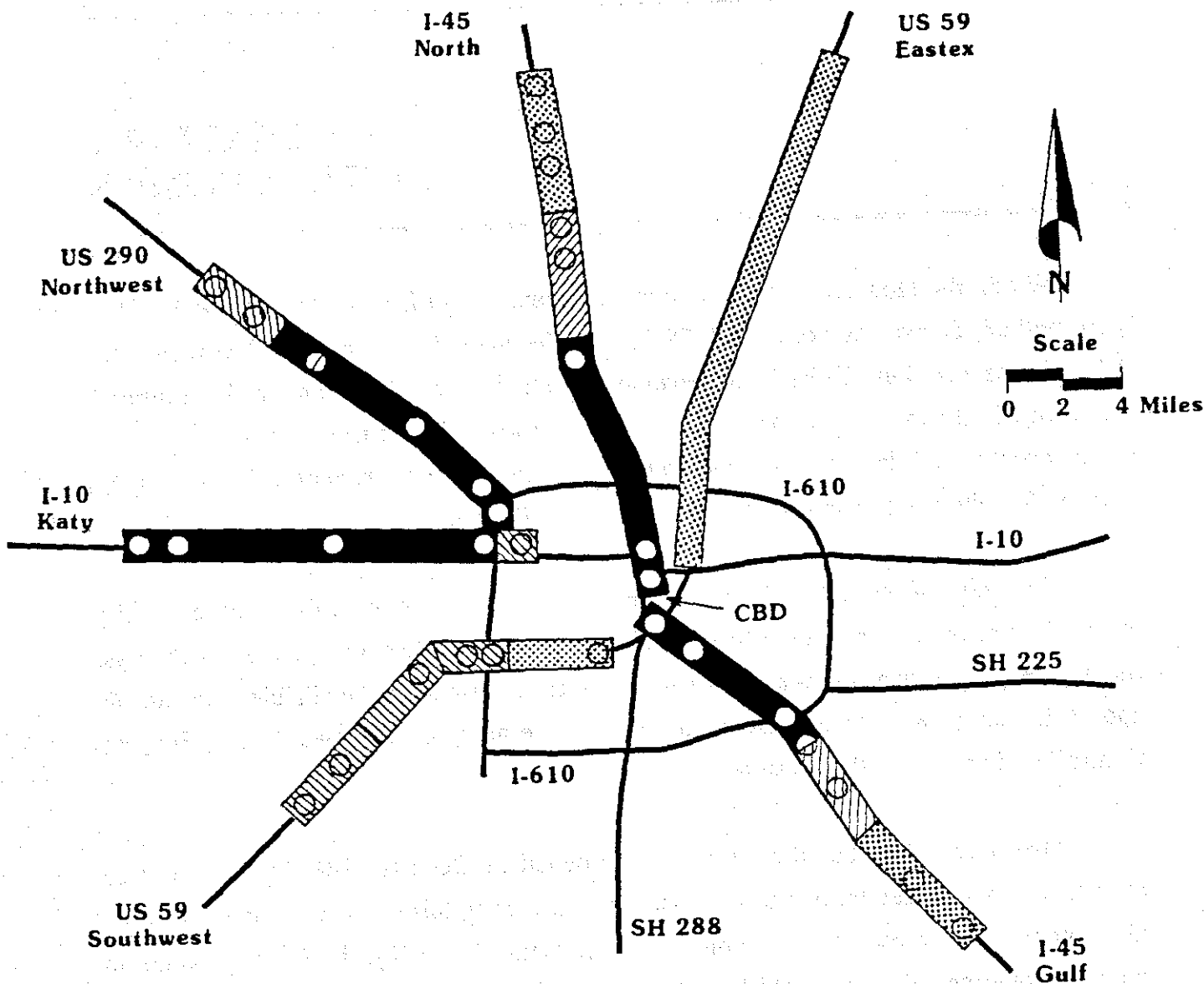
CHAPTER 1 INTRODUCTION

Within the Houston metropolitan area, a major effort is currently underway by the Metropolitan Transit Authority (METRO) and the State Department of Highways and Public Transportation (SDHPT) to develop an extensive system of physically separated transitways in the medians of the existing freeway network. These transitways are reserved for the exclusive use by high-occupancy vehicles. At present, approximately 36 miles of the planned 95-mile transitway system are in operation (Figure 1).

An area of considerable importance to the success of this venture is the determination of the types of vehicles that are to be permitted to use the transitways. Initially, only authorized buses and 8+ vanpools were envisioned to be eligible users, as this approach had proven highly successful in the operation of the I-45 North Freeway Contraflow Lane in north Houston.

Therefore, when the Katy Transitway opened in October 1984, its use was also restricted to authorized buses and 8+ vanpools. In theory, this operating strategy offered the potential to transport large volumes of persons; in reality, it did not result in transporting large volumes of vehicles and the transitway appeared to be underutilized. To encourage increased vehicular utilization of the facility, authorized 4+ carpools were allowed to begin using the transitway in April 1985. About 6 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 (7:00 a.m. - 8:00 a.m.) vehicle volumes on the Katy Transitway were approaching or exceeding capacity. This dramatic increase in utilization was beginning to have a negative effect on the facility's a.m. operation (lower



LEGEND

- Transitway Access Location
- ▤ Design and/or Planning
- ▨ Under Construction
- Operational

Figure 1.
Current Status of the Committed Houston Transitway System

transitway travel speeds, increased travel times and unreliable travel times). As a result, 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 are still permitted to use the transitway 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 September 1984. Since the North Transitway opened, usage has been restricted to authorized buses and 8+ vanpools; 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, the decision was made 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, they are being intensively studied to develop improved guidelines for planning, designing and operating future transitway improvements in Houston and across the nation.

Chronology of Events and Survey Activities on the Transitways

A chronology of major events and survey activities pertaining to the Katy Transitway is outlined below.

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 transitway.

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 484-8.

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.

This research report documents the results of the November 1988 surveys and compares them to the results of previous surveys conducted in 1985, 1986 and 1987. No attempt is made in this report to include all relevant data collected in previous survey efforts.

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.

Phase I of the North Transitway, which replaced the North Freeway contraflow lane, became operational in September 1984. A major "after" transitway implementation survey effort was performed in January 1986, approximately 18 months after the opening of the

North Transitway. 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, the decision was made to permit 2+ carpools on the Northwest and Gulf Transitways when they became operational 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.

Surveys of Transitway Users and Nonusers

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

- Patrons on transit buses using the Katy and North Transitway;
- Vanpoolers using the Katy, North, Northwest and Gulf Transitways;
- Carpoolers using the Katy, Northwest and Gulf Transitways;
- Carpoolers and vanpoolers on the Katy Freeway (former users of the Katy Transitway until the occupancy requirement was raised from 2 to 3 persons between 6:45 a.m. and 8:15 a.m.); and
- Motorists on the Katy and North Freeways not using the transitways.

These surveys were primarily intended 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 data were collected by TTI personnel. Comprehensive Katy Transitway survey efforts were performed in October 1985 and April 1986. Somewhat less comprehensive efforts were performed in October 1987 and November 1988. 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.

A chronology of survey activities relative to the opening dates and operating restrictions of each transitway is outlined on the following pages.

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 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.

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 - Approximately 18 months after the North Transitway replaced the North Freeway contraflow lane.

Northwest Transitway Carpool/Vanpool Survey

November 1988 - Approximately 3 months after the transitway opened.

Gulf Transitway Carpool/Vanpool Survey

November 1988 - Approximately 6 months after the transitway opened.

Survey Methodologies

Transitway User Surveys

Bus Mode. On-board transit user surveys were conducted on all METRO bus routes using the Katy and North Transitways during the a.m. 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 one express route (two in 1987 and 1988) and from 3 park-and-ride lots; North Transitway bus service was provided by one express bus route and from 4 park-and-ride lots. The location of the park-and-ride lots within the Katy and North 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.

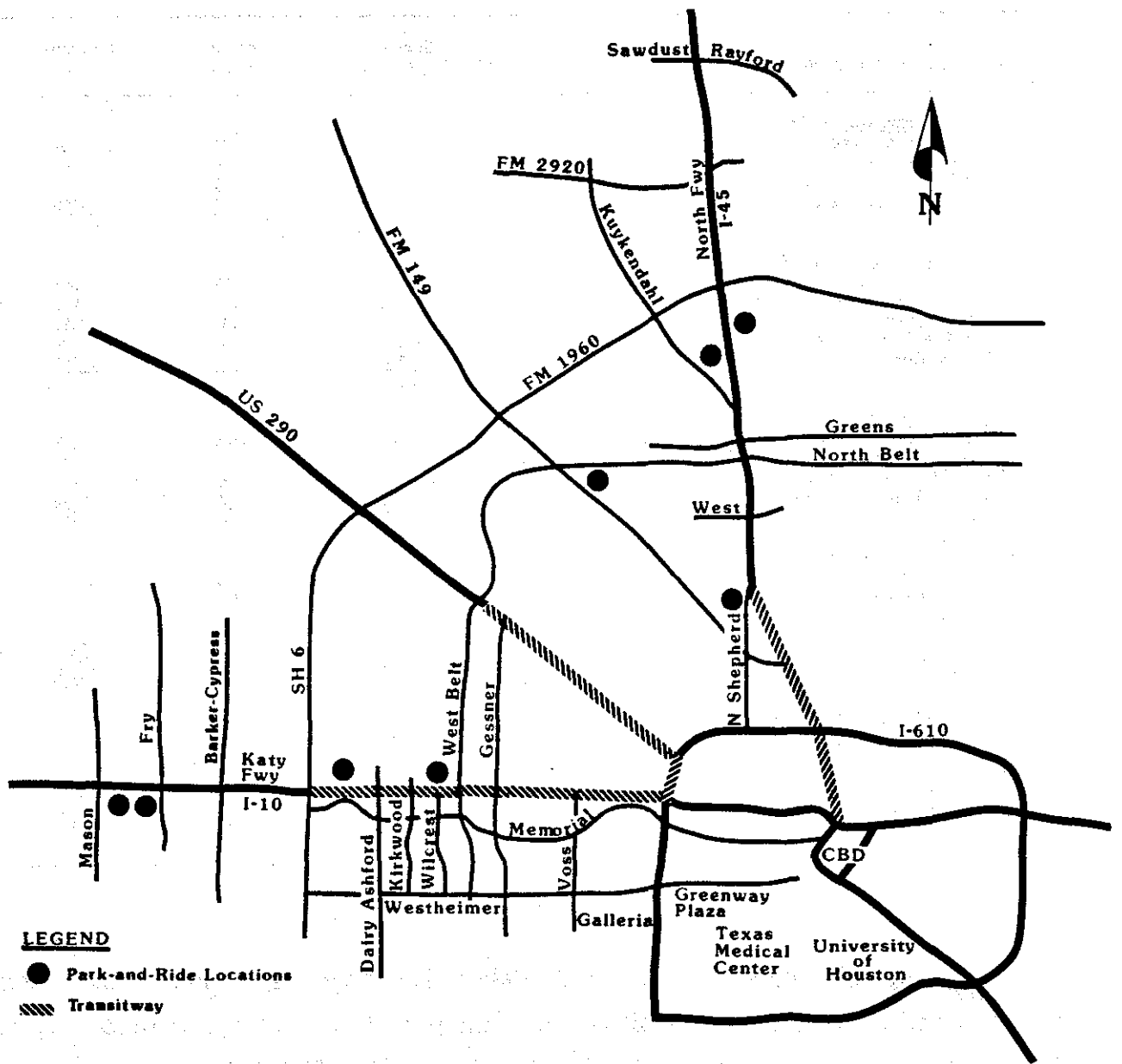


Figure 2.
Katy and North Transitway Study Corridors

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

Katy Transitway Bus Route	Surveys Distributed	Surveys Completed	Response Rate
<u>Katy Transitway, March 1985</u>			
Katy-Mason Park-and-Ride	81	73	90%
Addicks Park-and-Ride	96	94	98%
West Belt Park-and-Ride	55	55	100%
Memorial Limited Express	<u>137</u>	<u>136</u>	<u>99%</u>
Total	<u>369</u>	<u>358</u>	<u>97%</u>
<u>North Transitway, January 1986</u>			
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	<u>104</u>	<u>104</u>	<u>100%</u>
Total	<u>1,295</u>	<u>1,247</u>	<u>96%</u>
<u>Katy Transitway, April 1986</u>			
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 Limited Express	<u>169</u>	<u>167</u>	<u>99%</u>
Total	<u>594</u>	<u>581</u>	<u>98%</u>
<u>Katy Transitway, October 1987</u>			
Kingsland Park-and-Ride	101	101	100%
Addicks Park-and-Ride	204	193	95%
West Belt Park-and-Ride	56	55	98%
Memorial Limited Express	175	173	99%
Wilcrest Express	<u>112</u>	<u>112</u>	<u>100%</u>
Total	<u>648</u>	<u>634</u>	<u>98%</u>
<u>Katy Transitway, October 1988</u>			
Kingsland Park-and-Ride	111	105	95%
Addicks Park-and-Ride	363	341	94%
West Belt Park-and-Ride	86	79	92%
Memorial Limited Express	171	166	97%
Wilcrest Express	<u>89</u>	<u>86</u>	<u>97%</u>
Total	<u>820</u>	<u>777</u>	<u>95%</u>

Carpool and Vanpool Modes. For the 1985 and 1986 surveys, vanpools and carpools were surveyed during the p.m. transitway 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 respondents were requested to return the completed questionnaire 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 feasible 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. 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 carpool/vanpool surveys along the Katy, Northwest and Gulf Transitways.

An example survey instrument and cover letter (for the comprehensive carpool/vanpool surveys) is included in the Appendix. Response rates to the Katy, North, Northwest and Gulf Transitway carpool/vanpool surveys is presented in Table 2.

Table 2.
Carpool and 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)
<u>Katy Transitway, March 1985</u> Vanpool Drivers & Passengers	—	689	—	465	67%
<u>Katy Transitway, October 1985</u> Carpool Drivers & Passengers	—	121	—	81	67%
<u>North Transitway, January 1986</u> Vanpool Drivers & Passengers	—	2,323	—	1,637	70%
<u>Katy Transitway, April 1986</u> Carpool & Vanpool Drivers & Passengers	—	977	—	637	65%
<u>Katy Transitway, April 1987</u> Carpool Drivers	2,459	1,603	147	607	38%
<u>Katy Transitway, October 1987</u> Carpool & Vanpool Drivers	2,502	1,536	111	605	39%
<u>Katy Transitway, November 1988</u> Carpool & Vanpool Drivers	1,704	1,033	81	409	40%
<u>Northwest Transitway, November 1988</u> Carpool & Vanpool Drivers	797	553	71	261	47%
<u>Gulf Transitway, November 1988</u> Carpool & Vanpool Drivers	500	363	27	124	34%

Non Transitway User Surveys

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

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). 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 4. An example of the survey questionnaire used is included in the Appendix.

Table 3.
Motorist (Non Transitway User) Survey Distribution,
Katy and North 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 Carpool and Vanpool Modes. In October 1988, license plates of 2+ carpools and vanpools traveling inbound on the Katy Transitway during the a.m. operating period were recorded by TTI staff. A few weeks later, in order to maintain a 55 mph speed on the transitway, the operating rules were changed to require that a vehicle desiring to use the transitway between 6:45 a.m. and 8:15 a.m. must have 3 or more occupants. In November 1988 (shortly after this change went into effect), TTI staff once again recorded license plates of vehicles traveling inbound on the transitway. The license plate numbers

recorded in November were then cross-matched with those recorded in October. License plate numbers which appeared in the October data file, but did not reappear in the November data file were thought to belong to 2-person carpools/vanpools who were now probably traveling on the Katy Freeway since they were no longer eligible to use the transitway. These vehicles were designated as "Katy Freeway carpools and vanpools."

SDHPT Division of Motor Vehicles license plate files were accessed to obtain addresses of these vehicles. A special survey designed to assess the impacts of the 3+ operating decision was mailed to each address (excluding corporate addresses and leasing agencies). Freeway carpool/vanpool drivers were asked to complete the survey and return it to TTI in postage-paid envelope provided.

For this effort, 2,474 license plates were read; 1,633 surveys were mailed out to individuals; and 122 surveys were returned either "address unknown" or "vehicle was not on the Katy Freeway or Katy Transitway." A total of 632 surveys were completed for 39% response rate. A copy of the questionnaire and cover letter used for this survey is included in the Appendix.

Comparison to Previous Data

Some of the survey questions used in the Katy and North Transitway user and nonuser surveys are similar to those used to surveys of park-and-ride users and nonusers along the Katy and North Freeway 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 Freeway. On the North Freeway, however, a contraflow lane was available for authorized buses and vanpools at the time of the 1981 and 1984 surveys.

CHAPTER 2

TRANSITWAY BUS USER SURVEYS

Transitway bus user surveys were performed in the Katy Freeway Corridor in 1985, 1986, 1987 and 1988. North Transitway bus user surveys were performed in 1986. In most cases, responses from the patrons at the park-and-ride lots along each freeway 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 questions contained on the Katy and North Transitway transit user surveys generally fall into one of 3 subject areas:

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

Personal Characteristics

Questions concerning age, sex, occupation and last year of school completed were asked. Responses to these questions are presented in Table 4.

Age

The median age of the park-and-ride patrons surveyed is in the mid 30s. These data are consistent with previous on-board transit park-and-ride surveys conducted in 1981 and 1984. The median ages for the patrons on the express routes which utilize the Katy and North Transitways are 2 to 9 years higher.

Table 4.
Personal Characteristics of Transitway Transit Users,
Katy and North Transitway Transit User Surveys

Characteristic	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Age (years)					
<u>Total Sample</u>	(n=351)	(n=568)	(n=613)	(n=746)	(n=1226)
50th Percentile	33	32	35	34	34
<u>Park-and-Ride Routes</u>	(n=219)	(n=409)	(n=341)	(n=506)	(n=1129)
50th Percentile	33	31	34	34	33
<u>Express Routes</u>	(n=132)	(n=159)	(n=272)	(n=240)	(n=97)
50th Percentile	37	37	37	36	42
Sex					
<u>Total Sample</u>	(n=351)	(n=565)	(n=607)	(n=741)	(n=1203)
Male	49%	44%	42%	42%	44%
Female	51%	56%	58%	58%	56%
<u>Park-and-Ride Routes</u>	(n=218)	(n=402)	(n=332)	(n=504)	(n=1105)
Male	47%	40%	36%	40%	41%
Female	53%	60%	64%	60%	59%
<u>Express Routes</u>	(n=133)	(n=163)	(n=275)	(n=237)	(n=98)
Male	53%	54%	49%	46%	74%
Female	47%	46%	51%	54%	26%
Occupation					
<u>Total Sample</u>	(n=343)	(n=550)	(n=603)	(n=718)	(n=1140)
Professional	56%	46%	44%	44%	38%
Managerial	13%	20%	14%	26%	23%
Clerical	21%	26%	27%	24%	30%
Sales	4%	4%	6%	3%	3%
Student	3%	3%	3%	1%	1%
Other	3%	1%	6%	2%	5%
<u>Park-and-Ride Routes</u>	(n=215)	(n=391)	(n=334)	(n=487)	(n=1092)
Professional	57%	47%	47%	46%	38%
Managerial	13%	20%	11%	24%	22%
Clerical	22%	28%	31%	26%	32%
Sales	4%	3%	5%	2%	3%
Student	1%	1%	5%	0%	0%
Other	3%	1%	1%	2%	5%
<u>Express Routes</u>	(n=128)	(n=159)	(n=269)	(n=231)	(n=98)
Professional	54%	45%	41%	40%	41%
Managerial	14%	22%	19%	29%	34%
Clerical	20%	19%	22%	21%	12%
Sales	4%	4%	8%	3%	6%
Student	5%	6%	5%	3%	3%
Other	3%	4%	5%	4%	4%
Education (years)					
<u>Total Sample</u>	(n=346)	(n=570)	(n=591)	(n=739)	(n=1214)
Average	15.6	15.4	15.4	15.2	14.9
<u>Park-and-Ride Routes</u>	(n=215)	(n=409)	(n=326)	(n=502)	(n=1112)
Average	15.4	15.4	15.3	15.2	14.9
<u>Express Routes</u>	(n=131)	(n=161)	(n=265)	(n=237)	(n=102)
Average	16.0	15.5	15.5	15.4	15.8

Sex

Between 53% and 64% of the ridership on the park-and-ride routes is female. Again, this is in general agreement with previous park-and-ride survey data. By contrast, between 46% and 74% of the ridership on the express routes is male.

Occupation

The greatest number of riders on all routes serving both transitways are classified as "professional." A significant ridership component is also drawn from "managerial" and "clerical" job positions. More than half of the total ridership is "professional" or "managerial."

Education

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

Travel Patterns and Trip Characteristics

Questions were asked concerning trip purpose, trip frequency, trip origin, trip destination, whether the employer pays for part of the bus fare, and whether a car was available for the trip. Responses to these questions are summarized below.

Trip Purpose

The overwhelming majority of all the transitway transit trips surveyed are work trips (Table 5).

Table 5.
Trip Characteristics of Transitway Transit Users,
Katy and North Transitway Transit User Surveys

Characteristic	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Trip Purpose					
<u>Total Sample</u>	(n=358)	(n=580)	(n=634)	(n=777)	(n=1256)
Work	99%	97%	98%	98%	99%
School	1%	2%	1%	1%	1%
Other	0%	1%	1%	1%	---
<u>Park-and-Ride Routes</u>	(n=222)	(n=412)	(n=349)	(n=525)	(n=1152)
Work	100%	98%	100%	99%	99%
School	0%	2%	0%	0%	1%
Other	0%	0%	0%	1%	---
<u>Express Routes</u>	(n=136)	(n=168)	(n=285)	(n=252)	(n=104)
Work	96%	96%	96%	96%	97%
School	3%	3%	3%	3%	3%
Other	1%	1%	1%	1%	---
Trip Frequency (days per week)					
<u>Total Sample</u>	(n=355)	(n=579)	(n=631)	---	(n=1251)
0-1	1%	1%	2%	---	1%
2	1%	2%	1%	---	0%
3	2%	3%	4%	---	1%
4	5%	5%	5%	---	3%
5 or more	91%	89%	88%	---	95%
<u>Park-and-Ride Routes</u>	(n=219)	(n=411)	(n=348)	---	(n=1147)
0-1	1%	1%	1%	---	1%
2	1%	2%	1%	---	0%
3	1%	3%	5%	---	1%
4	5%	4%	5%	---	3%
5 or more	92%	90%	88%	---	95%
<u>Express Routes</u>	(n=136)	(n=168)	(n=283)	---	(n=104)
0-1	0%	1%	3%	---	2%
2	2%	2%	2%	---	1%
3	2%	3%	3%	---	1%
4	6%	7%	5%	---	4%
5 or more	90%	87%	87%	---	92%

Trip Frequency

As would be expected for a transit service catering to work trips, virtually all the trips are made 5 days a week or more (Table 5).

Trip Origin

The origin of the trip, by Zip Code, was requested. Data for the Katy Transitway routes are illustrated in Figures 3-7 and summarized in Table 6; data for the North Transitway routes are presented in Figures 8-12 and summarized in Table 7. The park-and-ride route origin data are consistent with market areas as defined in previous surveys.

Katy Transitway Routes. 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 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 ridership originated from north of the freeway. About 65% of the 1988 ridership also originated from north of the freeway.

For the Addicks Lot, 70% of its 1985 ridership, 64% of its 1986 and 1987 ridership and 65% of its 1988 ridership originated 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. More than 60% of the 1985, 1986, 1987 and 1988 ridership from this area originated from south of the freeway.

As to be expected, the 1985, 1986, 1987 and 1988 ridership on the Memorial Express route primarily originates from Zip Codes immediately adjacent to Memorial Drive. Similarly, the 1987 and 1988 ridership on the Wilcrest Route primarily originates from Zip Codes immediately adjacent to Wilcrest.

North Transitway Routes. The Kuykendahl, North Shepherd and Seton Lake Park-and-Ride Lots are located west of the North Freeway; and the 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.

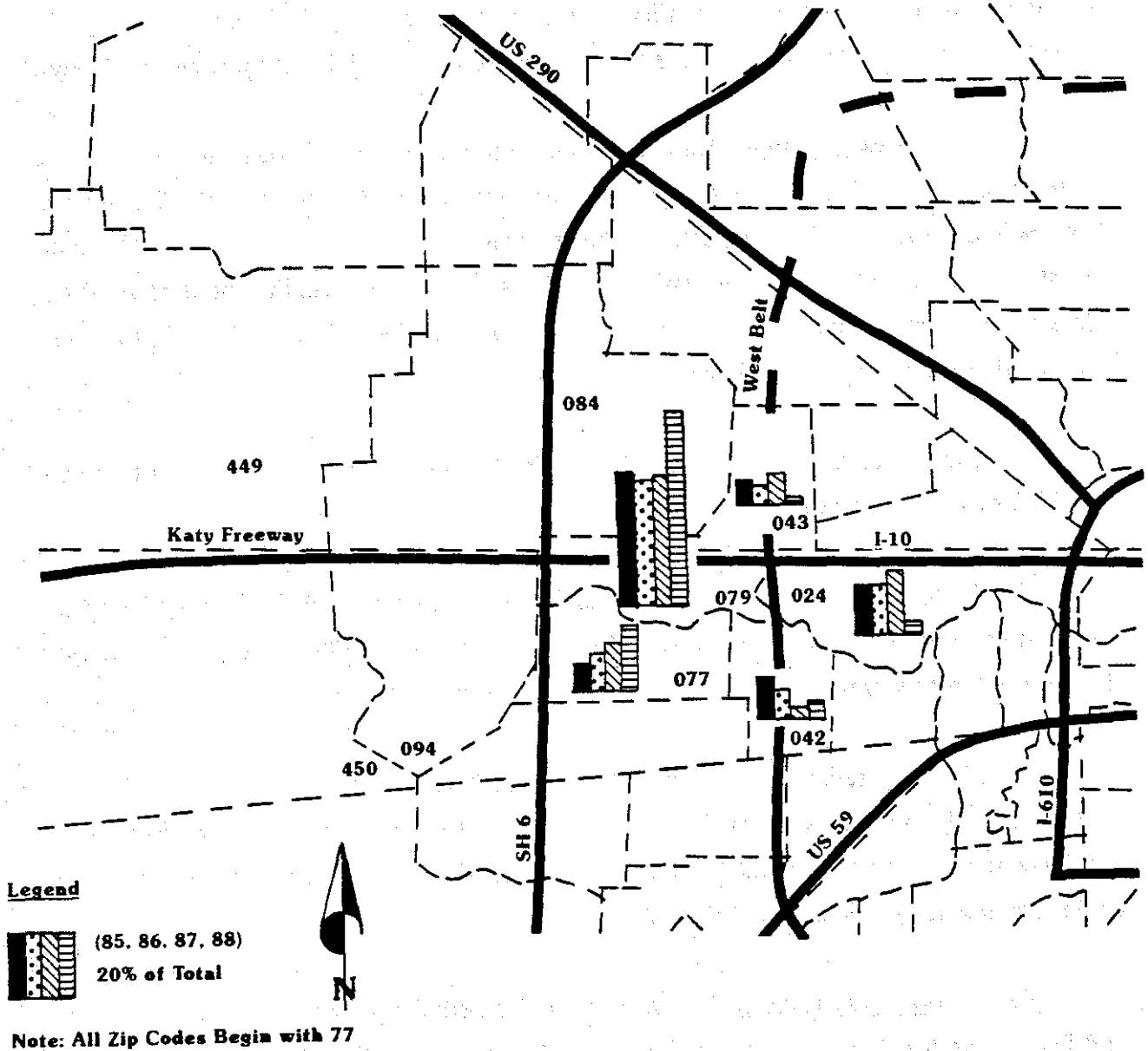


Figure 3.
Home Origins of Patrons of the Memorial Express Bus Route

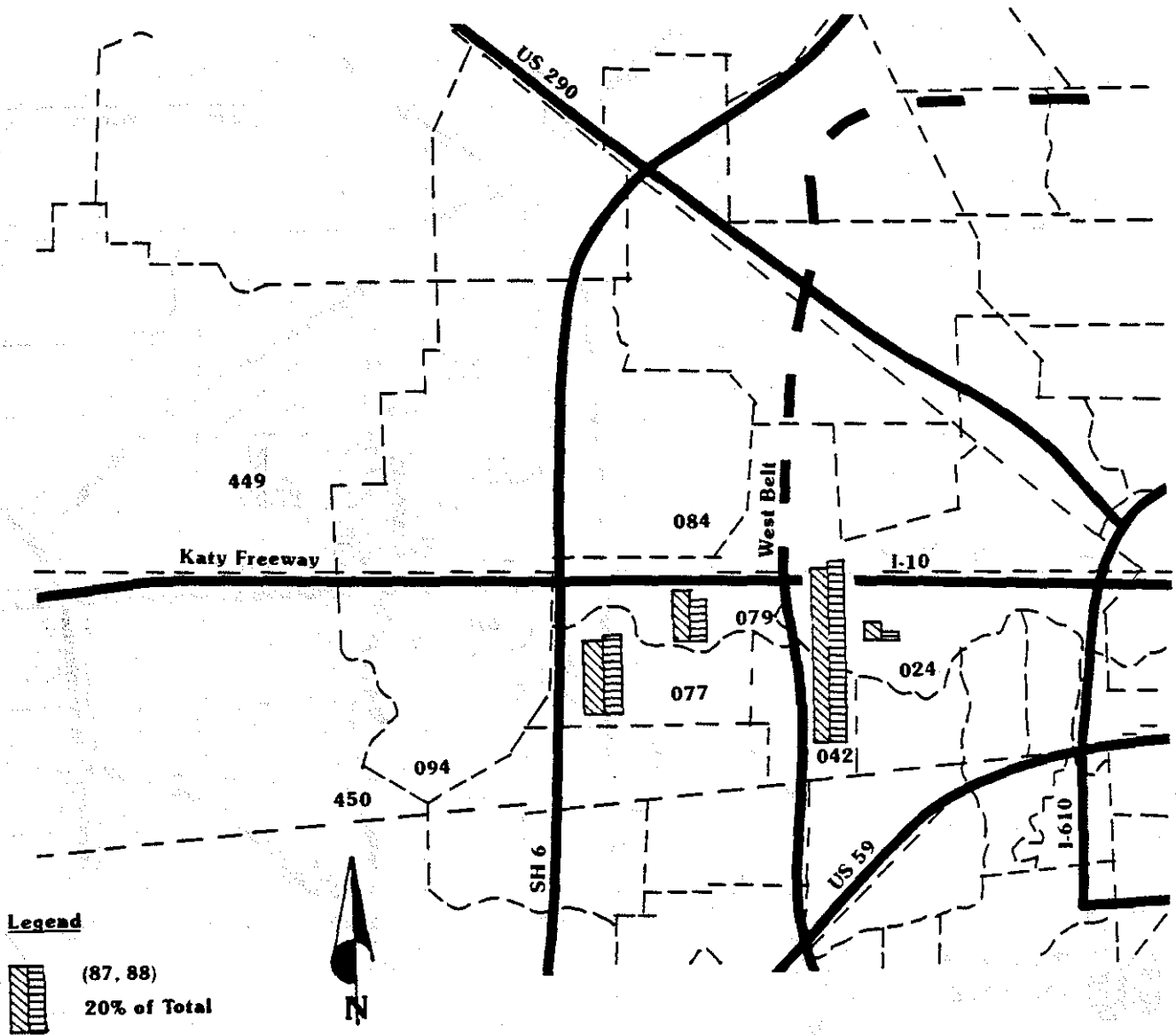


Figure 4.
Home Origins of Patrons of the Wilcrest Express Bus Route

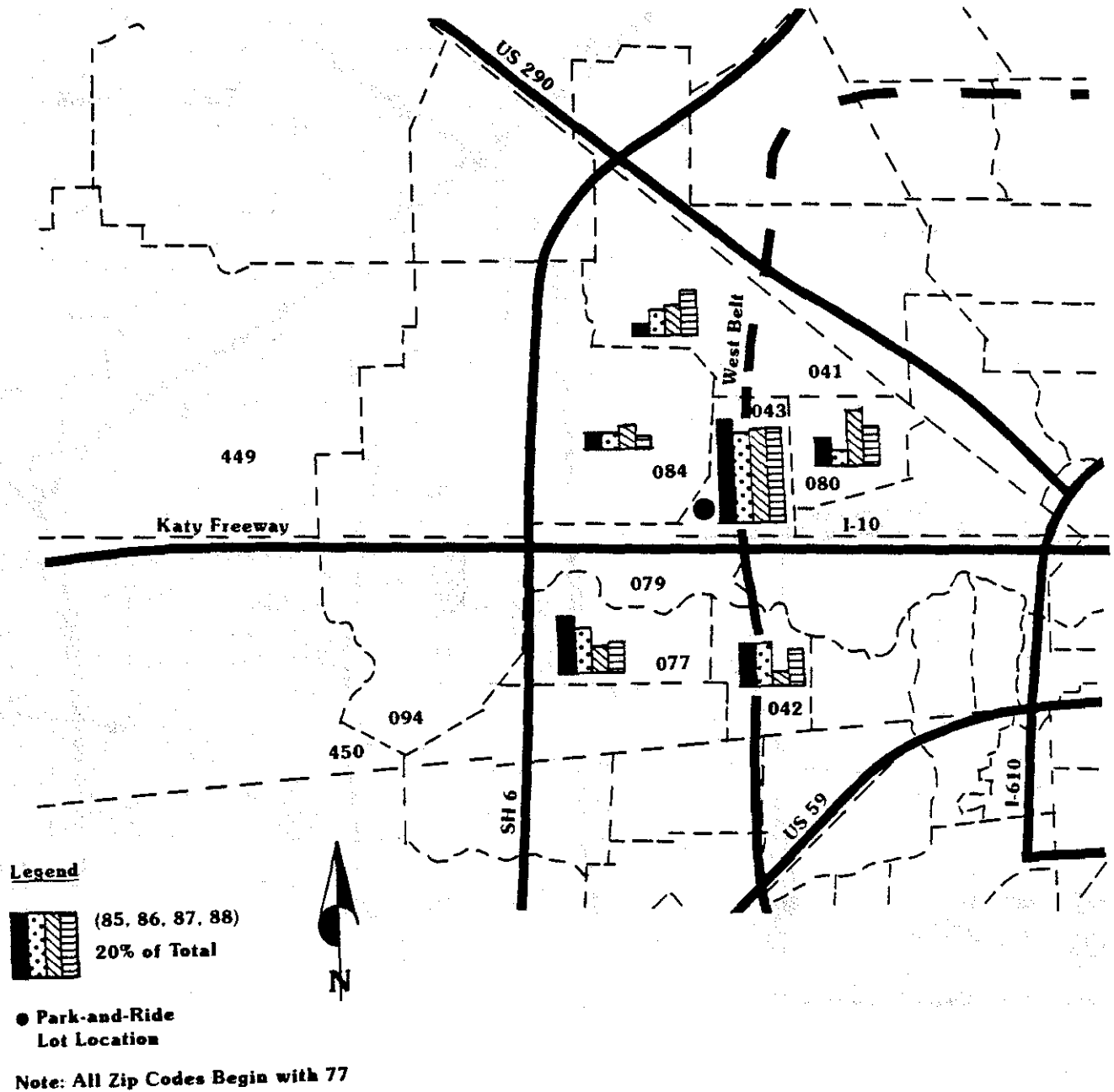


Figure 5.
Home Origins of Patrons of the West Belt Park-and-Ride Lot

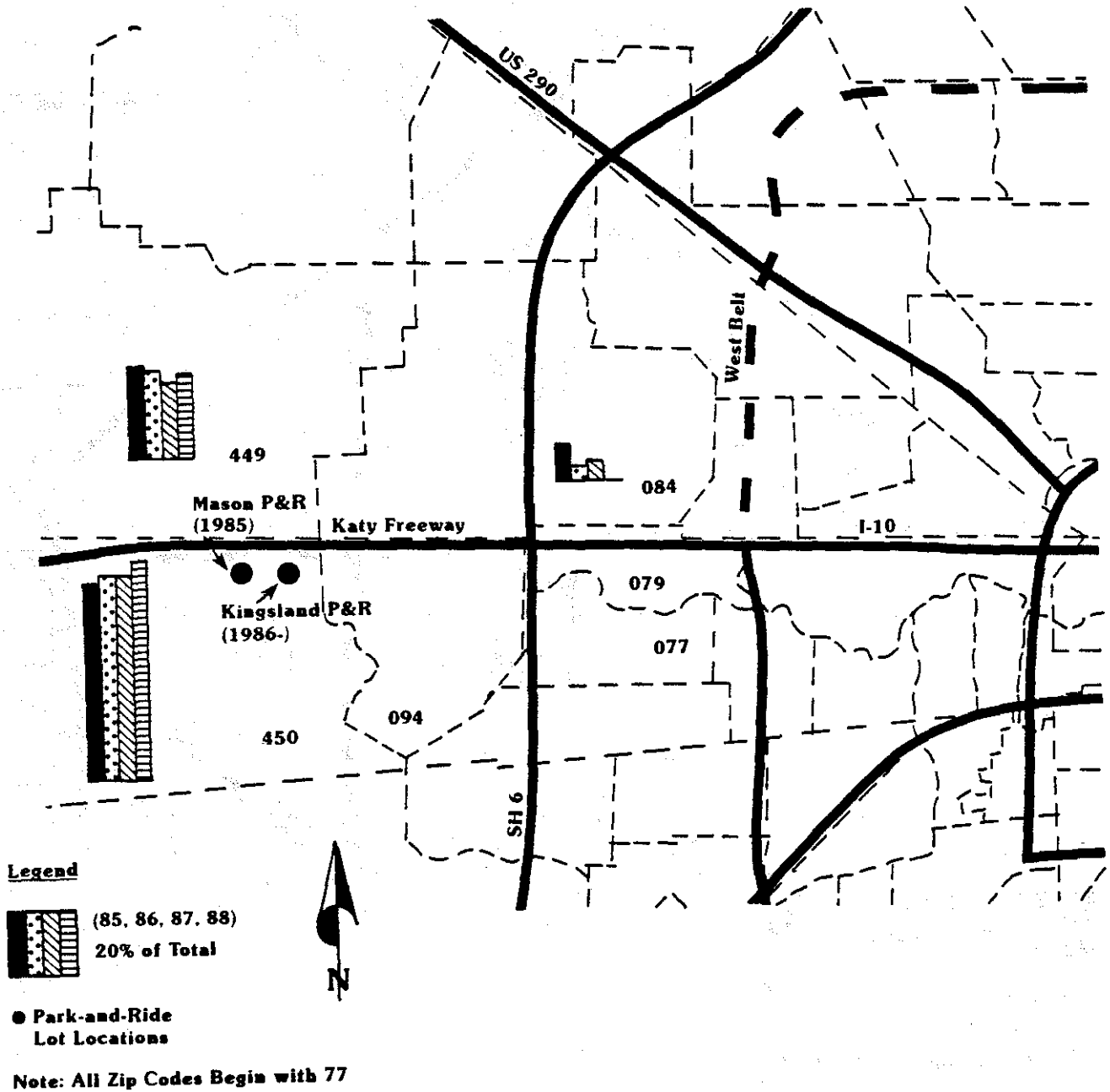


Figure 6.
 Home Origins of Patrons of the Katy-Mason/Kingsland Park-and-Ride Lot

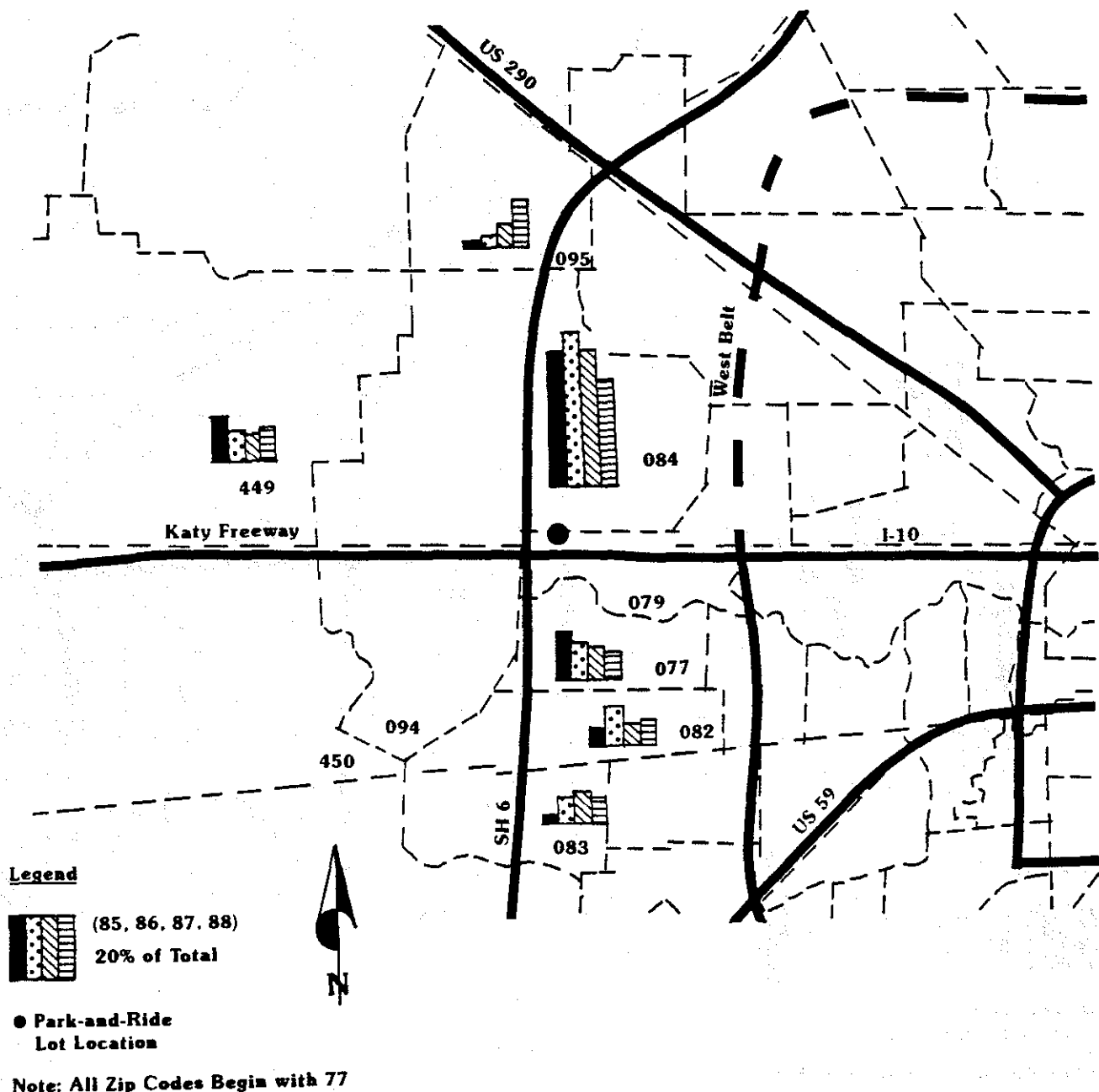


Figure 7.
Home Origins of Patrons of the Addicks Park-and-Ride Lot

Table 6.
Zip Codes of Origin for Katy Transitway Transit Trips,
Katy Transitway Transit User Surveys

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

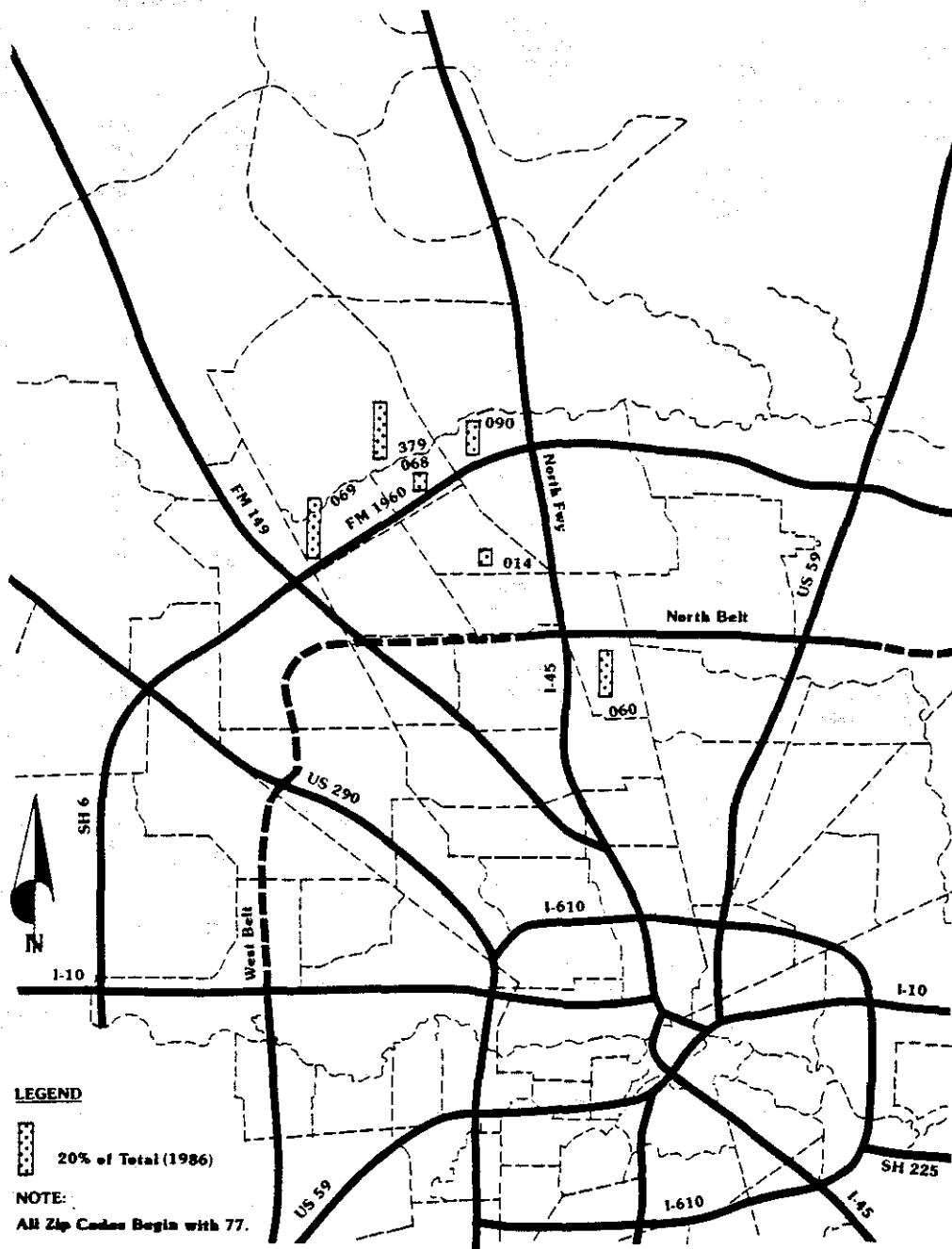


Figure 8.
Home Origins of Patrons of the FM 1960 Express Route

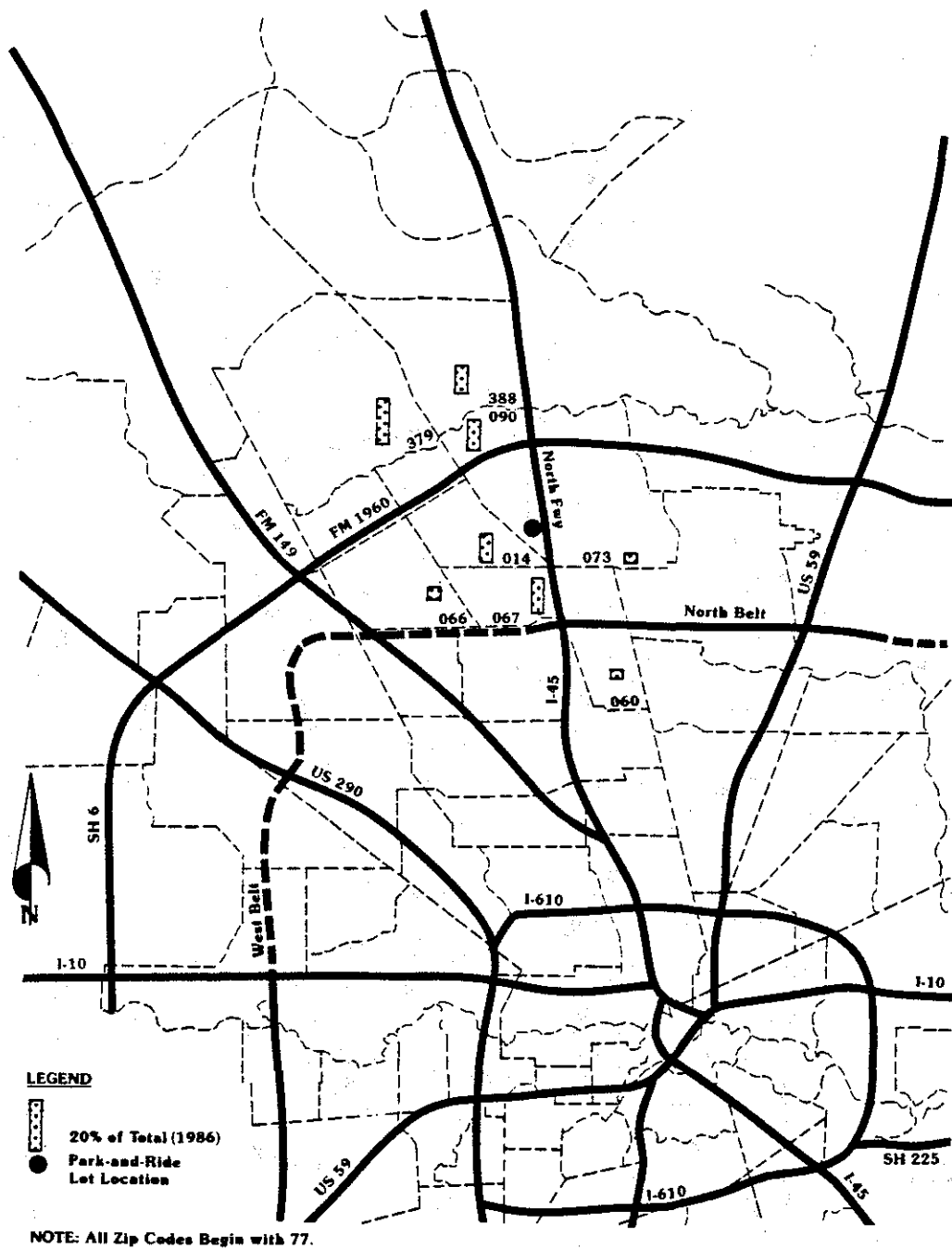


Figure 9.
Home Origins of Patrons of the Kuykendahl Park-and-Ride Lot

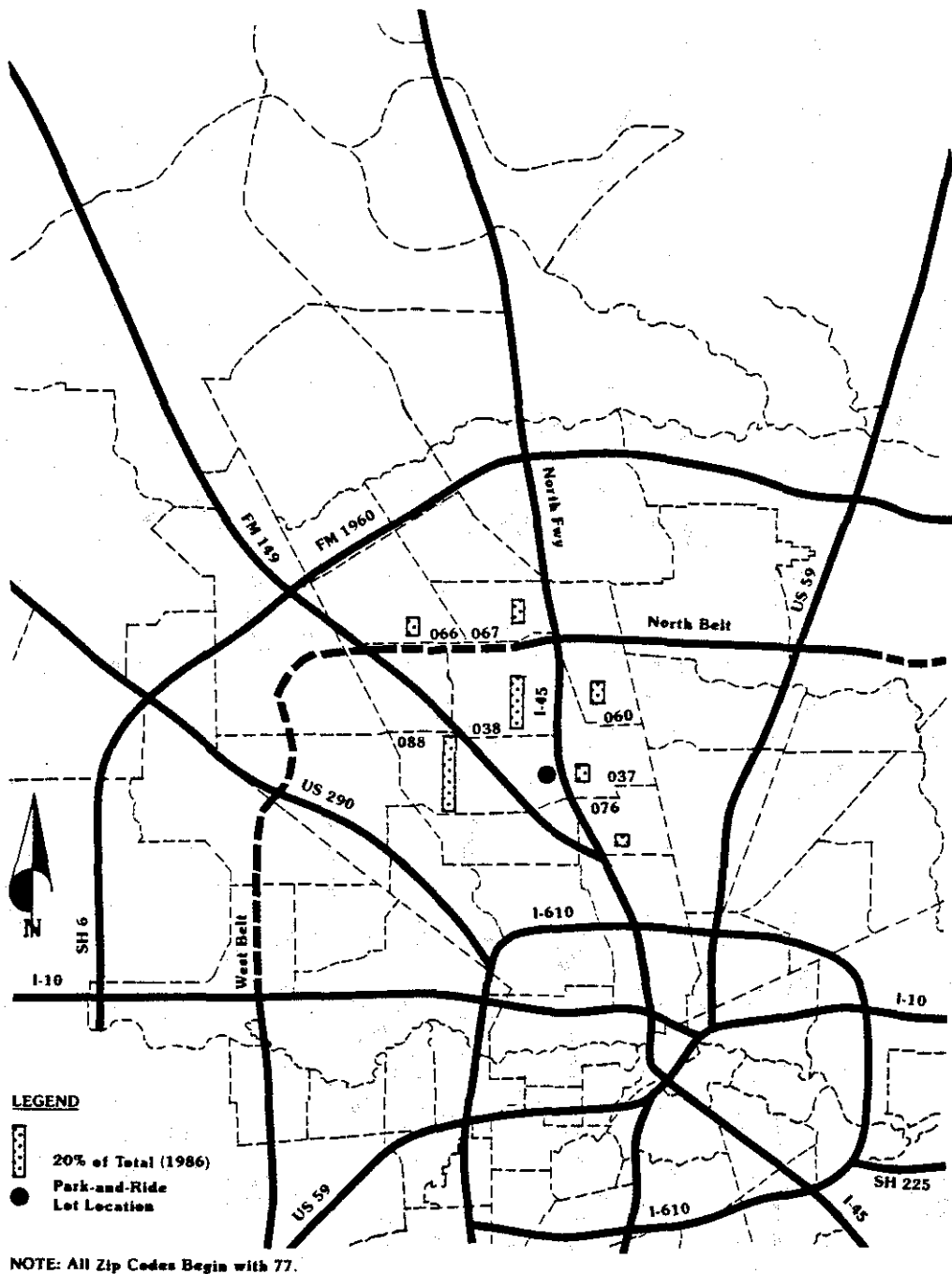


Figure 10.
Home Origins of Patrons of the North Shepherd Park-and-Ride Lot

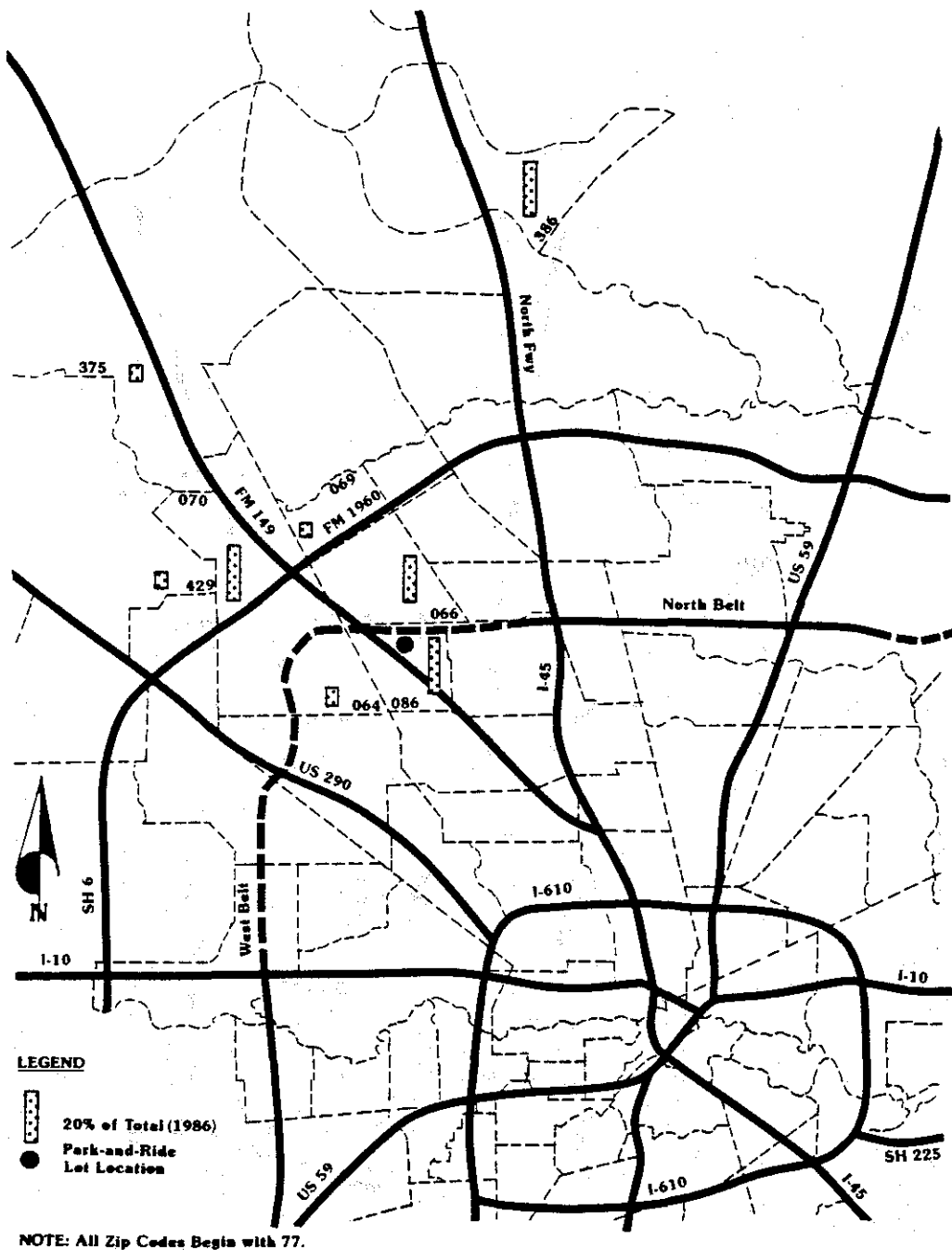


Figure 11.
Home Origins of Patrons of the Seton Lake Park-and-Ride Lot

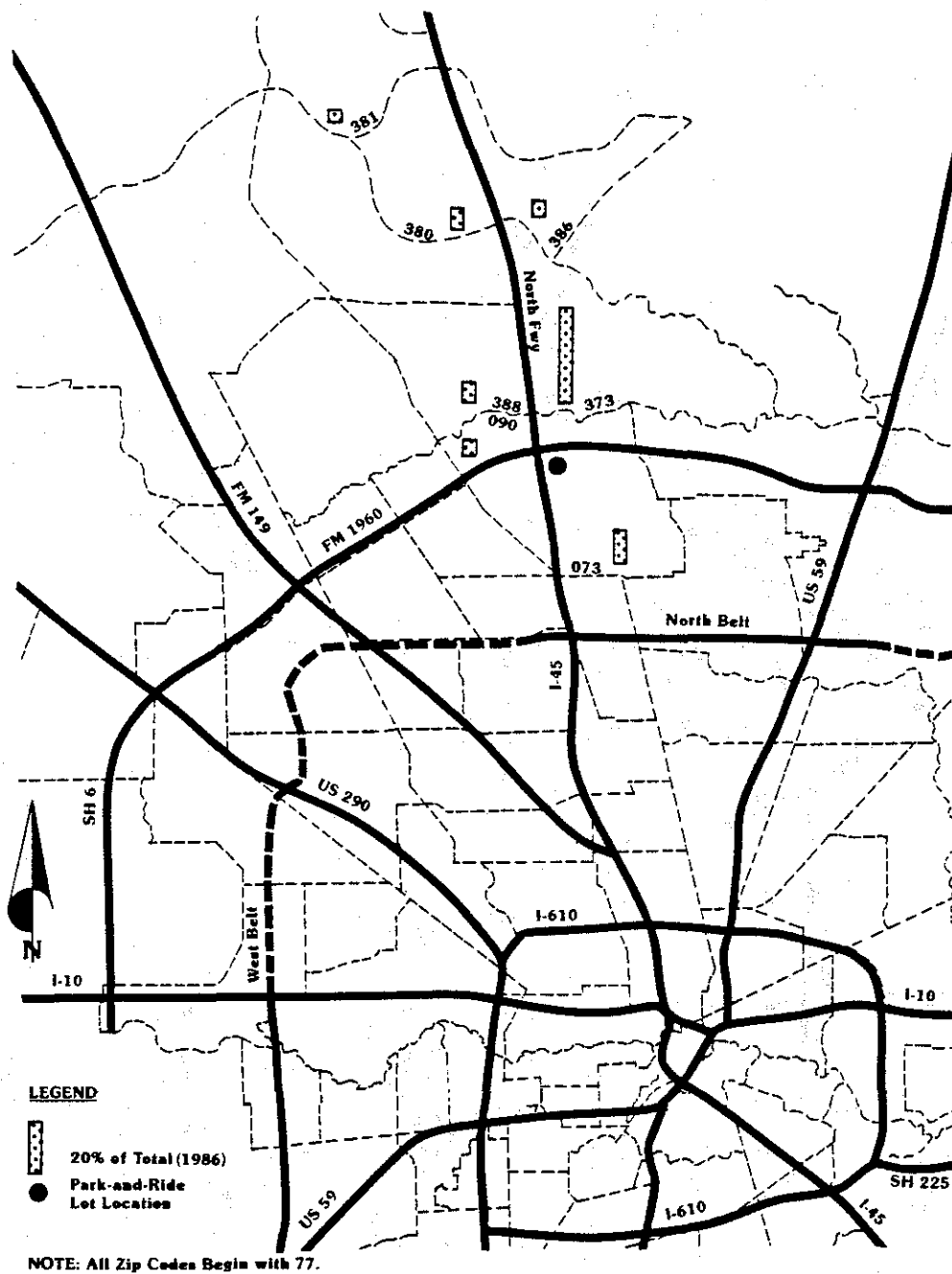


Figure 12.
Home Origins of Patrons of the Spring Park-and-Ride Lot

Table 7.
Zip Codes of Origin for North Transitway Transit Trips,
North Transitway Transit User Surveys

North Transitway Bus Route	Zip Code	Location Relative to North Freeway	% of Total Origins
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%

The Spring Park-and-Ride Lot is located on the east side of the North Freeway and more than 62% of its ridership originates from east of the freeway.

The ridership on the FM 1960 Express route primarily originates from Zip Codes immediately adjacent to FM 1960.

Trip Destination

The only destination served directly by the Katy Transitway bus operation is the downtown area; virtually all Katy Transitway bus trips being served are downtown trips (Table 8). 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 all transit trips being served by the North Transitway are downtown trips.

Auto Availability

The riders of the Katy and North Transitway transit routes are "choice" riders; the vast majority have an auto available for the trip, but prefer to ride a bus instead (Table 8).

Employer Contribution to Bus Fare

Most recent survey results show that, for 16% of the ridership on the Katy Transitway and 17% of that on the North Transitway, the employer pays the entire cost of the transit fare (Table 8). An additional 47% of the Katy Transitway bus patrons and 46% of the North Transitway bus patrons have part of their fares paid by the employer.

Table 8.
Travel Characteristics of Transitway Transit Users,
Katy and North Transitway Transit User Surveys

Characteristic	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Trip Destination					
<u>Total Sample</u>	(n=357)	(n=575)	(n=632)	(n=776)	(n=1252)
Downtown	96%	95%	94%	97%	94%
Galleria	—	0%	1%	0%	1%
Texas Medical Center	1%	1%	1%	1%	1%
Greenway Plaza	0%	0%	1%	0%	2%
Other	3%	4%	3%	2%	2%
<u>Park-and-Ride Routes</u>	(n=222)	(n=409)	(n=349)	(n=525)	(n=1149)
Downtown	97%	96%	96%	98%	95%
Galleria	—	0%	—	—	1%
Texas Medical Center	1%	1%	1%	1%	1%
Greenway Plaza	—	—	1%	—	2%
Other	2%	3%	2%	1%	1%
<u>Express Routes</u>	(n=135)	(n=166)	(n=283)	(n=251)	(n=103)
Downtown	94%	90%	91%	95%	91%
Galleria	—	1%	2%	1%	1%
Texas Medical Center	1%	2%	2%	2%	1%
Greenway Plaza	1%	1%	—	0%	—
Other	4%	6%	5%	2%	7%
Auto Available for Trip					
<u>Total Sample</u>	(n=354)	(n=575)	(n=622)	(n=772)	(n=1246)
No	7%	7%	10%	6%	5%
Yes, but inconvenient	10%	7%	8%	7%	5%
Yes, but prefer bus	83%	86%	82%	87%	90%
<u>Park-and-Ride Routes</u>	(n=220)	(n=410)	(n=343)	(n=522)	(n=1142)
No	5%	5%	7%	4%	5%
Yes, but inconvenient	8%	6%	5%	4%	4%
Yes, but prefer bus	87%	89%	88%	92%	91%
<u>Express Routes</u>	(n=134)	(n=165)	(n=279)	(n=250)	(n=104)
No	11%	12%	14%	9%	10%
Yes, but inconvenient	13%	11%	11%	13%	17%
Yes, but prefer bus	76%	77%	75%	78%	73%
Employer Payment of Bus Fare					
<u>Total Sample</u>	(n=355)	(n=574)	(n=628)	(n=772)	(n=1247)
Pays all	19%	15%	13%	16%	17%
Pays part	38%	41%	43%	47%	46%
pays none	43%	44%	44%	37%	37%
<u>Park-and-Ride Routes</u>	(n=221)	(n=408)	(n=347)	(n=522)	(n=1144)
Pays all	21%	18%	18%	17%	18%
Pays part	45%	46%	52%	52%	47%
Pays none	34%	36%	30%	31%	35%
<u>Express Routes</u>	(n=134)	(n=166)	(n=281)	(n=250)	(n=103)
Pays all	17%	7%	6%	14%	9%
Pays part	26%	31%	33%	38%	39%
Pays none	57%	62%	61%	48%	52%

Attitudes and Impacts Pertaining to the Transitways

Slightly more than half of the survey questions 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.

Time Savings and Duration of Transitway Use

Travel Time Savings. The transit users' perception of time saved by using the Katy or North Transitway is presented in Table 9. As this table indicates, Katy Transitway park-and-ride users perceived a greater time savings in 1986 than 1985. This may be attributed to the fact that the western terminus of the transitway was extended 1.7 miles from 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. After the 1986 survey, the Katy Transitway was extended an additional 5.1 miles from West Belt to State Highway 6. This extension did not increase the median travel time saving 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, 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.

Due to "backtracking" required in the route, users of the Memorial Express route do not perceive the same p.m. travel time savings as do the park-and-ride patrons (in 1985, 1986, 1987 or 1988). 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 patrons 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 time savings than do users of the Katy Transitway, even though the Katy Transitway is now 1.9 miles longer than the North Transitway.

Frequency distributions of perceived travel time savings along the Katy and North Transitways are presented in Figures 13 and 14.

Table 9.
Characteristics of Transitway Utilization,
Katy and North Transitway Transit User Surveys

Characteristic	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Perceived Transitway Travel Time Savings (minutes)					
<u>Total Sample</u>	(n=328)	(n=530)	(n=590)	(n=726)	(n=1147)
a.m. (50th Percentile)	9	15	15	20	20
p.m. (50th Percentile)	13	20	15	20	25
<u>Park-and-Ride Routes</u>	(n=208)	(n=388)	(n=334)	(n=501)	(n=986)
a.m. (50th Percentile)	10	15	15	20	20
p.m. (50th Percentile)	15	20	20	20	25
<u>Express Routes</u>	(n=120)	(n=142)	(n=256)	(n=225)	(n=94)
a.m. (50th Percentile)	8	15	10	15	25
p.m. (50th Percentile)	7	15	15	17	20
Actual Transitway Travel Time Savings (minutes)¹					
a.m. (50th Percentile)	6.8	3.0	4.4	5.1	4.2
p.m. (50th Percentile)	5.5	4.0	1.0	2.7	8.0
Duration of Transitway Use					
<u>Total Sample</u>	(n=352)	(n=562)	(n=618)	(n=755)	(n=1240)
% of riders using transitway since opened	71%	40%	31%	20%	75%
<u>Park-and-Ride Routes</u>	(n=222)	(n=405)	(n=345)	(n=514)	(n=1138)
% of riders using transitway since opened	68%	35%	28%	18%	77%
<u>Express Routes</u>	(n=130)	(n=157)	(n=273)	(n=241)	(n=102)
% of riders using transitway since opened	75%	51%	35%	23%	76%

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

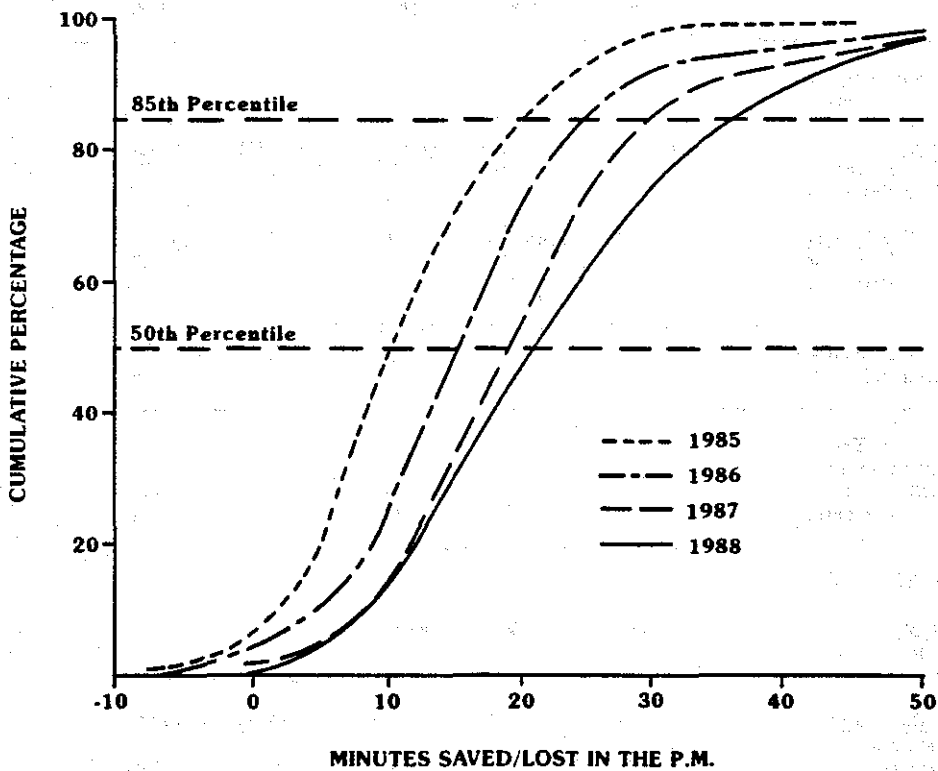
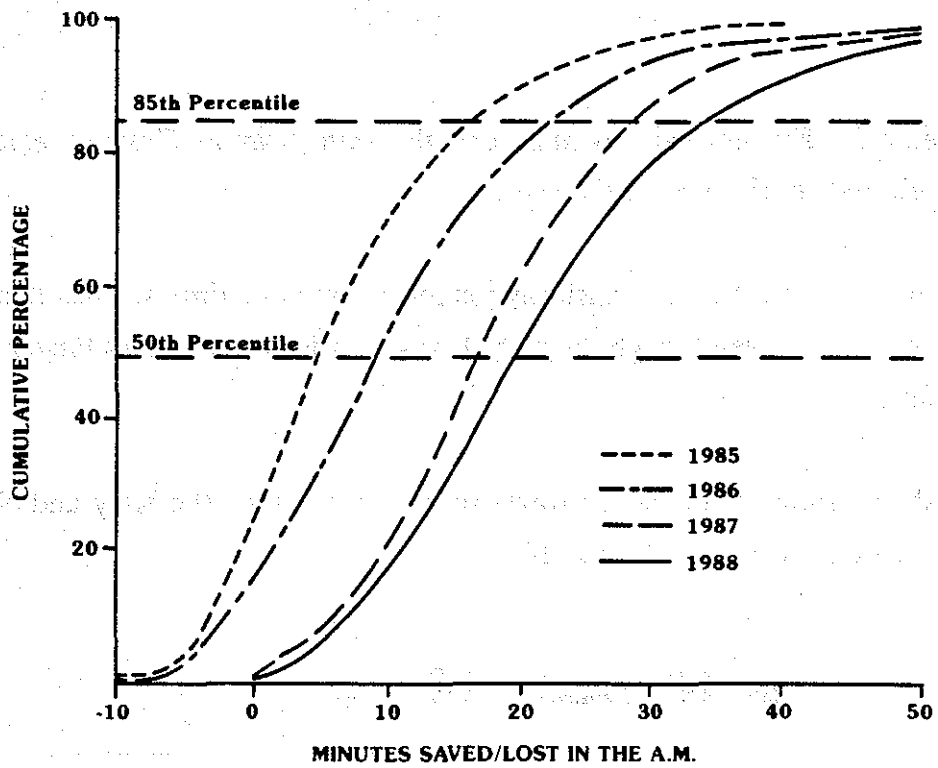


Figure 13.
 Perceived Katy Transitway Travel Time Savings,
 Katy Transitway Transit User Surveys

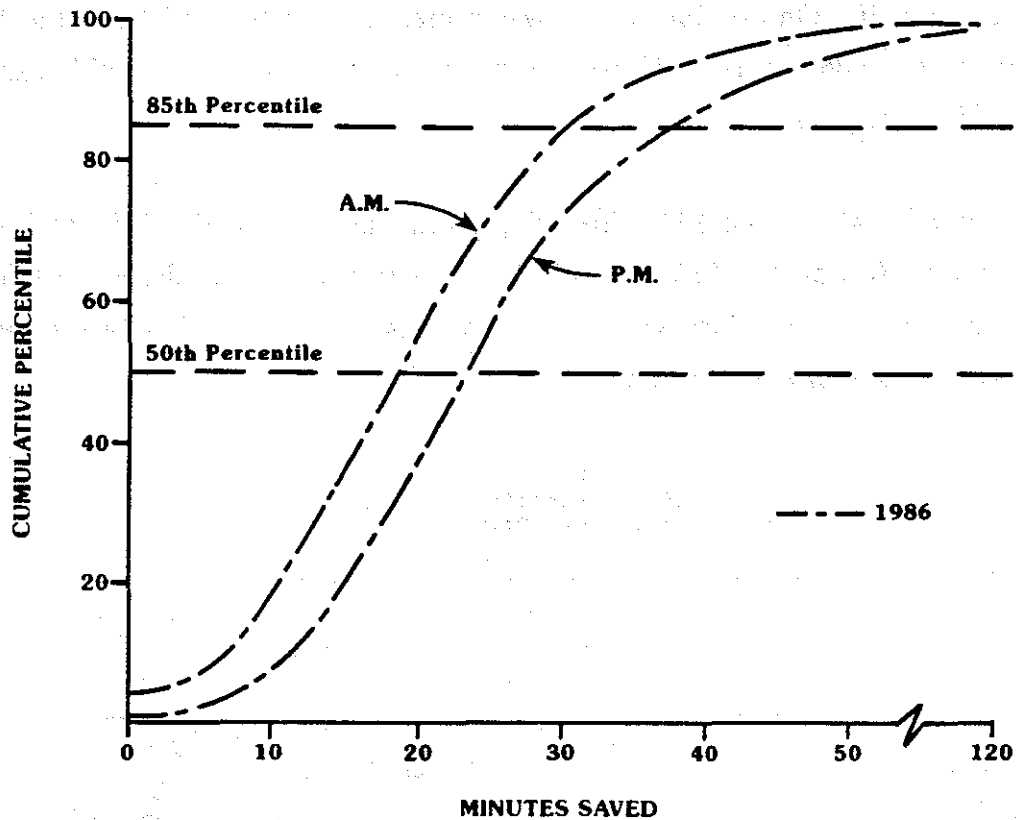


Figure 14.
Perceived North Transitway Travel Time Savings,
North Transitway Transit User Surveys

Duration of Transitway Use. 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 1988, this percentage dropped to 20% (after the transitway had been open 4 years).

Approximately 75% of the North Transitway transit patrons have used the lane since it opened (it had been open 18 months at the time of the survey).

Previous Travel Mode

Transit riders using the Katy and North 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 10. On the Katy Transitway routes, approximately 33% of the 1985 ridership, 46% of the 1986 and 1987 ridership and 51% of the 1988 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 ridership rode either 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.)

Table 10.
Previous Travel Mode,
Katy and North Transitway Transit User Surveys

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

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.)

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 11. In 1985, 69% of the Katy Transitway bus riders said "yes." By 1988, however, only 35% said "yes," indicating that the presence of the transitway has become more important in recent years.

On the North Transitway, 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.

Table 11.
Perceived Impacts of Transitway on Mode Choice,
Katy and North Transitway Transit User Surveys

Impact	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Ride Bus If No Transitway					
<u>Total Sample</u>	(n = 356)	(n = 575)	(n = 629)	(n = 773)	(n = 1247)
Yes	69%	43%	52%	35%	23%
No	15%	26%	20%	33%	41%
Not sure	16%	31%	28%	32%	36%
<u>Park-and-Ride Routes</u>	(n = 221)	(n = 410)	(n = 345)	(n = 522)	(n = 1145)
Yes	62%	37%	52%	31%	22%
No	22%	31%	24%	38%	42%
Not sure	16%	32%	24%	31%	36%
<u>Express Routes</u>	(n = 135)	(n = 165)	(n = 284)	(n = 251)	(n = 102)
Yes	79%	56%	53%	46%	34%
No	5%	14%	15%	21%	28%
Not sure	16%	30%	32%	33%	38%
How Important Was Transitway in Decision to Ride Bus					
<u>Total Sample</u>	(n = 357)	(n = 573)	(n = 626)	(n = 774)	(n = 1250)
Very important	39%	57%	54%	68%	76%
Somewhat important	26%	27%	24%	18%	17%
Not important	35%	16%	22%	14%	7%
<u>Park-and-Ride Routes</u>	(n = 222)	(n = 409)	(n = 345)	(n = 522)	(n = 1146)
Very important	47%	62%	57%	73%	76%
Somewhat important	27%	25%	24%	17%	17%
Not important	26%	13%	19%	10%	7%
<u>Express Routes</u>	(n = 135)	(n = 164)	(n = 281)	(n = 252)	(n = 104)
Very important	25%	44%	50%	58%	72%
Somewhat important	24%	30%	25%	20%	12%
Not important	51%	26%	25%	22%	16%

A related question asked how important the transitway is in their decision to ride a bus. Their responses to this question (Table 11) 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 and 1987, this percentage increased to more than 50%. By 1988, the percentage increased to 68%, further indicating that the transitway's role in mode choice decisions has become more important in recent years. For the North Transitway, 76% stated that the lane was "very important."

Perception of Transitway Utilization

One of the most important issues of the transit user surveys (and also the vanpool, carpool and motorist surveys) involves commuter perception of transitway utilization. One of the main reasons for permitting carpools on the Katy Transitway was to increase the perception of utilization. Transit patrons were asked whether they felt the transitway was sufficiently utilized to justify the project. Their responses are presented in Table 12.

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 of the transitway declined. Even so, 72% of those surveyed in 1988 felt the transitway is sufficiently utilized with the current 3+ restriction.

More than 80% of the North Transitway bus riders surveyed felt their transitway was sufficiently utilized.

In considering 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 utilizing the lane, and he is more likely to think in terms of the number of persons moved per bus.

Table 12.
Perception of Transitway Utilization,
Katy and North Transitway Transit User Surveys

Perception	Katy Transitway				North Transitway
	1985 ¹	1986 ²	1987 ³	1988 ⁴	1986 ⁵
Is the Transitway Sufficiently Utilized to Justify the Project					
<u>Total Sample</u>	(n=348)	(n=567)	(n=618)	(n=763)	(n=1230)
Yes	49%	66%	77%	72%	81%
No	33%	14%	7%	8%	6%
Not sure	18%	20%	16%	20%	13%
<u>Park-and-Ride Routes</u>	(n=218)	(n=404)	(n=339)	(n=515)	(n=1129)
Yes	55%	71%	81%	77%	81%
No	26%	11%	5%	6%	6%
Not sure	19%	18%	14%	17%	13%
<u>Express Routes</u>	(n=130)	(n=163)	(n=279)	(n=248)	(n=101)
Yes	37%	53%	72%	62%	79%
No	46%	21%	10%	12%	5%
Not sure	17%	26%	18%	26%	16%
Transitway Vehicle Volumes (A.M. Peak Period)⁶	138	256	2412	2032	394

- 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 volume counts

Comments

Survey participants were encouraged to use the back of the forms for additional comments. Approximately 20-25% of the participants did provide comments. Their comments are summarized in Table 13.

Table 13.
Additional Comments,
Katy and North Transitway Transit User Surveys

Comment	Percent of Total Comments				
	Katy Transitway				North Transitway
	1985	1986	1987	1988	1986
Extend the transitway	22%	5%	1%	—	23%
Provide more peak buses	16%	13%	11%	21%	14%
Poor transitway entry/exit design	16%	7%	10%	8%	—
Lose time doubling back (Memorial Route)	8%	7%	2%	1%	—
Bus fare too high	7%	2%	1%	3%	4%
Good job METRO/transitway is great	3%	13%	26%	23%	14%
Transitway too crowded with 2+ carpools	—	—	30%	20% ¹	—
Dislike old buses	—	—	—	—	5%
Other	28%	53%	19%	24%	30%

¹ On this survey, the comment was "Transitway was too crowded with 2+ carpools -- 3+ carpools between 6:45 a.m. and 8:15 a.m. was a good move."

CHAPTER 3

TRANSITWAY CARPOOL/VANPOOL USER SURVEYS

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

Previous reports (TTI Research Reports 484-4 and 484-8) present a breakdown of 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 and 1988 surveys included carpool/vanpool drivers only, so no passenger data are available. 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 14.

Table 14.
Personal Characteristics of Transitway Carpoolers/Vanpoolers,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

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

Age

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

Sex

More than half of the Katy, North, and Northwest Transitway pools are male; whereas 58% of the Gulf Transitway poolers are female.

Occupation

Most recent survey data indicate that between 33% and 45% of the transitway poolers are employed in "professional" positions, between 14% and 24% are classified as "managerial" and between 12% and 31% are employed in clerical positions. The high

percentage (31%) of clerical workers in the Gulf Transitway corridor is consistent with the high percentage (58%) of females.

Education

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

Travel Patterns and Trip Characteristics

As part of the initial survey efforts for each transitway evaluation (1985 and 1986 surveys of Katy Transitway carpoolers/vanpoolers; 1986 survey of North Transitway vanpoolers; and 1988 surveys of Northwest and Gulf Transitway carpoolers/vanpoolers), poolers were asked a series of questions pertaining to the formation and operation of the carpool/vanpool on the transitway.

Year Joined Carpool/Vanpool

The year transitway poolers joined their present carpool/vanpool is presented in Table 15. For the Katy Transitway corridor, 25% of the poolers surveyed in 1985 and 34% of those surveyed in 1986 reported joining their present carpool/vanpool after the opening of the Katy Transitway. (*Note: The Katy Transitway was open to vanpools in October 1984 and was open to carpools in April 1985.*)

For the Northwest Transitway Corridor, 34% of the transitway poolers reported joining their present carpool/vanpool after the opening of the Northwest Transitway (August 1988); 49% of the Gulf Transitway poolers joined their present carpool/vanpool after the opening of the Gulf Transitway (May 1988).

Table 15.
Travel Characteristics of Transitway Carpoolers/Vanpoolers
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Travel Characteristic	Katy Transitway Carpools/Vanpools		North Transitway Vanpools	Northwest Transitway Carpools/ Vanpools	Gulf Transitway Carpools/ Vanpools
	1985	1986	1986	1988	1988
Year Joined Present Carpool/Vanpool	(n=527)	(n=628)	(n=1600)	(n=222)	(n=111)
Before 1970	1%	3%	0%	—	1%
1970-1975	2%	1%	1%	1%	2%
1976-1980	17%	11%	19%	4%	6%
1981-1983	35%	17%	31%	6%	7%
1984	28%	12%	14%	4%	1%
1985	17%	38%	32%	4%	5%
1986	—	18%	3%	10%	6%
1987	—	—	—	11%	13%
1988	—	—	—	60%	59%
Joined Present Carpool/Vanpool	(n=549)	(n=646)	(n=1600)	(n=222)	(n=111)
Before Transitway Opened	75% ¹	66%	59%	66%	51%
After Transitway Opened	25%	34%	41%	34%	49%
Number of Months Carpools/ Vanpools Have Existed	(n=521)	(n=599)	(n=1562)	(n=222)	(n=111)
Average	29	27	33	17	24
Number of Months Transitway Has Been Open	6	12	18	3	6
Transitway Trip Frequency	(n=97)	(n=123)	(n=202)	(n=259)	(n=102)
% Carpools/Vanpools Using Daily	100%	98%	100%	84%	81%
Percent Carpools/Vanpools Using Transitway	(n=97)	(n=124)	(n=202)	(n=260)	(n=124)
a.m.	87%	88%	97%	99%	98%
p.m.	100%	99%	99%	72%	84%
Duration of Transitway Use	(n=92)	(n=124)	(n=199)	(n=257)	(n=123)
% Carpools/Vanpools Using Transitway Since Opening Day	76%	44%	94%	77%	67%
Main Reasons for Carpooling/ Vanpooling on the Transitway²	(n=1995)	(n=2625)	(n=7036)	(n=668)	(n=301)
Saves Time	19%	22%	20%	33%	31%
Freeway Too Congested	19%	21%	20%	31%	31%
Costs Less	16%	13%	15%	10%	10%
Reliable Schedule	13%	11%	13%	13%	15%
Time to Relax	13%	11%	13%	—	—
No Bus Service to Destination	4%	6%	5%	3%	2%
Car Used by Others	3%	4%	3%	3%	3%
No Other Way Available	1%	4%	1%	2%	0%
Other	12%	8%	10%	5%	8%

¹ The Katy Transitway opened to vanpools in October 1984 and opened to carpools in April 1985.

² On this question, it was possible to check more than one reason. Thus, the "n" value is the total number of reasons checked, not the number of surveys completed.

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, results of the 1988 Northwest and Gulf Transitway carpool/vanpool surveys confirm this theory.

<u>Transitway</u>	<u>Trip Purpose</u>
Northwest	94% Work; 5% School; 1% Other
Gulf	99% Work; 1% School

Transitway Trip Frequency

As would be expected for a travel mode that primarily serves work or school trips, almost all carpools/vanpools use the transitway five days per week (Table 15).

Percent of Carpools/Vanpools Using the Transitway by Time Period

Most all carpools/vanpools typically use the transitway in both the a.m. and p.m. (Table 15). Those which do not use the transitway in the a.m. generally indicated that: 1) they left before the transitway opened in the morning; 2) they used a different travel route in the morning; or 3) the transitway takes more time or is inconvenient in the morning (the regular freeway lanes are faster). Those which do not use the transitway in the p.m. typically stated that: 1) traffic on the freeway in the p.m. was not severe enough to warrant using the transitway; or 2) they cannot exit the transitway conveniently. In addition, a small percentage of the Northwest Transitway carpools reported using the Katy Transitway in the p.m.

Duration of Transitway Use

As shown in Table 15, approximately 76% of the Katy Transitway poolers surveyed in 1985 and 44% of those surveyed in 1986 reported using the priority lane since it opened (to vanpools in October 1984; to carpools in April 1985). On the North Transitway, more than 90% of the vanpoolers surveyed in 1986 reported using that facility since opening day. In the other two freeway corridors, approximately 77% of the Northwest Transitway poolers and 67% of the Gulf Transitway poolers had been using their transitway since opening day.

Reasons for Carpooling/Vanpooling on the Transitway

As indicated by the data in Table 15, the main reasons persons chose to carpool or vanpool on the transitway was:

- To save time;
- The freeway is too congested;
- It costs less; and
- A reliable travel schedule.

Trip Length

Transitway poolers were asked how long their round trip would be if they drove alone and how much longer their round trip is because they carpool/vanpool. Carpool/vanpool trip length frequencies are illustrated in Figure 15; 50th percentile and average responses are presented in Table 16. The average one-way carpool/vanpool trip in the Katy, Northwest and Gulf Transitway corridors is in excess of 20 miles; the average one-way vanpool trip in the North Transitway corridor is in excess of 30 miles.

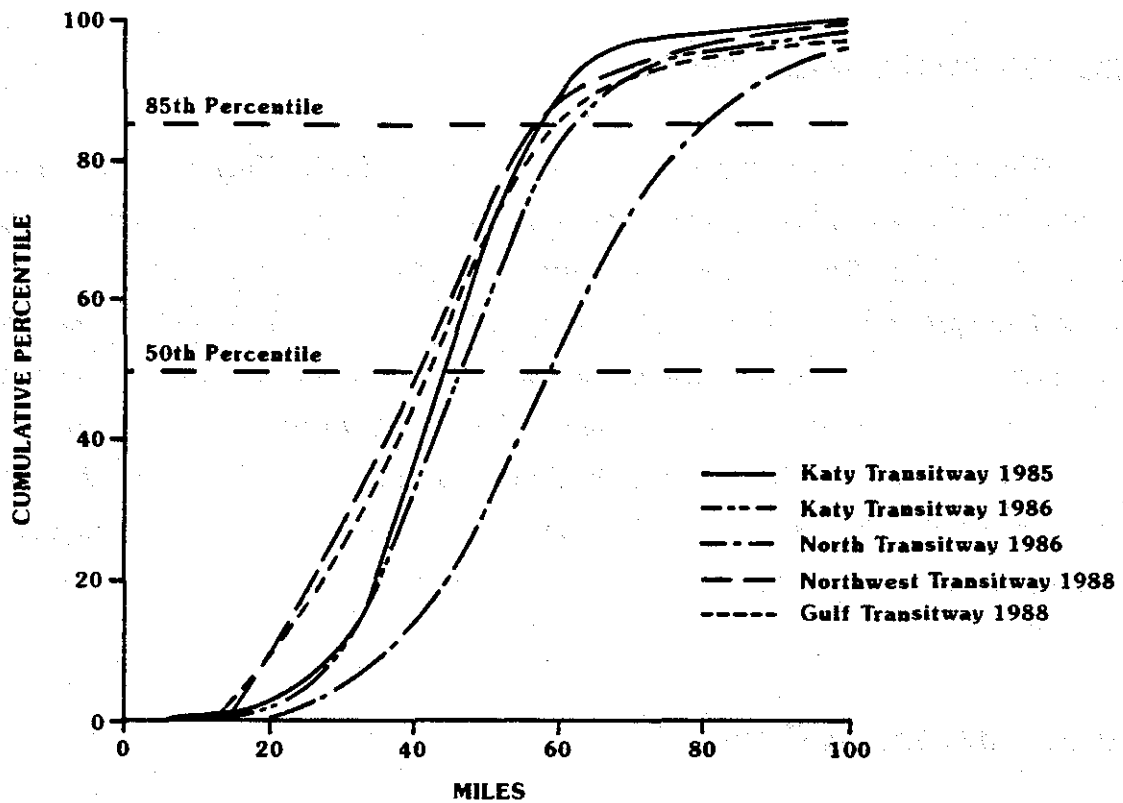


Figure 15.
Round Trip Mileage for Transitway Carpoolers/Vanpoolers

Table 16.
Trip Characteristics of Transitway Carpoolers/Vanpoolers
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Trip Characteristic	Katy Transitway Carpools/Vanpools		North Transitway Vanpools	Northwest Transitway Carpools/ Vanpools	Gulf Transitway Carpools/ Vanpools
	1985	1986	1986	1988	1988
Round Trip Distance if Drove Alone (miles)	(n=537)	(n=624)	(n=1617)	(n=244)	(n=114)
50th Percentile	44	48	58	41	40
Average	44	48	60	43	42
Extra Miles to Carpool/Vanpool	(n=515)	(n=612)	(n=1601)	(n=239)	(n=108)
50th Percentile	0	0	0	0	0
Average	2.1	2.0	2.5	1.3	1.8
Do Drivers Pick Up Passengers	(n=92)	(n=116)	(n=200)	(n=227)	(n=117)
At Home	24%	25%	13%	83%	70%
At Common Pick-Up Points	76%	75%	87%	17%	30%
Are There Employer Incentives to Carpool	(n=59)	(n=129)	---	(n=249)	(n=118)
Yes	25%	21%	---	8%	14%
No	75%	79%	---	92%	86%

Carpool/Vanpool Staging Points

More than three-fourths of the poolers surveyed in the Katy and North Transitway corridors in 1985 and 1986 reported that they pick up passengers at common staging points (Table 16). *(Note: This response is consistent with the fact that vanpools made up 66% of the total sample in the 1985 Katy Transitway survey, 46% of the sample in the 1986 Katy Transitway survey and 100% of the sample in the 1986 North Transitway survey; previous research has indicated that vanpool drivers typically pick up passengers at common staging points.)* By contrast, 70% of the Gulf Transitway poolers and 83% of the Northwest Transitway poolers indicated that either the pool was made up of family members who left from the same house or that they pick up passengers at home.

Employer Incentives to Carpool

Between 21% and 25% of the Katy Transitway carpoolers surveyed reported that their employer provided some sort of incentive for them to carpool. Employers of only 8% of the Northwest Transitway carpoolers and 14% of the Gulf Transitway carpoolers encouraged carpooling (Table 16). The incentives provided typically include: 1) subsidized parking; 2) transportation allowance; 3) company vehicles; and 4) permit flexible working hours.

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 17; Figure 16).
- Nearly 60% of the North Transitway vanpoolers reside in one of 8 Zip Code areas in north Houston (Table 17; Figure 17).

- More than three quarters of the Northwest Transitway carpoolers/vanpoolers reside in one of 7 Zip Code areas in northwest Houston (Table 17; Figure 18).
- Carpoolers and vanpoolers using the Gulf Transitway typically reside in one of 8 Zip Code areas in southeast Houston (Table 17; Figure 19).

Table 17.
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
Katy Transitway					
Carpools/Vanpools	(n=649)	(n=621)	(n=134)	(n=570)	(n=384)
77079	18%	18%	23%	14%	11%
77084	18%	15%	12%	14%	20%
77450	14%	19%	10%	15%	21%
77077	12%	11%	10%	9%	7%
77449	12%	14%	10%	16%	12%
77042	5%	3%	1%	4%	1%
77043	5%	3%	5%	3%	2%
77082	3%	2%	5%	4%	2%
77083	4%	5%	2%	4%	4%
Other	9%	10%	22%	17%	20%
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)
77040	----	----	----	----	24%
77095	----	----	----	----	14%
77064	----	----	----	----	13%
77065	----	----	----	----	8%
77070	----	----	----	----	8%
77429	----	----	----	----	8%
77041	----	----	----	----	7%
Other	----	----	----	----	18%
Gulf Transitway					
Carpools/Vanpools	----	----	----	----	(n=122)
77089	----	----	----	----	17%
77034	----	----	----	----	9%
77061	----	----	----	----	7%
77062	----	----	----	----	7%
77546	----	----	----	----	7%
77573	----	----	----	----	7%
77598	----	----	----	----	6%
77017	----	----	----	----	5%
Other	----	----	----	----	35%

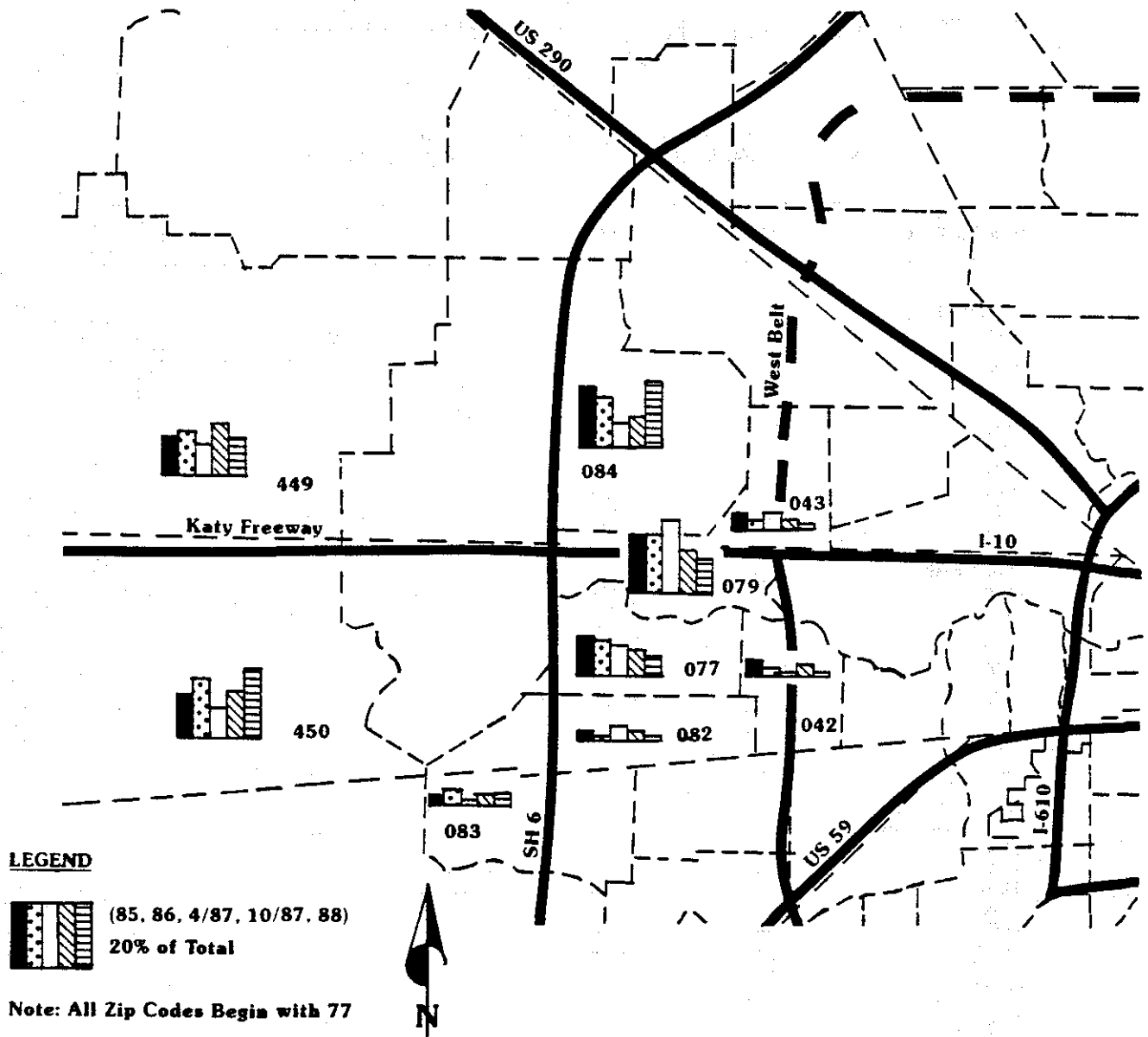


Figure 16.
Home Origins of Carpoolers and Vanpoolers Using the Katy Transitway

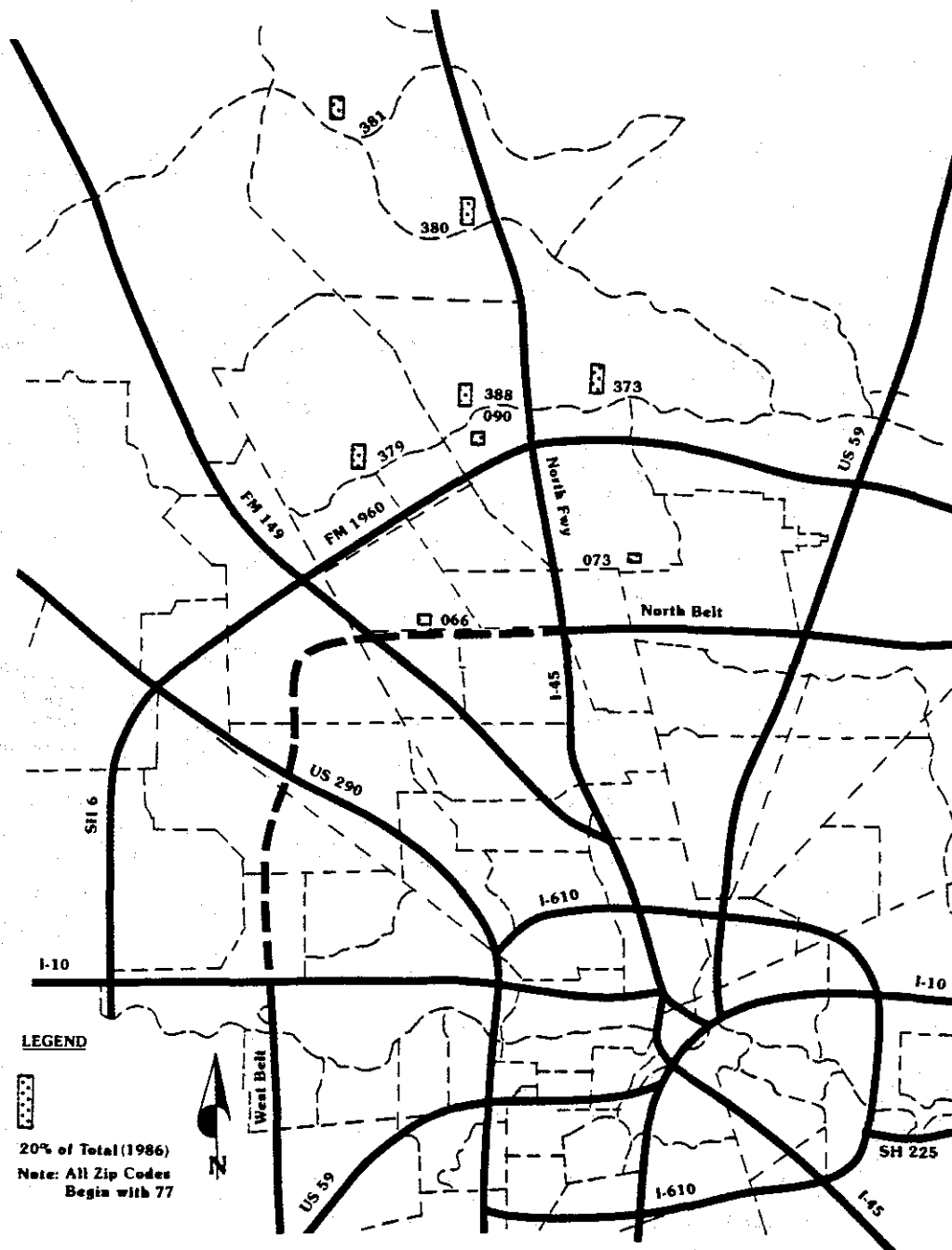
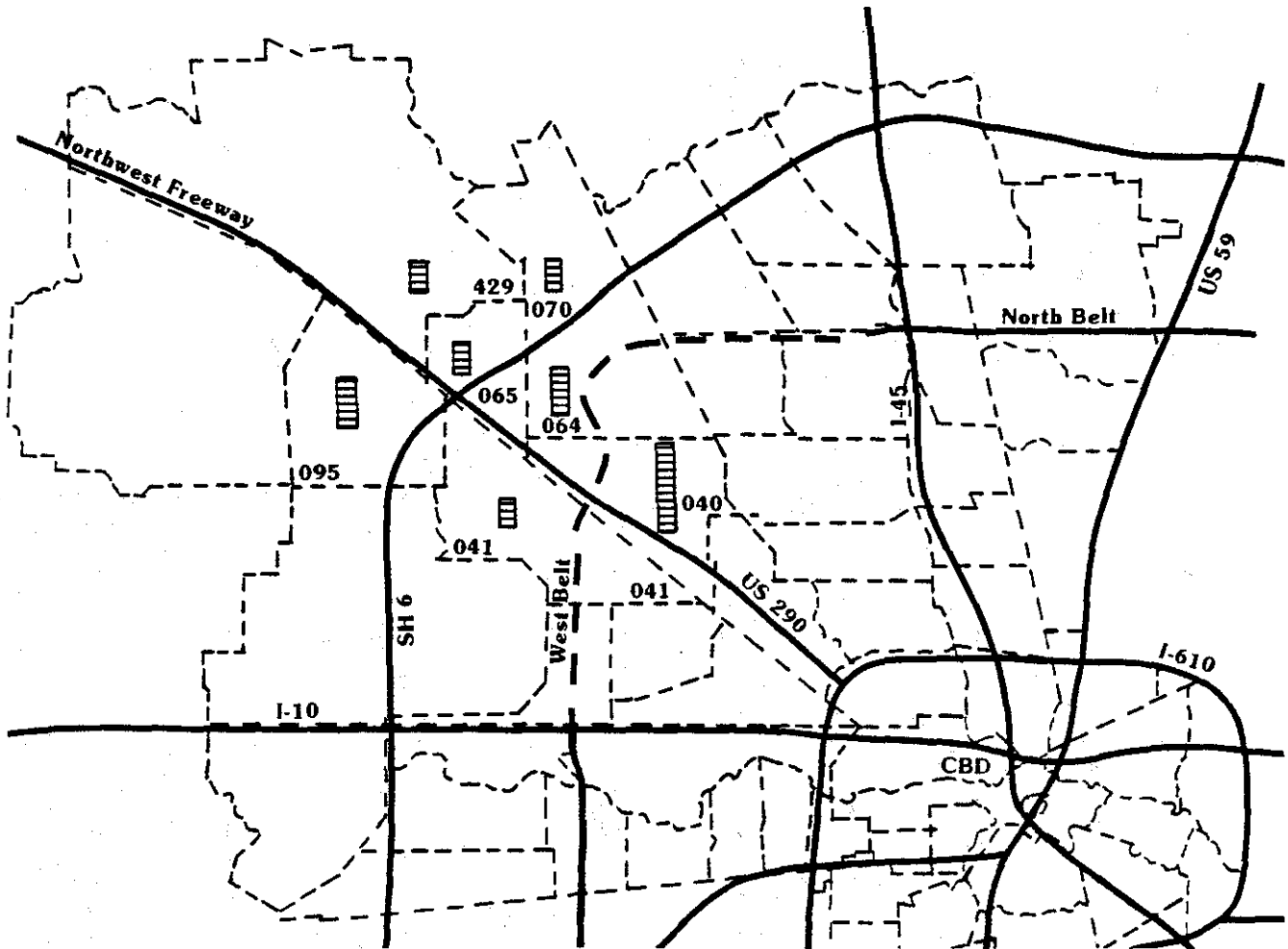




Figure 17.
Home Origins of Vanpoolers Using the North Transitway



Legend:

-  1988
-  20% of Total

Note: All Zip Codes Begin with 77

Figure 18.
Home Origins of Carpoolers and Vanpoolers Using the Northwest Transitway

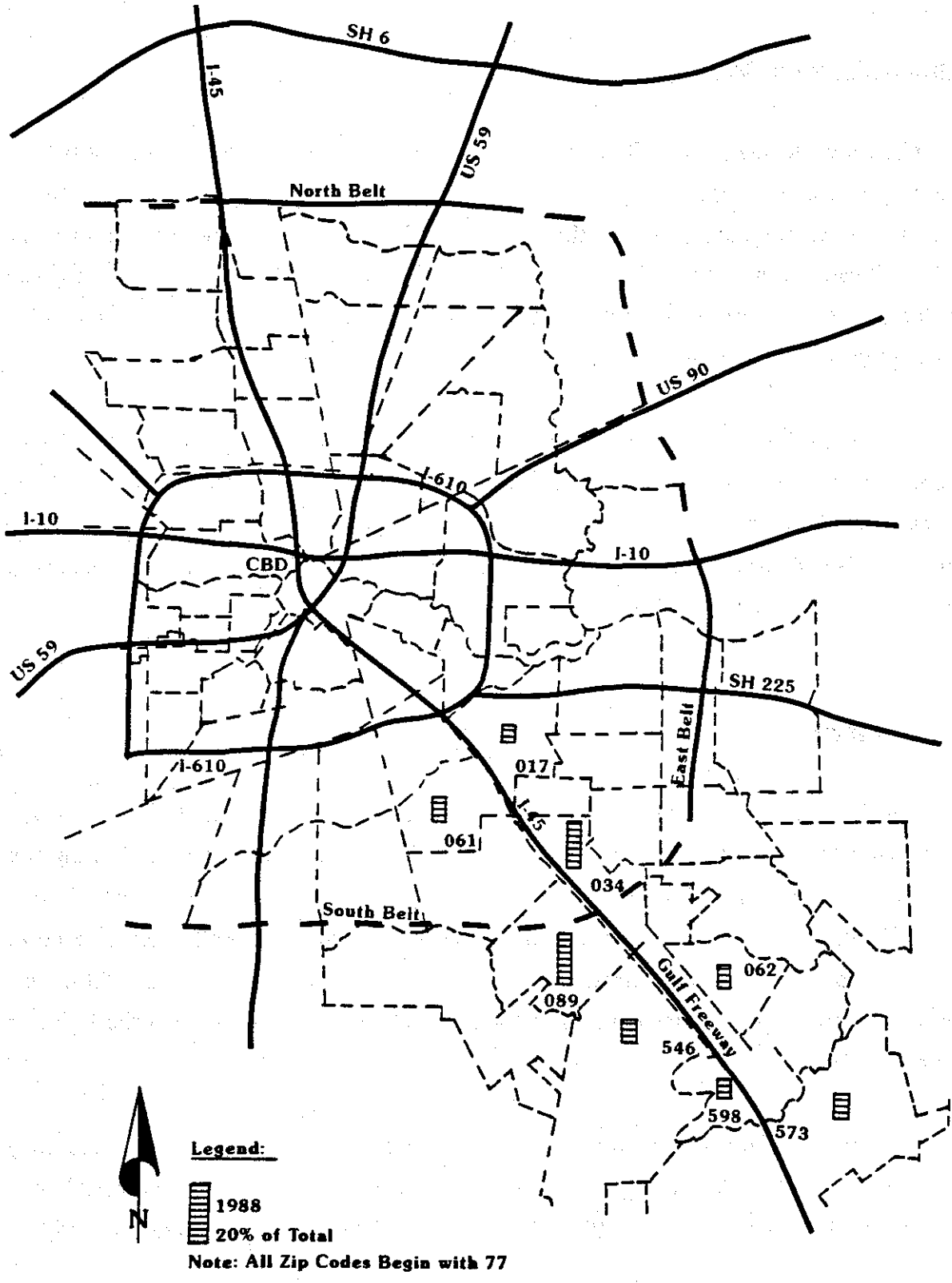


Figure 19.
Home Origins of Carpoolers and Vanpoolers Using the Gulf Transitway

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 52% use the I-10 ramp just west of SH 6; 26% 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, 82% reported they used the Little York flyover ramp, 17% enter via the Pinemont flyover ramp, and 1% use the Dacoma entrance. On the Gulf Transitway, 69% enter the transitway via the Broadway ramp and 31% enter from the South Loop (I-610) ramp. None of the Gulf Transitway poolers responding to the survey reported using 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 passenger requirement was raised from 2 to 3 persons between the hours of 6:45 a.m. and 8:15 a.m.

The actual occupancies of the carpools/vanpools traveling on the Katy Transitway is shown in Table 19. The average occupancy of Katy Transitway carpools/vanpools was 6.8 persons in 1985, 6.0 persons in 1986, 2.3 persons in 1987 and 2.5 persons in 1988.

Table 19.
Vehicle Occupancies and Trip Destinations of Transitway Carpoolers/Vanpoolers,
Katy, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

Carpool/Vanpool Characteristic	Katy Transitway Carpools/Vanpools				North Transitway Vanpools	Northwest Transitway Carpools/ Vanpools	Gulf Transitway Carpools/ Vanpools
	1985	1986	1987	1988	1986	1988	1988
Vehicle Occupancy	(n=97)	(n=123)	(n=592)	(n=409)	(n=202)	(n=261)	(n=124)
2 or less	—	1%	78%	65%	—	79%	78%
3	19%	30%	15%	24%	—	17%	13%
4	15%	23%	4%	9%	1%	3%	6%
5	4%	4%	1%	2%	2%	1%	2%
6	10%	5%	1%	0%	7%	—	1%
7	9%	3%	1%	—	9%	—	—
8	15%	8%	0%	—	14%	—	—
9	15%	4%	—	—	13%	—	—
10	2%	6%	—	—	16%	—	—
11	5%	6%	—	—	9%	—	—
12	4%	5%	0%	—	17%	—	—
More than 12	2%	5%	—	—	12%	—	—
Trip Destination	(n=95)	(n=123)	(n=597)	(n=404)	(n=199)	(n=268)	(n=123)
Downtown	57%	55%	39%	42%	61%	38%	81%
Galleria/City Post Oak/Uptown	12%	14%	22%	19%	7%	26%	9%
Greenway Plaza	6%	2%	6%	3%	8%	4%	3%
Texas Medical Center	4%	5%	5%	5%	4%	4%	—
Other	21%	24%	28%	31%	20%	28%	7%

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 19. The average occupancy of North Transitway vanpools was 9.7 persons.

Northwest and Gulf Transitways. At the time of the 1988 surveys along the Northwest and Gulf Transitways, both facilities were open to all 2+ vehicles; reported vehicle occupancies are presented in Table 19. The average occupancy of Northwest and Gulf Transitway pools is 2.3 persons.

Trip Destinations

Most recent survey data show that the downtown area is the single largest attractor of transitway carpool/vanpool trips (Table 19). In fact, 38% of poolers using the Northwest Transitway, 42% of those using the Katy Transitway, 61% of those using the North

Transitway and 81% 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 pooling on the transitway, between 36% and 50% of the Katy Transitway poolers drove alone. By contrast, 33% of the North Transitway vanpoolers, 59% of the Gulf Transitway poolers and 61% of the Northwest Transitway poolers were already carpooling or vanpooling prior to using the transitway (Table 20). Furthermore, when asked to identify their travel mode one year ago, more than 45% of the Northwest and Gulf Transitway poolers reported that they were carpooling or vanpooling. Poolers on 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 those responding replied "yes."

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

Travel Characteristic	Katy Transitway Carpools/Vanpools				North Transitway Vanpools	Northwest Transitway Carpools/ Vanpools	Gulf Transitway Carpools/ Vanpools
	1985	1986	1987	1988	1986	1988	1988
Previous Travel Mode	(n=549)	(n=624)	(n=588)	(n=391)	(n=1622)	(n=239)	(n=97)
Drove Alone	36%	39%	50%	45%	30%	34%	28%
Carpool	22%	17%	29%	33%	21%	60%	53%
Vanpool	12%	9%	3%	3%	12%	1%	6%
Bus	13%	13%	9%	7%	14%	4%	5%
Didn't Make Trip	17%	22%	9%	12%	23%	1%	8%
Travel Mode One Year Ago	----	----	----	----	----	(n=253)	(n=123)
Drove Alone	----	----	----	----	----	38%	32%
Carpool	----	----	----	----	----	45%	42%
Vanpool	----	----	----	----	----	1%	6%
Bus	----	----	----	----	----	2%	5%
Didn't Make Trip	----	----	----	----	----	14%	15%

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 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 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.

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	1986	1988	1988
Would You Carpool/Vanpool If No Transitway	(n=551)	(n=633)	(n=588)	(n=398)	(n=1632)	(n=255)	(n=122)
Yes	84%	68%	50%	54%	43%	70%	75%
No	8%	16%	37%	35%	27%	21%	14%
Not Sure	8%	16%	13%	11%	30%	9%	11%
How Important Was Transitway In Decision to Carpool/Vanpool	(n=547)	(n=632)	-----	-----	(n=1618)	(n=253)	(n=122)
Very Important	28%	46%	-----	-----	68%	53%	43%
Somewhat Important	16%	16%	-----	-----	18%	15%	22%
Not Important	56%	38%	-----	-----	14%	32%	35%

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 on early survey efforts in each transitway corridor asked how important was the transitway in the decision to carpool or vanpool. While most respondents indicated that they would be ridesharing even if the transitway had not opened, between 44% and 86% of those surveyed said the transitway was 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 20 and 21.

Katy Transitway. Generally speaking, Katy Transitway poolers have 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 and 1988 (after the transitway was extended to SH 6) are greater yet. Median perceived travel time savings in 1988 were 20 minutes for the a.m. and 22 minutes for the p.m.

North Transitway. Vanpoolers using the North Transitway apparently do not perceive a.m. freeway traffic congestion is as severe as p.m. traffic congestion and, 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 poolers on both of the transitways were 15 minutes for the a.m. and p.m. (Table 22).

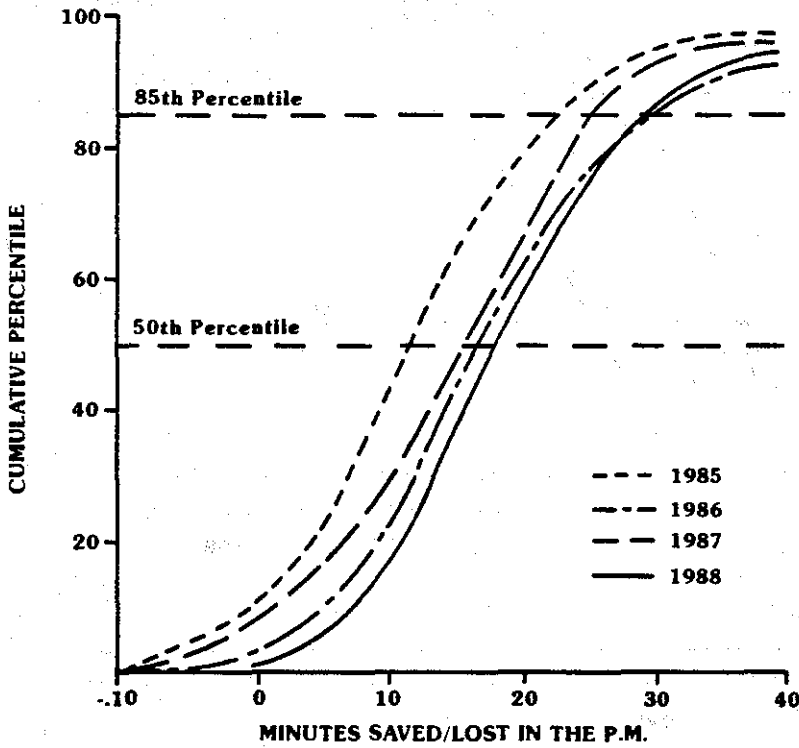
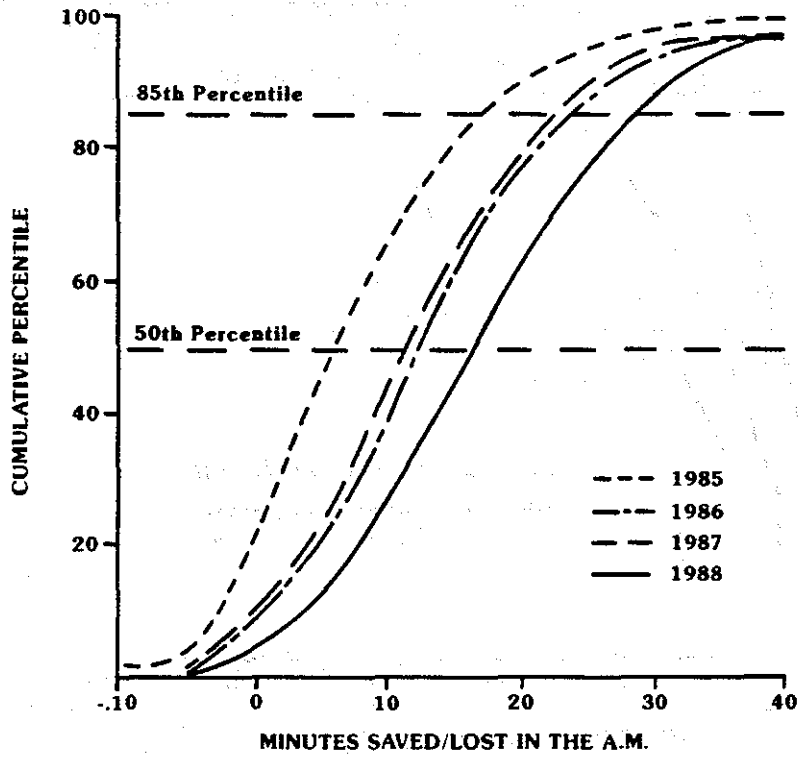


Figure 20.
Perceived Travel Time Savings, Katy Transitway Carpool/Vanpool Surveys

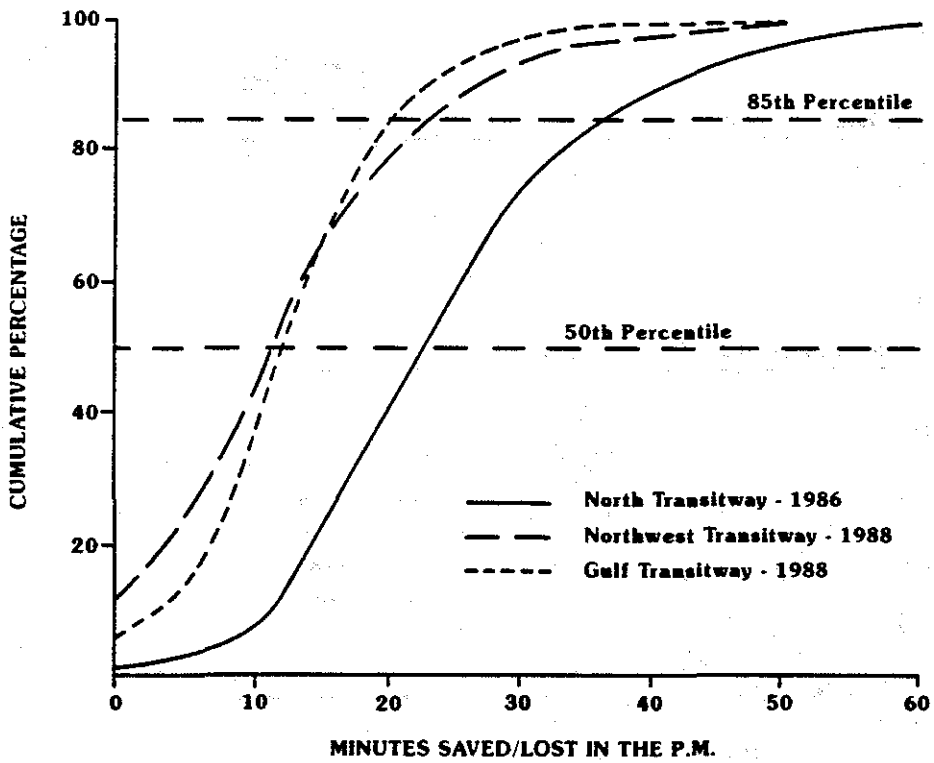
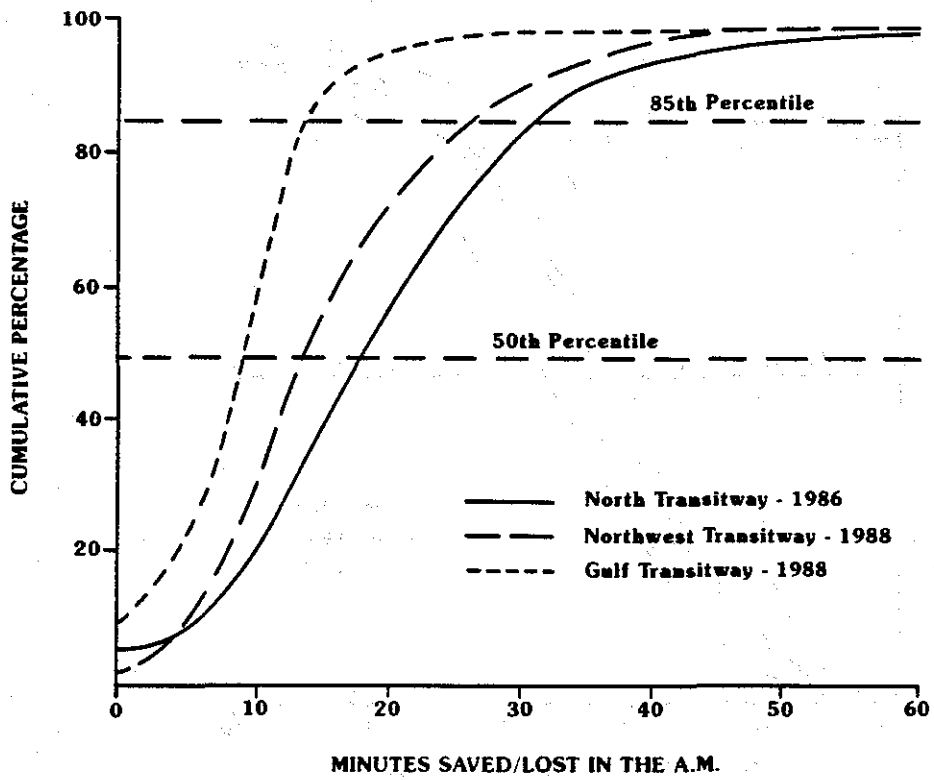


Figure 21.
Perceived Travel Time Savings, North, Northwest and Gulf Transitway Carpool/Vanpool Surveys

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	Northwest Transitway Carpools/ Vanpools	Gulf Transitway Carpools/ Vanpools
	1985	1986	1987	1988	1986	1988	1988
Perceived Transitway Travel Time Savings (minutes)	(n=505)	(n=588)	(n=592)	(n=394)	(n=199)	(n=256)	(n=121)
a.m. (50th Percentile)	8	10	20	20	20	15	15
p.m. (50th Percentile)	12	17	20	22	25	15	15
Actual Transitway Travel Time Savings (minutes)							
a.m. (50th Percentile)	6.8	3.0	4.4	5.1	4.2	3.1	3.3
p.m. (50th Percentile)	5.5	4.0	1.0	2.7	8.0	1.3	7.7

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

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 was 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 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 is sufficiently utilized with the current 3+ restriction.

By contrast, at least 65% of the Northwest and Gulf Transitway poolers felt these transitways are sufficiently utilized to justify the projects. Furthermore, 84% of the North Transitway vanpoolers felt that transitway was sufficiently utilized even without the presence of carpools on that facility (Table 23).

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	1986 ⁵	1988 ³	1988 ³
Is the Transitway Sufficiently Utilized to Justify the Project	(n=534)	(n=622)	(n=606)	(n=371)	(n=1616)	(n=257)	(n=118)
Yes	31%	42%	82%	47%	84%	69%	65%
No	50%	33%	9%	27%	7%	14%	21%
Not Sure	19%	25%	9%	26%	9%	17%	14%
Transitway Vehicle Volumes (A.M. Peak Period)⁶	138	256	2412	2032	394	961	681

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

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	1986	1988	1988
Transitway is great	7%	20%	51%	24%	16%	28%	23%
Extend the Transitway	26%	13%	3%	-----	29%	27%	43%
Transitway is underutilized	5%	9%	2%	1%	-----	-----	-----
3-person carpools a good move	6%	2%	-----	7% ¹	-----	-----	-----
Lower carpool occupancy requirement	1%	6%	-----	-----	-----	-----	-----
Poor transitway entry/exit design	12%	8%	14%	13%	-----	11%	8%
Enforce 55 mph minimum speed	-----	1%	12%	16%	-----	5%	10%
Keep carpool requirement at 2+	-----	-----	7%	14% ²	-----	8%	-----
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%	32%	21%	16%

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 requirements to 2+ during all hours of operation."

CHAPTER 4

KATY FREEWAY CARPOOL/VANPOOL USER SURVEYS

As mentioned previously, the third major "after carpools" Katy Transitway evaluation performed in 1988 included a survey of carpools/vanpools who had previously used the transitway during the a.m. peak, but were now using the freeway mainlanes since they no longer had the required number of occupants to use the transitway during the peak period. Consistent with other survey efforts, the freeway carpool/vanpool survey was designed to address 3 primary areas:

- Personal characteristics;
- Travel patterns and trip characteristics; and
- Attitudes toward the transitway with the new operating restrictions.

Personal Characteristics

Responses to questions concerning the age, sex, occupation and educational level of Katy Freeway carpools and vanpools are presented in Table 25. As expected, the personal characteristics of the Katy Freeway poolers are similar to those of the Katy Transitway poolers.

Age

The median age of the Katy Freeway carpools/vanpools is 35 (the median age of transitway poolers is 36).

Sex

More than half (56%) of the freeway poolers are male (54% of the transitway poolers are male).

Table 25.
Personal Characteristics of Katy Freeway Carpoolers/Vanpoolers,
Katy Freeway Carpool/Vanpool Survey

Personal Characteristic	1988
Age	(n=618)
50th Percentile	35
Sex	(n=608)
Male	56%
Female	44%
Occupation	(n=599)
Professional	41%
Managerial	23%
Clerical	12%
Sales	9%
Student	5%
Service Worker	4%
Craftsman	3%
Homemaker	2%
Other	1%
Education	(n=602)
Average	15.4

Occupation

Approximately 64% of the freeway poolers are employed in occupations which can be classified as either "professional" or "managerial" (63% of the transitway poolers are employed in "professional" or "managerial" positions).

Education

The average freeway pooler has completed 3.4 years of college (the average transitway pooler has completed 3.5 years of college).

Travel Patterns and Trip Characteristics

Use of the Katy Transitway

A series of 4 questions was asked relating to the carpool/vanpool's use of the Katy Transitway. First, poolers were asked if they are still using the Katy Transitway on a regular basis. Only 40% responded "yes." Those which still use the transitway were then asked what actions they had to take to still be eligible to use the facility. As indicated in Table 26, 49% of the poolers adjusted to the new requirement by changing their morning departure time; 37% now use the transitway before 6:45 a.m. and 12% now use the facility after 8:15 a.m. An additional 9% added another passenger to their carpool/vanpool and 3% reported that they now travel by bus instead of a carpool.

Nineteen percent reported using the transitway in the evenings only now and 20% reported that no change in travel pattern or schedule was necessary as they already had a 3+ carpool or they were already routinely using the transitway before 6:45 a.m. or after 8:15 a.m.

Table 26.
Actions Necessary to Continue Using the Transitway
Katy Freeway Carpool/Vanpool Survey

Action	1988
	(n=412)
Changed departure time to use transitway before 6:45 a.m.	37%
Changed departure time to use transitway after 8:15 a.m.	12%
Added additional passenger(s) to my carpool/vanpool	9%
Now use transitway in the evenings only	19%
Now use a bus instead of a carpool	3%
No action was necessary -- already had 3+ carpool/vanpool	14%
No action was necessary -- already use transitway before 6:15 or after 8:15 a.m.	6%

Next, poolers who still use the transitway on a regular basis were asked the time they normally entered the transitway in the mornings. The majority of poolers now enter between 5:45 a.m. and 6:45 a.m. (Table 27).

Table 27.
Time Carpools/Vanpools Now Enter the Transitway in the Mornings,
Katy Freeway Carpool/Vanpool Survey

Time Enter Transitway	1988
	(n = 315)
5:45 a.m. - 6:45 a.m.	60%
6:46 a.m. - 8:14 a.m.	23%
8:15 a.m. - 9:00 a.m.	17%
Median departure time	6:40 a.m.

Freeway carpoolers/vanpoolers who no longer use the transitway were asked if they were considering either changing their morning departure time or adding another passenger to the carpool to be able to return to the transitway. Approximately 15% of the 249 poolers indicated they are considering changing their departure time; an additional 8% are considering adding another passenger.

Freeway poolers no longer using the transitway were also asked if they will continue to carpool on a regular basis. Forty-six percent responded "yes,"; 38% said "no"; and 16% were "not sure."

Home Zip Codes

An analysis of home Zip Code data for the Katy Freeway carpoolers and vanpoolers indicates that the majority of poolers reside in one of 5 Zip code areas (Figure 22; Table 28). This data is consistent with that which was reported by the transitway carpoolers and vanpoolers.

Vehicle Occupancies

As to be expected, more than 80% of the freeway carpools/vanpools have only 2 members (Table 28).

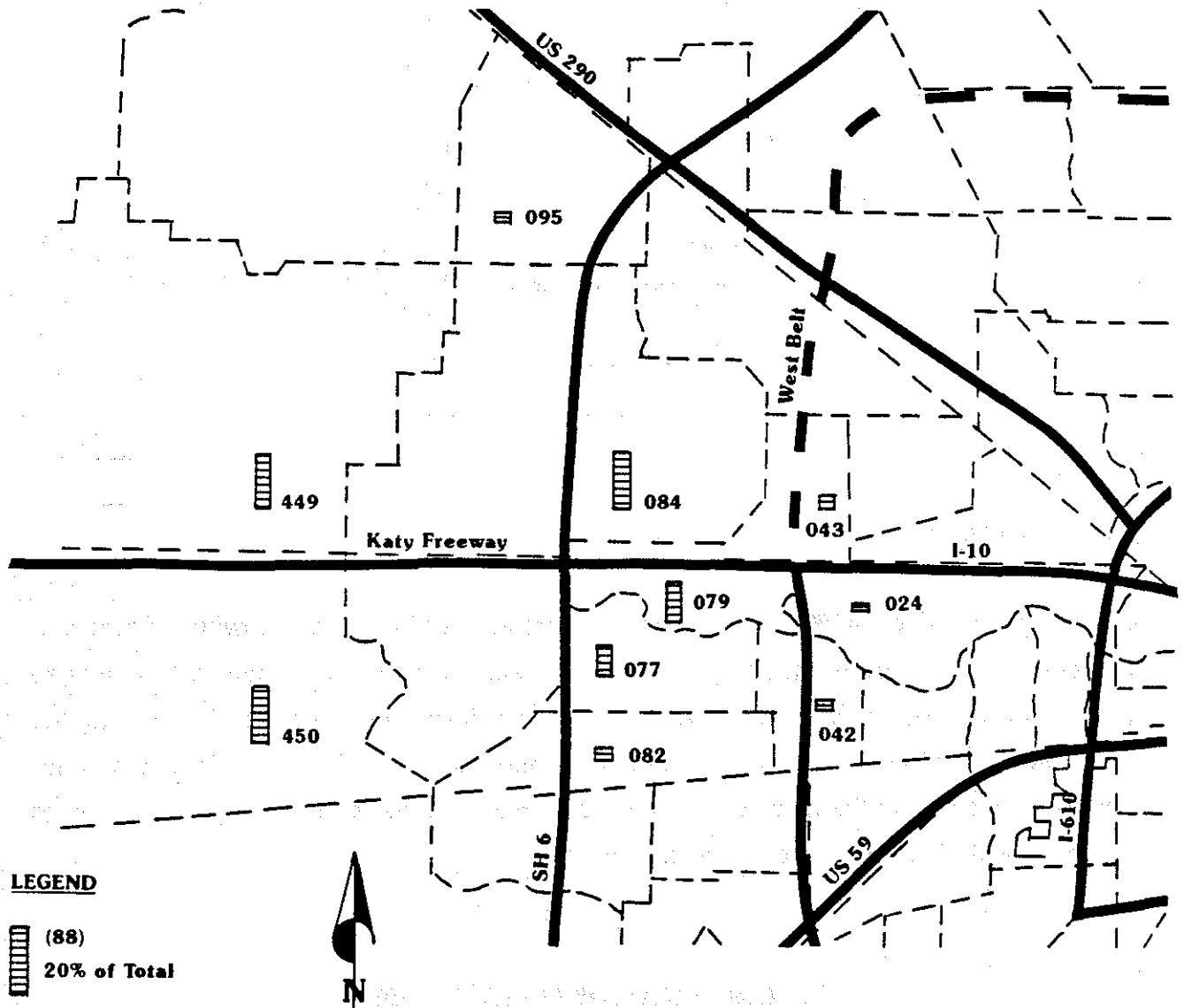


Figure 22.
Home Origins of Carpoolers and Vanpoolers Using the Katy Freeway

Table 28.
Home Zip Code, Vehicle Occupancy and Trip Destination,
Katy Freeway Carpool/Vanpool Survey

Characteristic	1988
Home Zip Code (n=627)	
77450	16%
77084	16%
77449	15%
77079	12%
77077	9%
77043	4%
77083	4%
Other	24%
Vehicle Occupancy (n=607)	
1	2%
2	82%
3	12%
4	2%
5 or more	2%
Carpool/Vanpool A.M. Destination (n=617)	
Downtown	41%
Galleria	20%
Greenway Plaza	6%
Texas Medical Center	6%
Other	27%

Trip Destinations

Approximately 41% of the freeway poolers are destined to the downtown area and an additional 20% are destined to the Galleria area. This data are remarkably similar to the transitway pooler data where 42% of the transitway poolers were destined to the downtown and 19% to the Galleria. For these poolers, the likelihood of finding another passenger to travel to the downtown or the Galleria areas may be higher than that for other poolers not destined to a major activity center.

Attitudes Pertaining to the Transitway

Two of the questions asked of the freeway carpoolers/vanpoolers were designed to collect information concerning attitudes toward raising the minimum vehicle occupancy requirement to 3 persons during the morning peak. The first question asked, "In your opinion, was the congestion on the transitway sufficiently severe to justify the change in

carpool occupancy requirement?" As noted in Table 29, 47% of the freeway poolers responded "no."

Table 29.
Perceptions of Transitway Congestion and Utilization,
Katy Freeway Carpool/Vanpool Survey

Attitude	1988
Was Congestion on Transitway Sufficiently Severe to Justify the Change in Carpool Occupancy Requirements?	
	(n = 618)
Yes	37%
No	47%
Not sure	16%
With the 3+ Carpool Requirement, Do You Feel the Transitway is Sufficiently Utilized?	
	(n = 619)
Yes	29%
No	51%
Not sure	20%

The second question asked, "With the 3+ carpool requirement, do you feel that the Katy Transitway is, at present, sufficiently utilized to justify the project?" Not too surprisingly, more than half of the freeway poolers indicated that it was not. This compares to only 27% of the transitway poolers who felt the facility was not sufficiently utilized.

Comments

Katy Freeway carpoolers and vanpoolers were asked to provide additional comments. A total of 439 comments were received. As to be expected, the highest percentage of these dealt with the new 3+ restriction on carpools during the a.m. peak (Table 30.) Included in these comments are their perceptions of the major causes of the congestion on the transitway (traffic light at the Post Oak terminus, slow drivers, and too many carpools getting on the transitway at Gessner).

**Table 30.
Additional Comments,
Katy Freeway Carpool/Vanpool Survey**

Comment	1988
Cannot use transitway now - please lift restriction on 2-person carpools	20%
Backup on transitway was due to light at Post Oak - regulate light & allow 2-person carpools on transitway	16%
Congestion on transitway was caused by slow drivers - enforce 55 mph min. & allow 2-person carpools on transitway again	9%
Transitway is great	8%
Close Gessner entrance to all carpools & allow 2-person carpools on transitway again	7%
Transitway was too congested - 3+ requirement good move	7%
Shorten time period for 3+ occupancy requirement	6%
Transitway is underutilized with 3+ requirement	5%
Other	22%

CHAPTER 5

FREEWAY MOTORIST SURVEYS

Surveys were conducted of motorists using the Katy and North Freeway mainlanes during the a.m. transitway operating periods. As was the case with the other transitway user and nonuser surveys, the motorist surveys 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 were asked to identify age, sex, occupation and last year of school completed. The responses to these questions are summarized in Tables 31 and 32. Also summarized in these tables are data collected from previous motorist surveys conducted before the Katy and North Transitways were opened. In most instances the "before" and "after" data are similar.

Age

The median Katy Freeway motorist's age was 40 in 1985 and 1986, 39 in 1987 and 41 in 1988. The median age of the North Freeway motorist is 36.

Table 31.
Personal Characteristics of Motorists on the Katy Freeway,
Katy Freeway Motorist Surveys

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

Table 32.
Personal Characteristics of Motorists on the North Freeway,
North Freeway Motorist Survey

Personal Characteristic	Before Transitway		After Transitway
	1981	1984	1986
Age (years)	(n=449)	(n=52)	(n=404)
50th Percentile	40	32-41	36
Sex	(n=482)	(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	(n=444)	(n=52)	(n=397)
Average	15.4	14.5	14.8

Sex

The majority of the Katy and North Freeway motorists are male.

Occupation

As was the case with the transitway users, the majority of the motorists surveyed in 1985-1988 are employed in occupations which are classified as either "professional" or "managerial."

Education

Katy and North Freeway motorists are a well educated group. On the average, Katy Freeway motorists have completed more than 3 1/2 years of college; North Freeway motorists have completed more than 2 1/2 years of college.

Travel Patterns and Trip Characteristics

Questions were asked regarding the selection of the auto mode, trip purpose, usual travel mode, trip frequency, vehicle occupancy, trip origin and trip destination. Several of these questions are similar to questions asked in previous surveys of Katy and North Freeway motorists. When possible, for comparative purposes, data from the previous surveys are also presented in this section.

Trip Purpose

Trip purpose data for Katy and North Freeway motorists are presented in Table 33. As was the case with the transit and carpool/vanpool surveys, virtually all of the peak period motorist trips are to work.

Table 33.
Trip Characteristics of Motorists on the Katy and North Freeways,
Katy and North Freeway Motorist Surveys

Trip Characteristic	Katy Freeway				North Freeway	
	1985	1986	Spring 1987	Fall 1987	1988	
Trip Purpose	(n=451)	(n=741)	(n=950)	(n=1431)	(n=1064)	(n=425)
Work	94%	91%	90%	92%	90%	90%
School	3%	2%	3%	3%	4%	3%
Other	3%	7%	7%	5%	6%	7%
Trip Frequency (days per week)	(n=442)	(n=722)	---	(n=1417)	(n=1049)	(n=415)
0-1	5%	6%	---	9%	7%	9%
2	4%	3%	---	3%	4%	2%
3	3%	3%	---	3%	5%	3%
4	4%	4%	---	2%	4%	3%
5 or more	84%	84%	---	83%	80%	83%
Vehicle Occupancy (persons/vehicle)	(n=445)	(n=734)	---	(n=1434)	(n=1065)	(n=420)
1	83%	89%	---	84%	87%	84%
2	12%	7%	---	13%	10%	13%
3	3%	2%	---	2%	2%	2%
4 or more	2%	2%	---	1%	1%	1%

Trip Frequency

At least 80% of the freeway motorist trips surveyed occurred 5 or more days per week (Table 33).

Vehicle Occupancy

On the Katy Freeway, peak period vehicle occupancies (persons/vehicle) averaged 1.2 all 4 survey years (1985-1988). On the North Freeway, vehicle occupancies also averaged 1.2 persons per vehicle (Table 33).

Trip Origin

Two questions were asked concerning trip origin. The first asked for 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, 1987 and 1988 motorist surveys were conducted at locations between Wilcrest and Barker-Cypress. The North Freeway motorist survey was conducted between Greens Road and FM 1960.

Katy Freeway Home Zip Codes. Katy Freeway motorists surveyed listed 50 different Zip Codes in 1985, 42 in 1986, 70 in 1987 and 66 different Zip Codes in 1988. The most commonly listed home Zip Code in all four survey years was 77079 (Table 34, Figure 23); between 20% and 41% of the Katy Freeway motorists surveyed resided in this Zip Code area.

Table 34.
Characteristics of Trip Origins of Motorists on the Katy and North Freeways,
Katy and North Freeway Motorist Surveys

Trip Characteristic	1985	1986	Spring 1987	Fall 1987	1988
Home Zip Code	(n=444)	(n=729)	(n=944)	(n=1425)	(n=1058)
77079	20%	35%	34%	24%	41%
77024	12%	3%	3%	1%	1%
77043	9%	9%	8%	6%	7%
77077	7%	21%	20%	12%	14%
77080	7%	1%	1%	0%	0%
77084	6%	3%	3%	10%	7%
77042	6%	9%	12%	3%	4%
77055	5%	1%	—	0%	0%
77450	5%	3%	2%	20%	6%
77082	2%	5%	5%	3%	2%
77449	4%	1%	1%	12%	3%
Other	17%	9%	11%	9%	15%
A.M. Freeway Entrance Ramp	(n=438)	(n=726)	—	(n=1405)	(n=1031)
Gessner	13%	2%	—	3%	5%
Wilcrest	12%	40%	—	19%	24%
Blalock	10%	1%	—	0%	0%
West Belt	9%	15%	—	—	3%
Dairy Ashford	9%	20%	—	14%	13%
Bunker Hill	9%	1%	—	1%	1%
SH 6	8%	4%	—	5%	15%
Kirkwood	8%	5%	—	12%	22%
Fry Road	6%	3%	—	17%	3%
Mason	4%	1%	—	13%	4%
Barker-Cypress	3%	1%	—	9%	1%
Other	9%	7%	—	7%	9%

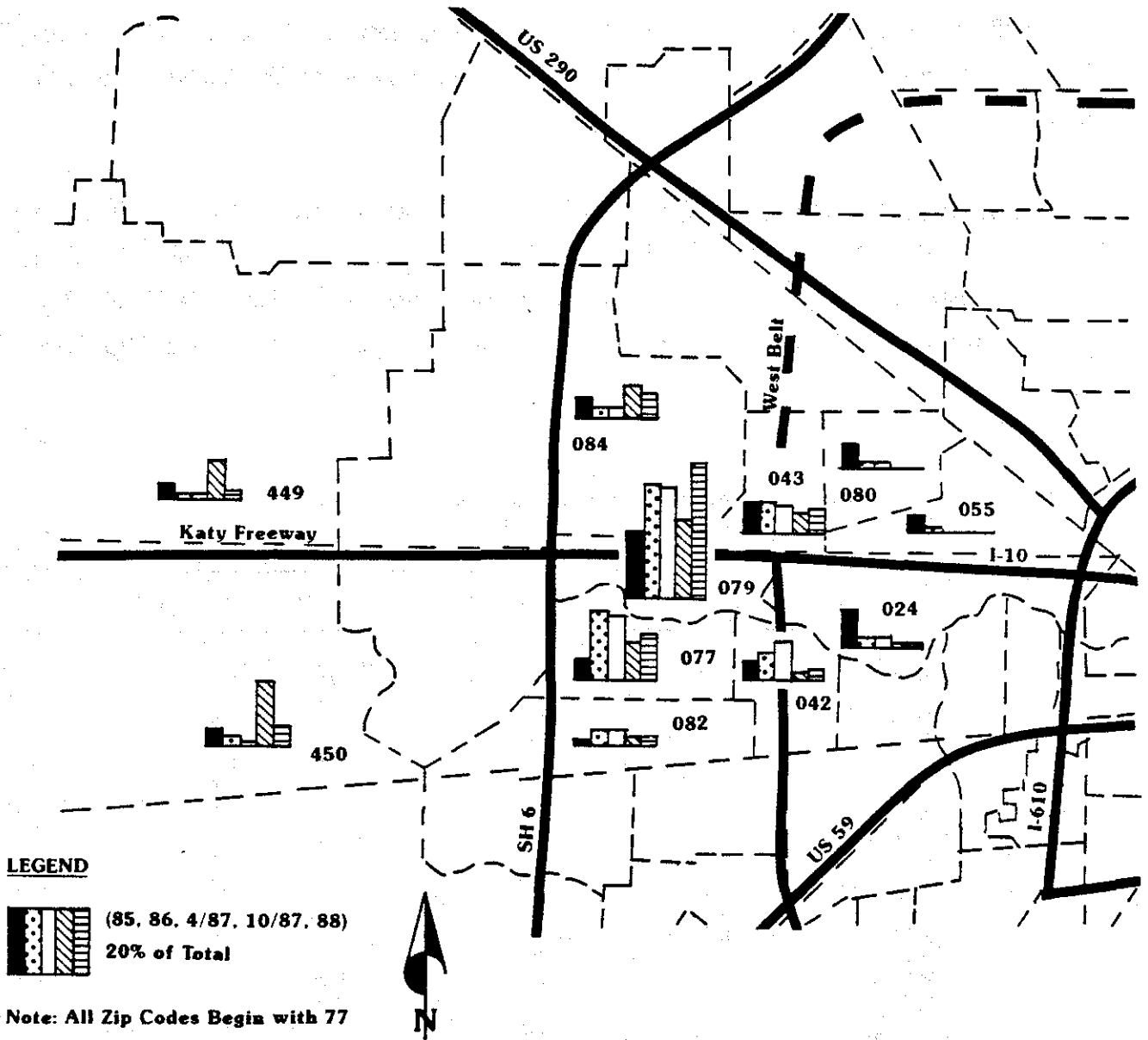


Figure 23.
Home Origins of Katy Freeway Motorists

Katy Freeway Entrance Ramps. The most common entrance ramps used to access the Katy Freeway in the a.m. are presented in Table 34. As this table indicates, one of the most common entrance ramps used (1985-1988) is the Wilcrest ramp. In 1988, 24% of those surveyed entered the Katy Freeway at Wilcrest. An additional 22% entered at Kirkwood.

North Freeway Home Zip Codes. Sixty-five different home Zip Codes were listed by North Freeway motorists. The most frequently listed North Freeway area Zip Codes were 77090 and 77067 (Table 35; Figure 24).

North Freeway Entrance Ramps. The most common entrance ramps to the North Freeway in the a.m. were FM 1960, FM 149 and Greens Road (Table 35).

Table 35.
Characteristics of Trip Origins of North Freeway Motorists,
North Freeway Motorist Surveys

Trip 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%

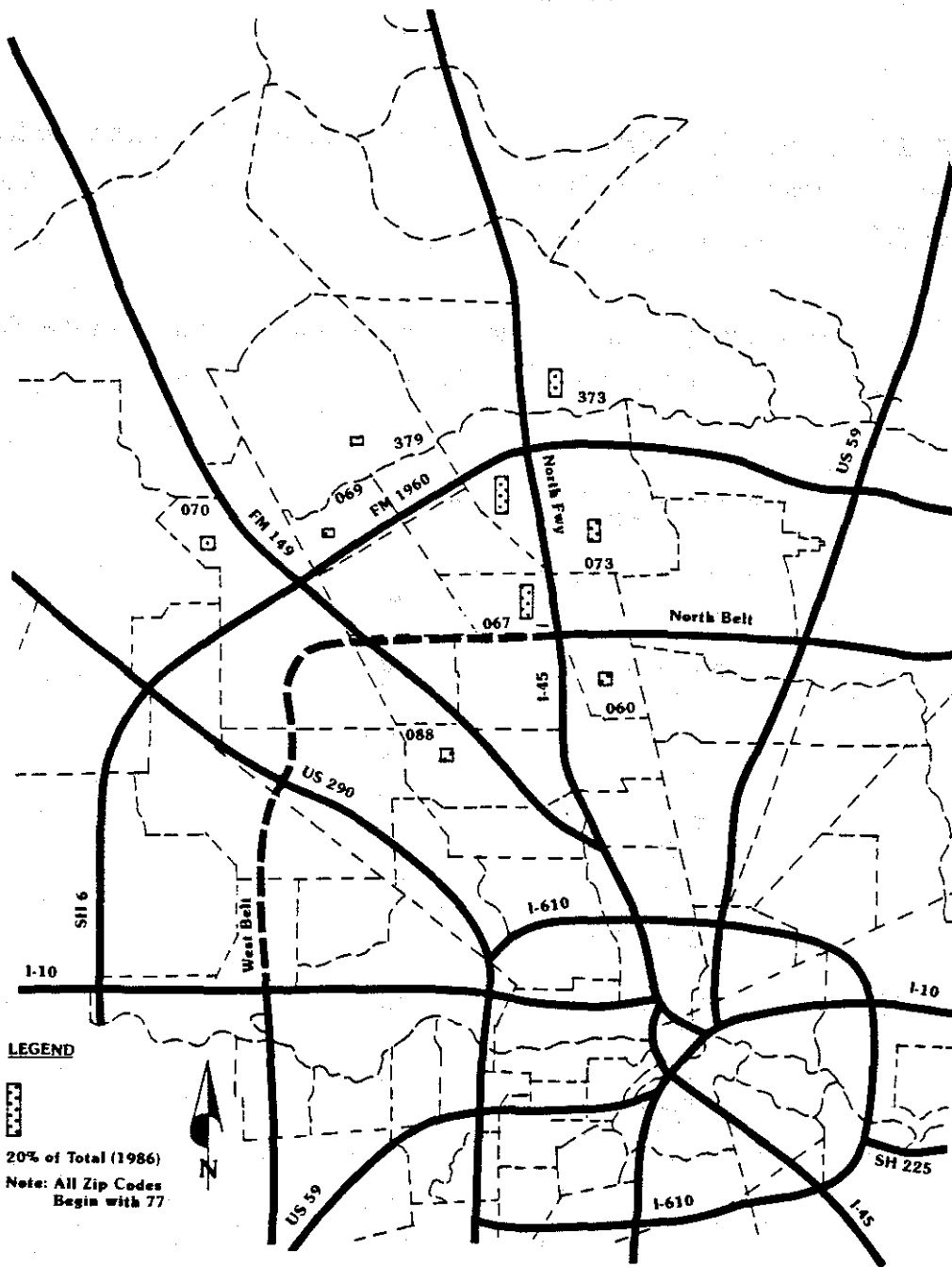


Figure 24.
Home Origins of North Freeway Motorists

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 Katy/North Transitway are summarized in Tables 36 and 37.

Table 36.
Reasons for Selecting the Auto Mode, Katy Freeway Motorist Surveys

Travel Mode Characteristic	Before Transitway	After Transitway			
	1984	1985	1986	1987	1988
Why Did You Choose Auto¹	---	(n=564)	(n=838)	(n=2121)	(n=1655)
Need Car for Job	---	22%	25%	21%	23%
Convenience/Flexibility	---	17%	26%	21%	23%
No Bus/Carpool/Vanpool Available	---	22%	21%	18%	18%
Work Odd Hours	---	10%	10%	25%	24%
Don't Work in CBD	---	6%	3%	8%	7%
Other	---	23%	15%	7%	5%
Usual Mode of Travel	(n=81)	(n=445)	(n=738)	(n=1424)	(n=1053)
Drive Alone	83%	88%	90%	85%	91%
Carpool	10%	8%	6%	12%	8%
Vanpool	6%	1%	1%	0%	0%
Other	1%	3%	3%	3%	1%

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 37.
Reasons for Selecting the Auto Travel Mode, North Freeway Motorist Survey

Travel Mode Characteristic	Before Transitway		After Transitway
	1981	1984	1986
Why Did You Choose Auto¹	---	---	(n=498)
Need Car for Job	---	---	15%
Convenience/Flexibility	---	---	16%
No Bus/Vanpool Available	---	---	20%
Work Odd Hours	---	---	9%
Don't Work in CBD	---	---	7%
Other	---	---	33%
Usual Mode of Travel	(n=482)	(n=52)	(n=423)
Drive Alone	56%	58%	87%
Carpool	15%	27%	8%
Vanpool	11%	9%	1%
Other	18%	6%	4%

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.

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 or other HOV available; and 4) work irregular hours. Furthermore, of those freeway motorists surveyed between 1985 and 1988, at least 85% drove alone on a regular basis (Tables 36 and 37).

Trip Destination

While the downtown area was the predominant destination for transitway users, less than 40% of the motorists surveyed on the Katy and North Freeway locations are destined to downtown (Table 38). In fact, less than one-third of the Katy Freeway motorists surveyed in 1988 reported downtown trip destinations. A significant number of trips are also destined to the Galleria, Greenway Plaza and the Texas Medical Center.

Table 38.
A.M. Trip Destination of Motorists on the Katy and North Freeways,
Katy and North Freeway Motorist Surveys

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

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 both the SDHPT and METRO. 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. (Approximately 460 vehicles were using the North Transitway at the time it replaced the contraflow lane.) In fact, one of the major reasons for allowing carpools to use the Katy Transitway is to increase the public's perception of transitway utilization.

Katy and North 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 39. 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 motorists felt there was sufficient vehicle utilization of the transitway and 36% stated there was sufficient person 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 39).

Table 39.
Perceptions of Utilization and Desirability of Transitway Improvement,
Katy and North Freeway Motorist Surveys

Measure of Effectiveness or Success	Katy Freeway					North Freeway
	1985 ¹	1986 ²	Spring 1987 ³	Fall 1987 ³	1988 ⁴	1986 ⁵
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=418)
Yes	3%	3%	36%	44%	31%	26%
No	90%	92%	55%	42%	55%	56%
Not Sure	7%	5%	9%	14%	14%	18%
Transitway Vehicle Volumes (A.M. Peak Period)⁶	138	256	2412	2854	2032	393
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=422)
Yes	4%	4%	30%	36%	24%	23%
No	85%	86%	58%	46%	58%	57%
Not Sure	11%	10%	12%	18%	18%	20%
Transitway Persons Moved (A.M. Peak Period)⁶	2465	3156	7769	8599	7210	6647
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=417)
Yes	41%	36%	56%	64%	64%	62%
No	35%	43%	29%	20%	22%	20%
Not Sure	24%	21%	15%	16%	14%	18%

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

On the North Freeway, 26% perceived there was sufficient person utilization of the transitway and 23% stated there was sufficient vehicle utilization.

Motorists were also asked if they felt the Katy/North Transitway is a good transportation improvement. The percentage of Katy Freeway motorists who responded "yes" fluctuated from 41% in 1985, to 36% in 1986, to 64% in the fall of 1987 and 1988. On the North Freeway, 62% of the motorists thought the transitway was a good transportation improvement.

Comments

Katy and North Freeway motorists were encouraged to offer additional comments.
A summary of the comments received is presented in Table 40.

Table 40.
Additional Comments,
Katy and North Freeway Motorist Surveys

Comment	Katy Freeway					North Freeway
	1985	1986	Spring 1987	Fall 1987	1988	1986
Transitway is a waste of money	14%	13%	10%	4%	5%	3%
Transitway is underutilized	12%	20%	9%	4%	9%	6%
Open transitway to all	8%	6%	10%	7%	5%	6%
Allow carpools on transitway	7%	5% ¹	6% ²	3% ²	10% ³	10%
Ban trucks on the freeway	5%	4%	2%	2%	4%	2%
Transitway is a good idea	5%	6%	12%	16%	8%	11%
Need more freeway lanes	4%	10%	9%	9%	10%	5%
Provide more bus routes	3%	3%	2%	3%	4%	3%
Congestion on freeway is no better	3%	5%	4%	3%	9% ⁴	5%
Other	39%	28%	36%	49%	36%	49%

¹ Allow 2+ carpools on transitway

² Allowing 2+ carpools on transitway was a good move

³ Allow (lift restriction on) 2+ carpools between 6:45 a.m. and 8:15 a.m.

⁴ Congestion on freeway is worse since transitway went to 3+ between 6:45 a.m. and 8:15 a.m.

CHAPTER 6

SUMMARY OF MAJOR FINDINGS

The Katy Transitway was opened to authorized buses and 8+ vanpools in October 1984. To encourage increased vehicular utilization of the facility, authorized 4+ carpools were allowed to begin using the transitway in April 1985. A few 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 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 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 September 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 Northwest and Gulf Transitways when they became operational in May 1988 and August 1988, respectively. The Northwest Transitway extends from Broadway to downtown, a distance of 6.5 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 Little York to the Northwest Transit Center, a distance of 9.5 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 3 to 6 months after the transitways became operational.

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 41). 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, 58% of the 1988 Katy Transitway carpool/vanpool trips and 67% of the Northwest Transitway carpool/vanpool trips were destined to locations other than downtown.

Table 41.
Trip Destinations of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1988

A. M. Trip Destination	Katy Corridor				North Corridor	Northwest Corridor	Gulf Corridor
	1985	1986	1987	1988	1986	1988	1988
Transitway Bus Users	(n=357)	(n=575)	(n=632)	(n=776)	(n=1252)	---	---
Downtown	96%	95%	94%	97%	94%	---	---
Galleria/City Post Oak/Uptown	---	0%	1%	0%	1%	---	---
Greenway Plaza	0%	0%	1%	0%	2%	---	---
Texas Medical Center	1%	1%	1%	1%	1%	---	---
Other	3%	4%	3%	2%	2%	---	---
Transitway Carpools/Vanpools	(n=95)	(n=123)	(n=597)	(n=404)	(n=199)	(n=268)	(n=123)
Downtown	57%	55%	39%	42%	61%	38%	81%
Galleria/City Post Oak/Uptown	12%	14%	22%	19%	7%	26%	9%
Greenway Plaza	6%	2%	6%	3%	8%	4%	3%
Texas Medical Center	4%	5%	5%	5%	4%	4%	---
Other	21%	24%	28%	31%	20%	28%	7%
Freeway Carpoolers/Vanpoolers	---	---	---	(n=617)	---	---	---
Downtown	---	---	---	41%	---	---	---
Galleria/City Post Oak/Uptown	---	---	---	20%	---	---	---
Greenway Plaza	---	---	---	6%	---	---	---
Texas Medical Center	---	---	---	6%	---	---	---
Other	---	---	---	27%	---	---	---
Freeway Motorists	(n=302)	(n=728)	(n=1418)	(n=1056)	(n=421)	---	---
Downtown	38%	33%	23%	30%	31%	---	---
Galleria/City Post Oak/Uptown	24%	10%	13%	12%	7%	---	---
Greenway Plaza	8%	4%	5%	4%	4%	---	---
Texas Medical Center	9%	3%	3%	4%	4%	---	---
Other	21%	50%	56%	50%	54%	---	---

Mode Choice Considerations

Previous Mode of Travel

In looking at the previous travel modes of the transitway users, a significant percentage drove alone (Table 42).

In the Katy Freeway Corridor, the park-and-ride and express bus service (which utilizes the transitway) also attracted 9% of its 1985 ridership, 11% of its 1986 and 1987 ridership and 13% of its 1988 ridership from carpools and vanpools.

The carpools and vanpools attracted 13% of their 1985 and 1986 ridership, 9% of their 1987 ridership and 7% of their 1988 ridership from buses.

Table 42.
Previous Travel Mode of Katy, North, Northwest and Gulf Freeway Corridor Commuters, 1985-1988

Trip Destination	Katy Corridor				North Corridor	Northwest Corridor	Gulf Corridor
	1985	1986	1987	1988	1986	1988	1988
Transitway Bus Users	(n=255)	(n=573)	(n=630)	(n=771)	(n=1240)	---	---
Drove alone	24%	35%	34%	38%	35%	---	---
Carpool	5%	5%	9%	9%	10%	---	---
Vanpool	4%	6%	2%	4%	7%	---	---
Bus	43%	34%	38%	37%	29%	---	---
Didn't make trip	12%	18%	21%	28%	25%	---	---
Transitway Carpoolers/Vanpoolers	(n=549)	(n=624)	(n=588)	(n=391)	(n=1622)	(n=239)	(n=97)
Drove alone	36%	39%	50%	45%	30%	34%	28%
Carpool	22%	17%	29%	33%	21%	60%	53%
Vanpool	12%	9%	3%	3%	12%	1%	6%
Bus	13%	13%	9%	7%	14%	4%	5%
Didn't make trip	17%	22%	9%	12%	23%	1%	8%
Freeway Motorists¹	(n=445)	(n=738)	(n=1424)	(n=1053)	(n=423)	---	---
Drive alone	88%	90%	85%	91%	87%	---	---
Carpool	8%	6%	12%	8%	8%	---	---
Vanpool	1%	1%	0%	0%	1%	---	---
Other	3%	3%	3%	1%	4%	---	---

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

In the North Freeway corridor, transit service had attracted 17% of its ridership from carpools or vanpools. The vanpools had attracted 14% of their members from transit and 21% from carpools.

In the Northwest and Gulf Freeway corridors, carpools/vanpools have attracted only 4% to 5% of their ridership from transit.

Impacts of the Transitways on Mode Choice

The Katy, North, Northwest and Gulf Transitways all appear to have had a definite effect on mode choice (Table 43).

Table 43.
Use of Current Mode by Transitway Users If Transitway Had Not Opened, 1985-1988

Use Current Mode if No Transitway	Katy Transitway				North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1986	1988	1988
<u>Transitway Bus Users</u>	(n=356)	(n=575)	(n=629)	(n=773)	(n=1247)	----	----
Yes	69%	43%	52%	35%	23%	----	----
No	15%	26%	20%	33%	41%	----	----
Not sure	16%	31%	28%	32%	36%	----	----
<u>Transitway Carpoolers/Vanpoolers</u>	(n=551)	(n=633)	(n=588)	(n=398)	(n=1632)	(n=255)	(n=122)
Yes	84%	68%	50%	54%	43%	70%	54%
No	8%	16%	37%	35%	27%	21%	14%
Not sure	8%	16%	13%	11%	39%	9%	11%

While sizable percentages of the transitway users indicated that they would be using their current mode even if there was no transitway, at least 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, 14% of the Gulf Transitway poolers and 21% of the Northwest Transitway poolers would not be carpooling or vanpooling if not for the 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 44).

In the Katy Freeway corridor, the median travel time savings reported by current bus users is 20 minutes in both the a.m. and the p.m. Carpoolers and vanpoolers responding to the most recent survey also perceive a significant travel time savings (20 minutes in the a.m. and 22 minutes in the p.m.).

Table 44.
Perceived Transitway Travel Time Savings, 1985-1988

Travel Time Savings	Katy Transitway				North Transitway	Northwest Transitway	Gulf Transitway
	1985	1986	1987	1988	1986	1988	1988
Perceived Transitway Travel Time Savings (minutes)							
<u>Transitway Bus Users</u>	(n=328)	(n=530)	(n=590)	(n=726)	(n=1147)	----	----
a.m. (50th Percentile)	9	15	15	20	20	----	----
p.m. (50th Percentile)	13	20	15	20	25	----	----
<u>Transitway Carpoolers/Vanpoolers</u>	(n=505)	(n=588)	(n=592)	(n=394)	(n=1595)	(n=256)	(n=121)
a.m. (50th Percentile)	8	10	20	20	20	15	15
p.m. (50th Percentile)	12	17	20	22	30	15	15
Actual Transitway Travel Time Savings (minutes)¹							
a.m. (50th Percentile)	6.8	3.0	4.4	5.1	4.2	3.1	3.3
p.m. (50th Percentile)	5.5	4.0	1.0	2.7	8.0	1.3	7.7

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

North Transitway users perceive an even greater travel time savings. Median travel time savings reported by bus users were 20 minutes in the a.m. and 25 minutes in the p.m. Vanpoolers generally perceived a 20-minute savings in both the a.m. and p.m.

Median time savings reported by carpoolers and vanpoolers traveling the Northwest and Gulf Transitways totaled 15 minutes in both the morning and afternoon. It is interesting to note the extent to which perceived travel time savings exceed actual transitway travel time savings in all four study corridors.

Motorists' Attitudes Concerning the Transitways

In the North Freeway corridor, only 26% of the motorists operating in the freeway mainlanes (non transitway users) felt the North Transitway was sufficiently utilized to justify the project (Table 45). Nevertheless, 62% of the motorists did feel the transitway was a good transportation improvement.

Table 45.
Motorists' Attitudes Toward the Transitways, 1885-1988

Attitude	Katy Freeway					North Freeway
	1985 ¹	1986 ²	Spring 1987 ³	Fall 1987 ³	1988 ⁴	1986 ⁵
In Terms of Vehicles Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=742)	(n=948)	(n=1420)	(n=1052)	(n=418)
Yes	3%	3%	36%	44%	31%	26%
No	90%	92%	55%	42%	55%	56%
Not Sure	7%	5%	9%	14%	14%	18%
Transitway Vehicle Volumes (A.M. Peak Period)⁶	138	256	2412	2854	2032	393
In Terms of Persons Moved, Is the Transitway Sufficiently Utilized?	(n=451)	(n=741)	(n=950)	(n=1426)	(n=1051)	(n=422)
Yes	4%	4%	30%	36%	24%	23%
No	85%	86%	58%	46%	58%	57%
Not Sure	11%	10%	12%	18%	18%	20%
Transitway Persons Moved (A.M. Peak Period)⁶	2465	3156	7769	8599	7210	6647
Is the Transitway a Good Transportation Improvement?	(n=441)	(n=733)	(n=949)	(n=1423)	(n=1045)	(n=417)
Yes	41%	36%	56%	64%	64%	62%
No	35%	43%	29%	20%	22%	20%
Not Sure	24%	21%	15%	16%	14%	18%

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

In the Katy Freeway corridor, as transitway utilization has increased, acceptance of the transitway by the freeway motorists has also increased significantly (Table 44). In 1985 (before carpools were allowed on the transitway) and again in 1986 (when 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 the lane was restricted to 3+ carpools between 6:45 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. 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.

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 conducted by Texas Transportation Institute, the State Department of Highways and Public Transportation and METRO in order to obtain important 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 not 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, pays all Yes, pays part No
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 normally make this trip? (check one)
 Drove alone Rode a park-and-ride bus on the regular freeway lanes
 Carpooled Rode a regular route or express bus
 Vanpooled Did not make this trip prior to using the Katy Transitway
 Other (specify) _____
12. In your opinion, was prohibiting 2 person carpools from using the transitway between 6:45 a.m. and 8:15 a.m. a good decision? Yes No Not Sure
13. With the 3+ carpool requirement, do you feel that the Katy Transitway is, at present, being sufficiently utilized to justify the project? Yes No Not sure
14. What is your... Age? _____ Sex? _____ Occupation? _____
15. What is the last level of school you have completed? _____

Comments: _____

Thank you for your cooperation.

STATISTICAL THEORY OF PROBABILITY

The first part of the course deals with the foundations of probability theory, including the concepts of random events, probability measures, and conditional probability. It also covers the basic properties of probability distributions and the central limit theorem.

The second part of the course focuses on the theory of random variables, including the joint distribution of random variables, the bivariate normal distribution, and the theory of stochastic processes. It also discusses the concept of independence and the properties of Markov chains.

The third part of the course is devoted to the theory of estimation and hypothesis testing. It covers the methods of maximum likelihood estimation, the method of moments, and the theory of confidence intervals. It also discusses the concepts of unbiasedness, efficiency, and consistency.

The fourth part of the course deals with the theory of statistical inference, including the theory of point estimation, the theory of interval estimation, and the theory of hypothesis testing. It also covers the concepts of power functions, significance levels, and the theory of tests of goodness of fit.

The fifth part of the course is devoted to the theory of statistical decision making, including the theory of decision functions, the theory of risk functions, and the theory of optimal decision rules. It also discusses the concepts of admissibility, dominance, and the theory of Bayesian decision making.

The sixth part of the course deals with the theory of statistical quality control, including the theory of acceptance sampling, the theory of control charts, and the theory of process control. It also covers the concepts of process capability, process control, and the theory of statistical process control.

The seventh part of the course is devoted to the theory of statistical simulation, including the theory of Monte Carlo simulation, the theory of Markov chain simulation, and the theory of queueing simulation. It also discusses the concepts of simulation, random number generation, and the theory of simulation.

The eighth part of the course deals with the theory of statistical data analysis, including the theory of principal component analysis, the theory of factor analysis, and the theory of discriminant analysis. It also covers the concepts of data reduction, data analysis, and the theory of statistical data analysis.

The ninth part of the course is devoted to the theory of statistical forecasting, including the theory of time series analysis, the theory of regression analysis, and the theory of forecasting. It also discusses the concepts of forecasting, time series analysis, and the theory of statistical forecasting.

The tenth part of the course deals with the theory of statistical decision making under uncertainty, including the theory of decision trees, the theory of decision matrices, and the theory of decision making under uncertainty. It also covers the concepts of decision making, uncertainty, and the theory of statistical decision making under uncertainty.

The eleventh part of the course is devoted to the theory of statistical quality control, including the theory of acceptance sampling, the theory of control charts, and the theory of process control. It also covers the concepts of process capability, process control, and the theory of statistical quality control.

The twelfth part of the course deals with the theory of statistical simulation, including the theory of Monte Carlo simulation, the theory of Markov chain simulation, and the theory of queueing simulation. It also discusses the concepts of simulation, random number generation, and the theory of simulation.

The thirteenth part of the course is devoted to the theory of statistical data analysis, including the theory of principal component analysis, the theory of factor analysis, and the theory of discriminant analysis. It also covers the concepts of data reduction, data analysis, and the theory of statistical data analysis.

The fourteenth part of the course deals with the theory of statistical forecasting, including the theory of time series analysis, the theory of regression analysis, and the theory of forecasting. It also discusses the concepts of forecasting, time series analysis, and the theory of statistical forecasting.



COMMISSION

ROBERT H. DEDMAN, CHAIRMAN
JOHN R. BUTLER, JR.
RAY STOKER, JR.

**STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION**

ENGINEER-DIRECTOR
R. E. STOTZER, JR.

IN REPLY REFER TO

Dear Carpooler/Vanpooler:

Your vehicle was observed traveling eastbound on the Katy Transitway the week of October 24. Since you have first-hand knowledge of the transitway, we need your help in a special study being conducted by the Texas Transportation Institute, The Texas A&M University System. Because the Katy Transitway is the first of its kind to operate in Houston, 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 or vanpooling on the transitway. Because of the small number of poolers contacted, your 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.

Sincerely,

A handwritten signature in cursive script that reads "Alvin R. Luedecke, Jr.".

Alvin R. Luedecke, Jr.
State Transportation Planning Engineer

ALR:d1b

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, and the U.S. Department of Transportation

1. Is your vehicle a carpool or vanpool? Carpool Vanpool
2. How many members are regularly in your carpool/vanpool (including yourself)? _____
3. How many days per week does your carpool/vanpool use the Katy Transitway? _____
4. What time do you normally enter the transitway in the morning? _____ a.m.
5. What is your carpool/vanpool destination? Downtown Galleria/City Post Oak/Uptown
 Greenway Plaza Texas Medical Center Other (specify Zip Code) _____
6. Which transitway entrance did you use to access the Katy Transitway for the a.m. trip?
 I-10 West of SH 6 Addicks Park-and-Ride Flyover Ramp Gessner
7. If the Katy Transitway had not opened, would you be carpooling/vanpooling now?
 Yes No Not sure
8. 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
 Other (please specify) _____
9. In your opinion, with the 3+ carpool requirement between 6:45 a.m. and 8:15 a.m., how congested is the Katy Transitway? Too congested No problems Too Little Traffic
10. Since the 3+ carpool requirement was implemented, have you encountered any difficulties in using the transitway?
 No
 Yes, at an a.m. entrance (specify entrance) _____
 Yes, at the a.m. exit
 Yes, a.m. on the lane
 Yes, at the p.m. entrance
 Yes, at a p.m. exit (specify exit) _____
 Yes, p.m. on the lane
11. 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

(OVER)

12. In your opinion, was prohibiting 2 person carpools from using the transitway between 6:45 a.m. and 8:15 a.m. a good decision? Yes No Not Sure

13. With the 3+ carpool requirement, do you feel that the Katy Transitway is, at present, sufficiently utilized to justify the project? Yes No Not Sure

14. What is your ... Age? _____ Sex? _____ Occupation? _____

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

16. 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.



COMMISSION

ROBERT H. DEDMAN, CHAIRMAN
JOHN R. BUTLER, JR.
RAY STOKER, JR.

**STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION**

ENGINEER-DIRECTOR
R. E. STOTZER, JR.

IN REPLY REFER TO

Dear Carpooler/Vanpooler:

Your vehicle was observed traveling eastbound on the Katy Transitway the week of October 3 between 6:45 a.m. and 8:15 a.m. Since that time, in order to maintain a reliable 55 mph speed on the transitway, the operating rules have been changed to require that a carpool desiring to use the transitway during that time period must have 3 or more occupants. Because of this recent change in transitway operations, we need your help to determine what effect this change has had on your travel.

Please take a few minutes to answer the enclosed questionnaire. Your answers will provide valuable information concerning the operation of the transitway. Because of the small number of poolers contacted, your 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.

Sincerely,

A handwritten signature in cursive script that reads "Alvin R. Luedecke, Jr.".

Alvin R. Luedecke, Jr.
State Transportation Planning Engineer

ALR:dlb

Enclosures

KATY FREEWAY 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 and the U.S. Department of Transportation

During the week of October 3, your vehicle was observed using the Katy Transitway between 6:45 a.m. and 8:15 a.m. Since that time, in order to maintain a reliable 55 mph speed on the transitway, the operating rules have been changed to require that a carpool desiring to use the transitway during that time period must have 3 or more occupants. Your response to this survey will be helpful in assessing the impacts of that operating decision.

1. Is your vehicle a carpool or vanpool? Carpool Vanpool
2. Are you still using the Katy Transitway on a regular basis? Yes No
3. If you are still using the transitway, have you had to take any of the following actions?
 Changed my departure time to use the transitway before 6:45 a.m.
 Changed my departure time to use the transitway after 8:15 a.m.
 Added an additional passenger(s) to my carpool
 No action was necessary as I already had a 3+ carpool or vanpool
 Other (specify) _____
4. If you still use the transitway, what time do you now enter the transitway in the morning? _____ a.m.
5. If you are no longer using the transitway, are you considering changing either of the following to be able to use the transitway?
 Change my morning departure time to use the transitway either before 6:45 a.m. or after 8:15 a.m.
 Add an additional person(s) to my carpool
6. If you are no longer using the transitway, will you continue to carpool on a regular basis?
 Yes No Not Sure
7. In your opinion, was the congestion on the transitway sufficiently severe to justify the change in carpool occupancy requirements? Yes No Not Sure
8. With the 3+ carpool requirement, do you feel that the Katy Transitway is, at present, sufficiently utilized to justify the project? Yes No Not Sure
9. What is your carpool/vanpool destination? Downtown Galleria/City Post Oak/Uptown
 Greenway Plaza Texas Medical Center Other (specify Zip Code) _____
10. How many members are regularly in your carpool/vanpool (including yourself)? _____
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.

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RAY STOKER, JR.

**STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION**

ENGINEER-DIRECTOR
R. E. STOTZER, JR.

IN REPLY REFER TO

Dear Motorist:

Your vehicle was observed traveling eastbound on the Katy Freeway between 6:00 and 9:30 a.m. the week of October 3. 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, 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 of Harris County have constructed the Katy Transitway for use by buses, carpools and vanpools. 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 the first of its kind to operate in Houston, 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, between 6:00 and 9:30 a.m. Because of the small number of motorists contacted, your 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.

Sincerely,

A handwritten signature in cursive script that reads "Alvin R. Luedecke, Jr.".

Alvin R. Luedecke, Jr.
State Transportation Planning Engineer

ALR:d1b

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 and the U.S. Department of Transportation

1. What was the purpose of your trip?
 Work School Other (specify) _____
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 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. In your opinion, was prohibiting 2 person carpools from using the transitway between 6:45 a.m. and 8:15 a.m. a good decision? Yes No Not Sure
11. Do you feel that the Katy Transitway is a good transportation improvement?
 Yes No Not sure
12. What is your... Age? _____ Sex? _____ Occupation? _____
13. What is the last level of school that you have completed? _____
14. 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.

