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16. Abstract

This report presents a review of eight operational transitways in four states and one Canadian Province. The review focuses on identifying the general design and operating characteristics of transitways and the development impacts these facilities have had on the urban areas in which they are located. The intent of the review is to develop a preliminary data base for assessing the transferability of the results to a study of the land use impacts of the Houston (Texas) transitway system. The review indicates that virtually no research on the land use impacts of transitways has been conducted. Additionally, the majority of transitway operators contacted indicated that no such research is being considered in the near future.

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
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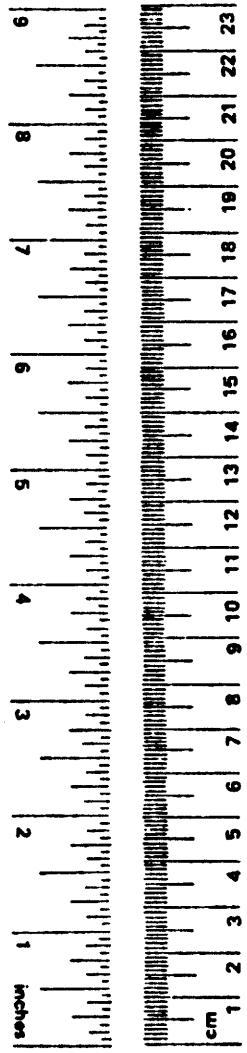

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
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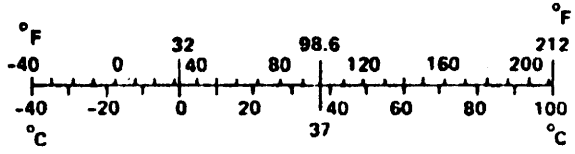

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

SURVEY OF TRANSITWAY PROJECTS IN THE UNITED STATES AND CANADA

by

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Technical Report 1086-3
Study Number 2-10-85-1086

Sponsored by

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Urban Mass Transportation Administration

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ABSTRACT

This report presents a review of eight operational transitways in four states and one Canadian Province. The review focuses on identifying the general design and operating characteristics of transitways and the development impacts these facilities have had on the urban areas in which they are located. The intent of the review is to develop a preliminary data base for assessing the transferability of the results to a study of the land use impacts of the Houston (Texas) transitway system. The review indicates that virtually no research on the land use impacts of transitways has been conducted. Additionally, the majority of transitway operators contacted indicated that no such research is being considered in the near future.

Key Words: Land Use, Transportation Impacts, Transitways, Busways, HOV Lanes, Authorized Vehicle Lanes, Park-and-Ride, Priority Treatment, Development, Bus Rapid Transit, Express Bus, Impact Studies.

IMPLEMENTATION STATEMENT

Research Study 2-10-85-1086 and companion Study 9-10-85-1085 are oriented toward assisting the Texas State Department of Highways and Public Transportation (SDHPT) in the planning and impact evaluation of high-occupancy vehicle (HOV) lanes or transitways. This portion of the study focuses on identifying existing transitway projects, summarizing their design and operating features, and highlighting the development impacts these facilities have had on the urban areas in which the projects are located. The results of this research, when completed, should assist the State Department of Highways and Public Transportation in evaluating potential land use and transportation impacts resulting from implementation of transitways and/or park-and-ride facilities.

DISCLAIMER

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SURVEY OF TRANSITWAY PROJECTS IN THE UNITED STATES AND CANADA

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1. INTRODUCTION

1.1 BACKGROUND

The Houston Metropolitan area is currently implementing one of the most extensive high-occupancy vehicle (HOV) priority treatment networks in the nation. Over 40 miles of transitways are currently under construction with another 23 miles in the final planning and design stages. The ultimate commitment to transitways may result in over 100 miles of these facilities in operation with a total capital cost in excess of $1 billion (1). The currently committed transitway system is depicted in Figure 1.

Since there are few transitways in operation, little experience exists regarding the planning, design, and operation of such facilities. Previous transitway assessments have focused primarily on the transportation impacts of transitways. One of the objectives of Research Study Number 2-10-85-1086 (and companion Study 9-10-85-1085) is to examine the impacts of Houston's Transitway system on land uses in the Houston Metropolitan area. This assessment should provide the basis for a comprehensive evaluation of the costs, benefits, and land use impacts of transitway projects.

This report presents a review of transitways currently in operation in the United States and Canada. The review of transitway facilities focuses on identifying the design and operating features of existing transitways and summarizing the general character of the urban areas in which the transitway projects are located. The results of the review are intended to provide a preliminary data base for evaluating the transferability of the results of the Houston study.

1.2 SCOPE

There are three basic types of HOV lanes that can be implemented on urban freeways: 1) contraflow lanes; 2) concurrent flow lanes; and 3) transitways. The first two types of HOV lanes are frequently classified as commuter lanes. The fundamental difference between commuter lanes and transitways is in terms of the level of service provided. Transitways, by

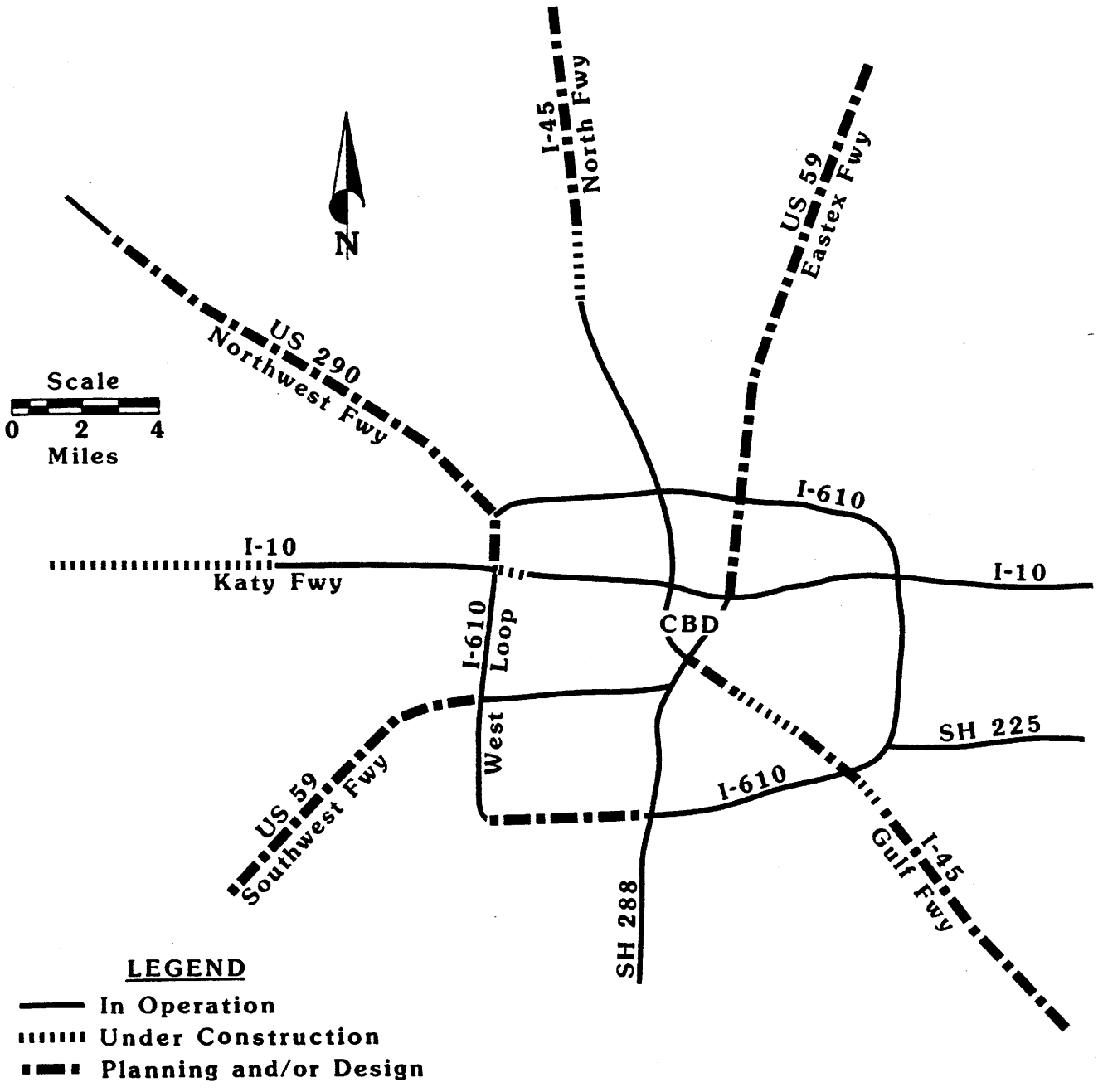


Figure 1. Status of Houston Transitway System as of August 1986

design, provide a higher level of service than commuter lanes. Transitways contain special features to provide this higher level of service, including: ramp connectors to employment centers, turning movement ramps through freeway to freeway interchanges, and on-line transit stations (2).

All of the projects described in this report fit into the transitway category. The transitways described in this report fall into two general sub-categories. The first type is a roadway built for exclusive use by HOVs, for all or part of the day, in a right-of-way independent from any facility for general traffic. Basically this option represents construction of an entirely new transportation corridor. The second type of transitway is development of a lane or lanes specifically dedicated for HOV use and fully separated (usually with barriers) from adjacent general purpose travel lanes. The basic difference between the two lies in the area where the facility is located (adjacent to general purpose travel lanes versus in a totally separate corridor), rather than in geometric and design features. Access to these kinds of facilities is usually via ramps; occasionally short open weave or median opening entrances are provided. Transitways are usually designed to high standards with full shoulders when possible (2).

2. SURVEY OF TRANSITWAY PROJECTS

2.1 SURVEY METHODOLOGY

The information on current transitway projects in the U.S. and Canada was obtained from three sources: 1) literature search; 2) mail-out and phone surveys; and 3) site visits.

The literature search consisted of a manual search of Texas Transportation Institute publications, and a computer assisted search of the Transportation Research Information Service (TRIS) files. The results of the literature search are summarized in Research Report 1086-1 (3).

The second phase of the survey effort consisted of mail-out and phone surveys of project operators to update information from the literature search and to solicit additional data on transitway projects. The following 15 urban areas were surveyed:

- Atlanta, Georgia
- Baltimore, Maryland
- Denver, Colorado
- Garden Grove (Orange County), California
- Houston, Texas
- Los Angeles, California
- Miami, Florida
- Minneapolis, Minnesota
- Oakland, California
- Ottawa, Canada
- Phoenix, Arizona
- Pittsburgh, Pennsylvania
- San Francisco, California
- Seattle, Washington
- Washington, D.C.

The survey was designed to solicit the following general information:

1. A general description of the urban area in which the transitway is located (e.g., population, land area, land uses, employment, and general traffic conditions).
2. Information on current and/or projected system configuration (length, cross-section, access points, terminals and transfer facilities), current and projected traffic volumes, authorized users, and enforcement/operating procedures and problems.
3. Reports and studies on existing and/or proposed transitways (e.g., documents dealing with the traffic/transportation, land use, economic and social/environmental impacts of transitways). Maps, artist renderings, and/or plan sheets were also requested.

In addition to the literature search and the mail-out and telephone surveys, site visits were made to transitway projects in Houston, Pittsburgh, San Francisco, and Ottawa, Canada.

2.2 SUMMARY OF SURVEY RESULTS

2.2.1 Overview

Eight operational transitways in four states and one Canadian Province were identified and reviewed. Table 1 presents a summary of the design and operating characteristics of the transitways surveyed. The projects surveyed represent a range of design and operational features.

Table 2 shows the population densities of the urban areas with transitways. As shown in Table 2, population density in Houston is considerably lower than in the other cities surveyed.

The transitway projects surveyed are described individually in the following sections.

Table 1. Characteristics of Transitways in the U.S. and Canada

Transitway/Location	Year Operational	Type of Facility	Length/Direction	Eligible Vehicles	Estimated Ridership (persons)	
					Peak Hour	Daily
Shirley Highway HOV Lanes Northern Virginia	1969	2-lane reversible roadway	11.5 miles Fairfax Co. to Washington, D.C.	Buses, vanpools, 4+ carpools	22,000	80,000
I-66 HOV Facility Northern Virginia	1982	4-lane, 2-way exclusive facility (peak hours and direction only; rest of the time is open to regular traffic)	9.6 miles I-495 Beltway to Roosevelt Bridge	Buses, vanpools, 3+ carpools	8,100	28,000
San Bernardino Freeway El Monte Busway Los Angeles, CA	1973	2-lane (1 in each direction) exclusive HOV facility	11.2 miles El Monte Bus Station to Los Angeles CBD	Buses, vanpools, 3+ carpools	3,400	36,000
East King Busway Pittsburgh, PA	1983	2-way exclusive, partially grade separated, ROW shared with Conrail	6.8 miles Wilkinsburg to CBD	Public buses, certified private operators	-	19,000
South Patway Busway Pittsburgh, PA	1977	2-way exclusive, partially grade separated, ROW shared with trolley	4.5 miles SW suburbs to CBD	Public buses, certified private operators	-	20,000
Katy Freeway Transitway Houston, TX	1984	1-lane reversible median busway	4.7 miles (Phase 1) W. Harris Co. to Houston (11.5 miles when completed)	Authorized vanpools buses, and 3+ carpools	1,100	5,700
North Freeway Transitway Houston, TX	1985	1-lane reversible median busway	9.6 miles (Phase 1) N. Houston to CBD (15 miles when completed)	Authorized vanpools and buses	3,300	16,000
Ottawa Transitway System, Canada	1984	2-lane, 2-way exclusive facility	7 miles of proposed 18 mile system currently in operation	Buses only	13,500[a]	-

[a] Approximately 5900 riders from West Transitway, 7600 from East and Southeast Transitways.

Table 2. Population Densities of Urbanized Areas with Transitways (1980)

Urbanized Area	Population (1000's)	Land Area (sq. mi.)	Population Density
Washington, DC	638	62.7	10,175
Los Angeles	2,967	464.7	6,385
Pittsburgh	424	55.4	7,653
Houston	1,595	556.4	2,866
Ottawa, Canada	303	42.5	7,128

Sources: Statistical Abstract of the U.S., and Statistics Canada.

2.2.2 Shirley Highway HOV Lanes (Washington, D.C.)

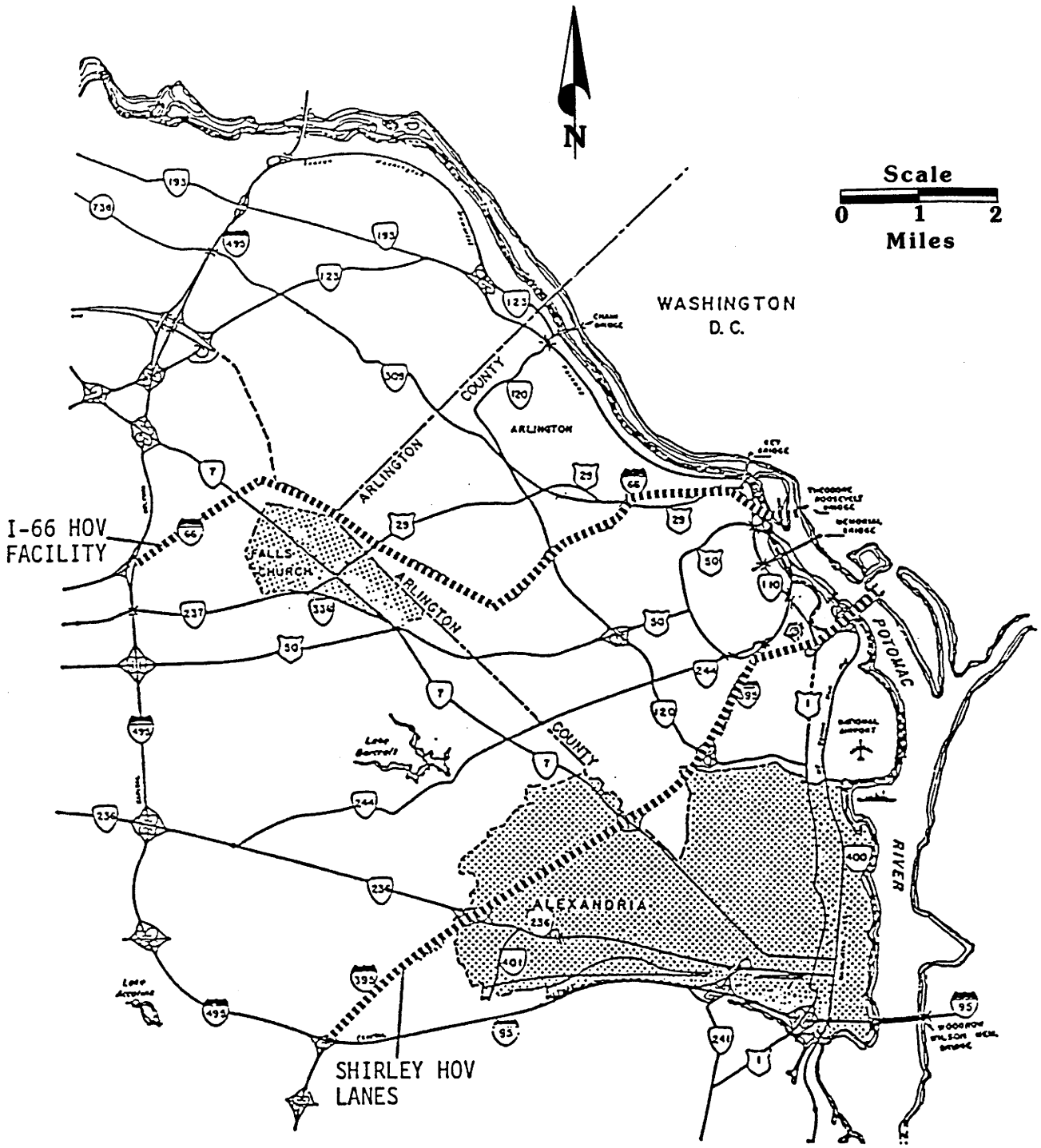
The Shirley Highway HOV facility is a 12-mile, two-lane, reversible roadway in the median of I-95, between Springfield, Virginia and Washington, DC (Figure 2). The HOV lanes are open in the in-bound direction (towards Washington) between 11pm and 11 am, and in the outbound direction between 1pm and 8 pm, 7 days a week. The remaining hours in each day are used to revers the direction of gates etc. on the HOV lanes (2). Eligible users during peak periods include buses, vanpools, and 4-or-more passenger carpools. The HOV facility is open to all traffic outside the peak periods. The current operation schedule is as follows:

Inbound

9:30pm - 6:00am	All traffic
6:00am - 9:00am	4+ only
9:00am - 11:00am	All traffic
11:00am - 1:00pm	Closed - Reverse facility direction

Outbound

1:00pm - 3:30pm	All traffic
3:30pm - 6:00pm	4+ only
6:00pm - 8:00pm	All traffic
8:00pm - 9:30pm	Closed - Reverse facility direction



Source (6).

Figure 2. General Location of Shirley and I-66 HOV Lanes, Virginia

With the volume on Shirley Highway beginning to approach the capacity of the existing six lane cross section, the Virginia Department of Highways and Transportation (VDH&T) is considering increasing the capacity of the Shirley Corridor south of Springfield by extending the HOV lanes. This proposal would extend the HOV lanes 19 miles to Route 619, just north of the Stafford County/Prince William County line. The complete 30-mile HOV facility would be the longest in the world (4).

Due to the increased accessibility that the Shirley Highway offers to persons employed in downtown Washington and the Pentagon, Rosslyn, and Crystal City areas, substantial residential development has occurred along the corridor to the south. People have found that they can reside at locations further than many other suburban sites, but still commute to work in less time. With housing costs decreasing with the distance from the D.C. core, the result has been major new housing developments at such locations as Dumfries, Triangle, Montclair, and Dale City. This development has resulted in over 1,000 carpools and vanpools and 70 buses now entering the existing HOV lanes at its southernmost entry point. Most of the buses are operated by private carriers which include Colonial Transit, Greyhound, and Trailways (4).

From its early beginning when the facility carried 100 buses and 400 carpools daily, usage has grown to a point where approximately 22,000 persons per hour are traveling in the two HOV lanes with slightly over half being carried in carpools and vans. The peak period totals include about 4,500 carpools or vanpools and 540 buses (4).

The HOV lanes carry about 65% of the total freeway person movement during the a.m. peak hour. Travel time savings for the HOV lane users range from 10 to 15 minutes per one-way trip; an average savings of slightly more than one minute per mile.

2.2.3 I-66 HOV Facility (Washington, D.C.)

The I-66 HOV facility is a four-lane, two-way exclusive facility in the peak period and peak direction. At all other times, the freeway is open to

regular traffic. The facility, which opened in late 1982, starts at the I-495 Beltway in Northern Virginia and continues to the Potomac River in Washington, D.C. (Figure 2). The HOV lanes, in operation from 7 a.m. to 9 a.m. inbound and 4 p.m. to 6 p.m. outbound, are used by buses, vanpools, and carpools of three or more. Vehicles travelling to or from Dulles Airport are also allowed on the facility during the peak time periods, in the peak direction (2).

The I-66 project was a compromise between pro-environment and pro-freeway proponents. The freeway was originally planned as an eight-lane freeway but was reduced to only four lanes. For the project to be funded, several criteria had to be met, including: a) provision of right-of-way in the median to the regional transit authority for construction of a heavy-rail line; b) restriction of the facility in the peak direction and period to buses, carpool vehicles carrying four or more persons, emergency vehicles, and vehicles bound to or from Dulles Airport; c) exclusion of heavy trucks from the facility at all times; and d) incorporation of design features intended to minimize adverse environmental impacts (5).

It is estimated that between 13,600 and 14,000 persons travel the restricted portion (Figure 3) of I-66 during each of the restricted periods. Peak-hour movements range from 8100 to 8400 persons. Time saved by those using the 9.6 mile long HOV facility has been estimated at 10 minutes per one-way trip (5).

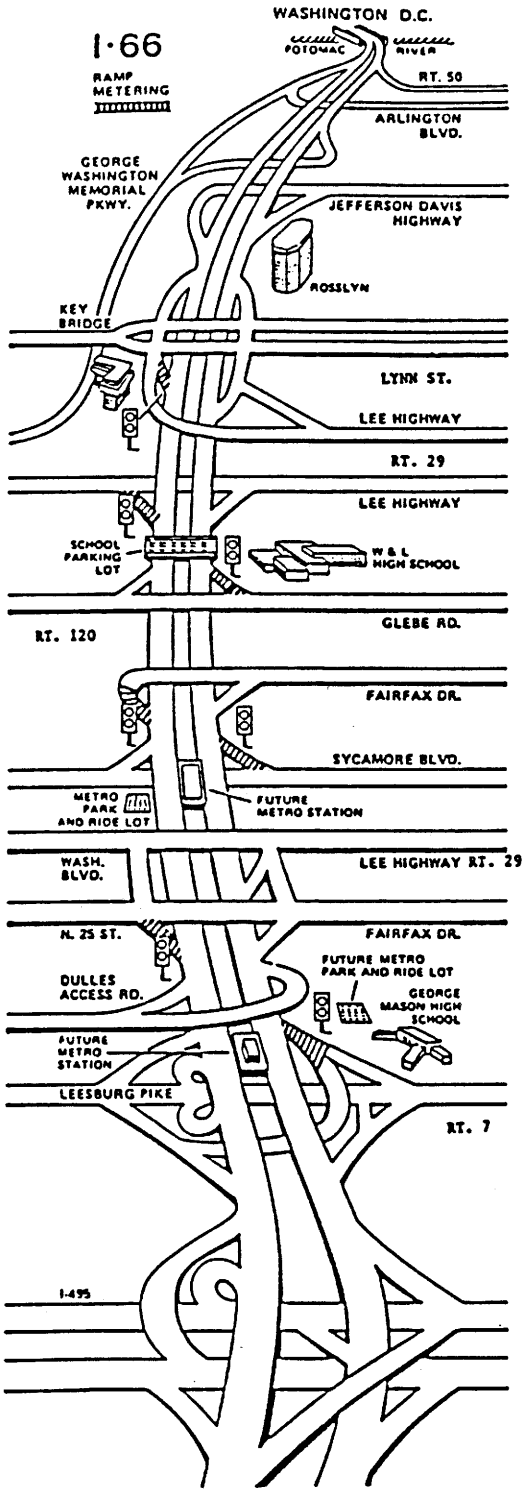
In terms of potential environmental and social impacts, the Secretary of Transportation (7) determined that construction of I-66 would:

1) Provide a net increase in public park and recreation lands, and improvement in the Arlington County bike trail;

2) Provide some net noise decrease and air quality improvements on local streets and arterials in Fairfax and Arlington Counties;

3) Increase noise levels in areas adjacent to the right-of-way, although extensive noise abatement features will reduce these levels below what they would be without noise abatement;

4) Have some adverse effect in terms of community disruption in Arling-



Source: (6).

Figure 3. Schematic of I-66 Restricted Section, Virginia

ton, and to a lesser extent in the District of Columbia and Fairfax County;

5) Possibly have some adverse air quality and energy effects, particularly over the longer run; and

6) Likely lead to land use changes more oriented toward greater automobile use.

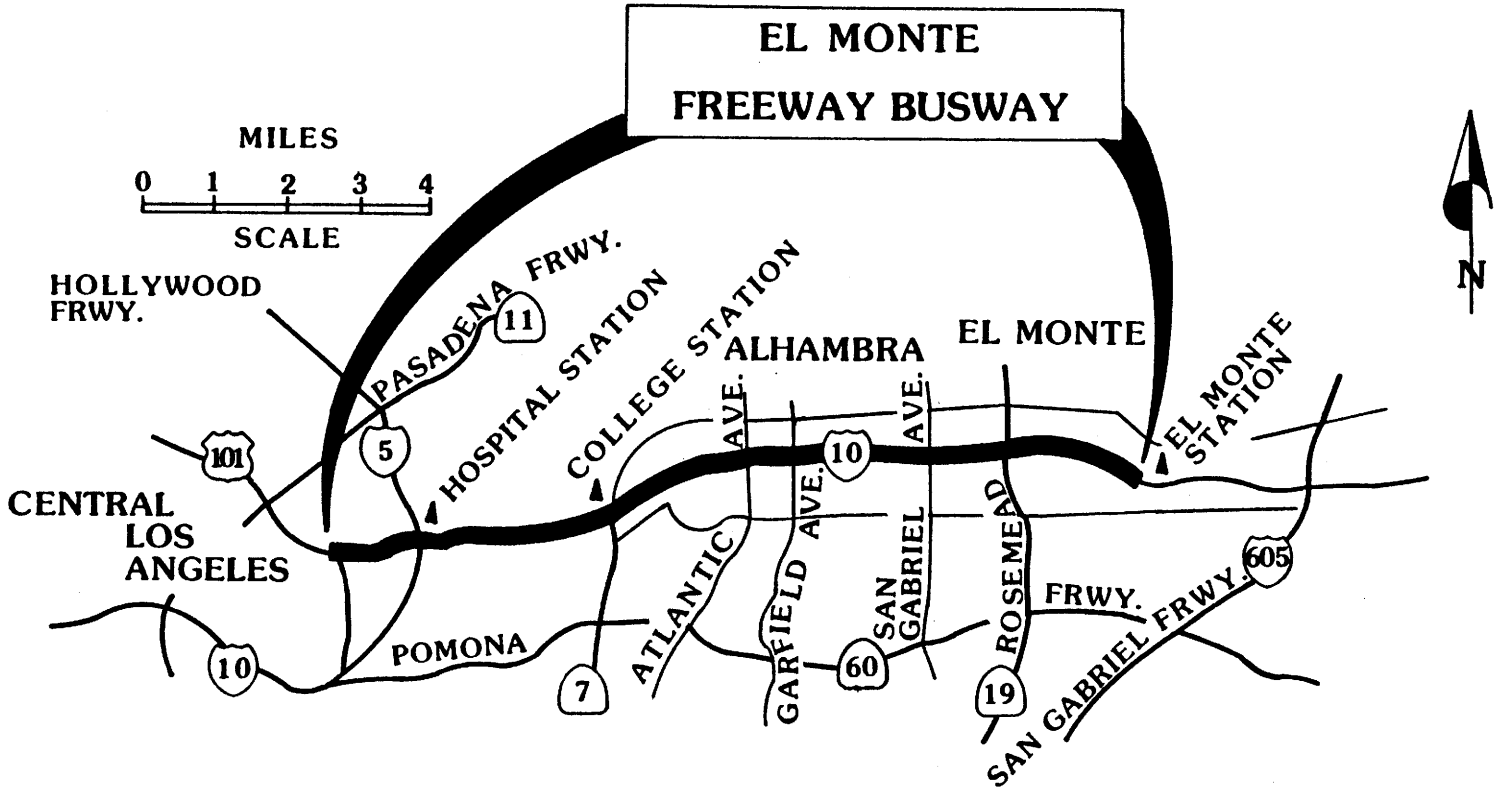
These general conclusions refer to the freeway in general and do not specifically address the potential impacts of the restricted portion of the facility.

2.2.4 El Monte Busway (Los Angeles)

The El Monte Busway is a two-way, two-lane (one in each direction), exclusive HOV facility in the San Bernardino Freeway right-of-way. It extends west from the El Monte Bus Station to the Los Angeles CBD (Figure 4). It operates 24 hours a day, with buses, vanpools, and carpools of three or more allowed to use the facility. The busway first opened in 1973 (2).

The eleven-mile busway is divided into two distinctive sections. In the easterly section of the busway, the exclusive lanes are located in the median strip of the freeway. This includes the seven miles between Santa Anita Avenue and Route 7. The westerly four-mile segment (Route 7 to Mission Road) is built along the north side of the freeway. The busway lanes are physically separated from the regular freeway lanes. The El Monte Station is situated at the easterly terminus of the busway. There are two intermediate stations, one at Cal State University, Los Angeles (which has bicycle storage areas) and one serving Los Angeles County General Hospital. A total of 1400 auto parking spaces are located at the El Monte Station as well as bicycle storage facilities and direct access from the Los Angeles County Rio Hondo Exclusive Bikeway. Additionally, outlying park-pool lots, park-ride facilities, feeder bus lines and a downtown reserved contraflow bus lane make this the most comprehensive transportation facility of its kind in the country (9).

Peak-hour volumes on the transitway are on the order of 3400 persons; approximately twice the volume of each adjacent freeway lane. Time saved



Source: (8).

Figure 4. Location of El Monte Busway, Los Angeles

using the 11 mile transitway ranges from 5 to 10 minutes per one-way trip over current freeway traffic in both the a.m. and p.m. peak periods (2).

Public reaction to the busway has been positive. Since the busway opened in 1973 the Southern California Rapid Transit District (SCRTD) has rerouted and rescheduled buses to maximize use of the busway. As a consequence, the busway is now an important part of SCRTD's total operation. Buses have been added to keep up with transit demand; auto-to-bus diversion and bus ridership continues to increase (9).

By 1978, the net effects of increased busway usage had been the elimination of 4100 one-way auto commute trips per day, savings of about 146,000 vehicle miles traveled per day, daily savings of 9200 gallons of gasoline (taking into account an added daily consumption of diesel fuel by the busway buses), and a reduction in air pollutants, relative to the environmental conditions which would have existed if there had been no busway (9).

Land use adjacent to and within the busway corridor is a mix of commercial and industrial development primarily zoned Heavy Industry (Table 3). Major features in the area include El Pueblo de Los Angeles State Historical Park, Union Station (now a property on the National Register of Historic Places as of November 13, 1980), and Piper Technical Center (9).

2.2.5 East M.L. King Busway (Pittsburgh)

The East Busway is a 6.8 mile long, grade-separated, exclusive bus facility running between downtown Pittsburgh and the eastern suburb of Wilkinsburg (Figure 5). Unlike other busways, it was not built next to a highway but shares the Conrail right-of-way for its full length. The busway has one lane in each direction and pullouts at five stations. Buses can enter and leave the facility at six locations, including the two ends. Busway service is provided by five new routes and a number of regular suburban routes, mostly expresses, which have been rerouted to the busway for the last part of their trips to the downtown. The major new route is the East Busway All-stops (EBA), which operates on three-minute headways at peak, runs the length of the busway, and serves patrons who either start their trip

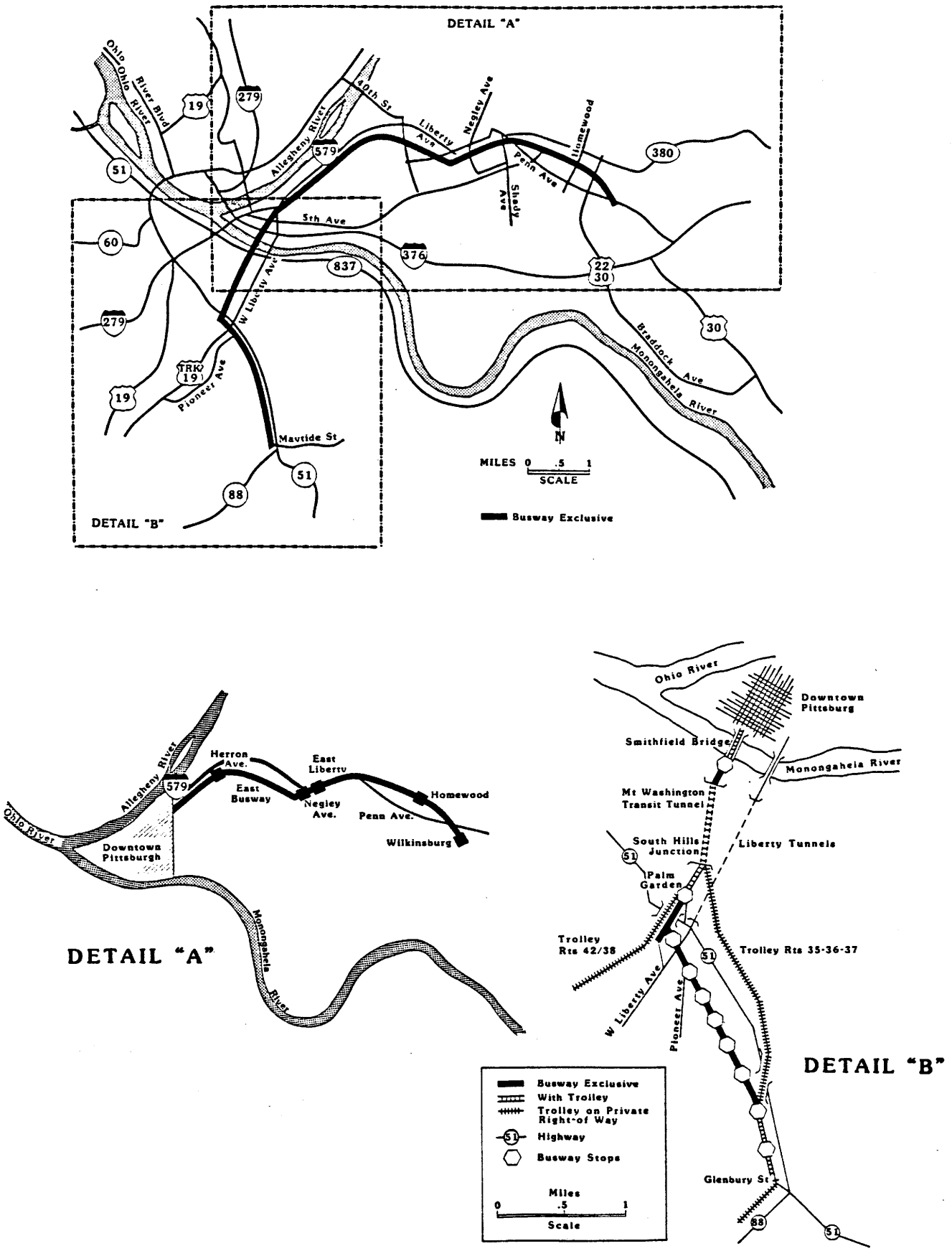


Figure 5. Location of East and South Busways, Pittsburgh

Table 3. El Monte Busway Corridor Land Uses, 1976

Land Use	Acres	% Total
Housing		
Med. Density[a]	56.7	3.4
Commerce		
Highway Oriented	21.8	1.3
Community	44.6	2.7
Industry		
Manuf.	30.4	1.8
Light Ind.	42.6	2.6
Heavy Ind.	1159.3	69.9
Open Space		
Recreation	86.5	5.2
Roadways	21.2	1.3
Other Public Lands	195.0	11.8
Total	1658.1	100.0

Source: (9).

[a] 25 to 40 Dwelling units per gross acre.

at a busway station or transfer to the busway from another route. The busway began operation on February 21, 1983 (10).

Since the busway began operating in February 1983, five new routes have been added to the Port Authority Transit (PAT) system which use the busway for either all or most of their length. The major new route is the EBA (East Busway All-stops), which uses the busway exclusively and, in November 1983, made about 130 roundtrips each weekday (10).

Average weekday vehicle miles of service in the East corridor increased by 3.5 percent, from 39,700 to 41,100 during the time period when the new busway routes were added between February 1983, and November 1983. Average weekday vehicle hours of service in the corridor increased by 2.1 percent, from 3,060 to 3,130, during this period. As of November 1983, the new busway routes accounted for about 7 percent, or 2840, of the average weekday vehicle

miles and about 6 percent, or 180, of the average weekday vehicle hours. The number of vehicle miles added for new busway routes is greater than the increase in East Corridor vehicle miles, so non-busway service was decreased slightly during this period (10).

Ridership on the East Busway in 1983 was estimated at 19,000 daily riders. One-way travel time savings for the 6.8 mile busway is between 10 and 60 minutes, largely due to removing buses from severe peak hour congestion at the Squirrel Hill Tunnel.

In terms of development impacts of the busway, only small-scale redevelopments of a service-oriented nature at or near station areas have been observed at this time.

2.2.6 South Patway Busway (Pittsburgh)

This facility is an exclusive two-way, two-lane partially grade-separated roadway that shares right-of-way with a passenger trolley. The South Patway (Port Authority Transit) Busway parallels Saw Mill Run Boulevard (Route 51) between the southwestern suburbs and the Pittsburgh CBD (Figure 5). This facility opened in 1977 and is still in operation. Eligible users include buses and certified private bus operators. Due to constraints related to the proximity of bus and trolley operations and existing congestion at the terminus of the busway, carpools and vanpools are prohibited from using the facility (2).

South Patway is the first exclusive bus only highway in the United States and has enjoyed public and private support as well as growing ridership, due in large part to accessibility, reliability, and speed. The facility successfully reduces travel time to the CBD and appears to be a stimulus for residential and economic development.

Daily ridership has grown from 18,000 passengers in 1977 to over 20,000 in 1981.

2.2.7 Katy Transitway (Houston)

The Katy Freeway Transitway is a one-lane reversible (HOV) facility located in the median of the Katy Freeway (IH-10W) in West Houston. The project is divided into three phases (Figure 6). Phase 1 of the project, currently in operation, is a transitway or Authorized High Occupancy Vehicle Lane (AVL), from near I-610 to West Belt (5 miles). Freeway rehabilitation was accomplished in conjunction with the transitway implementation.

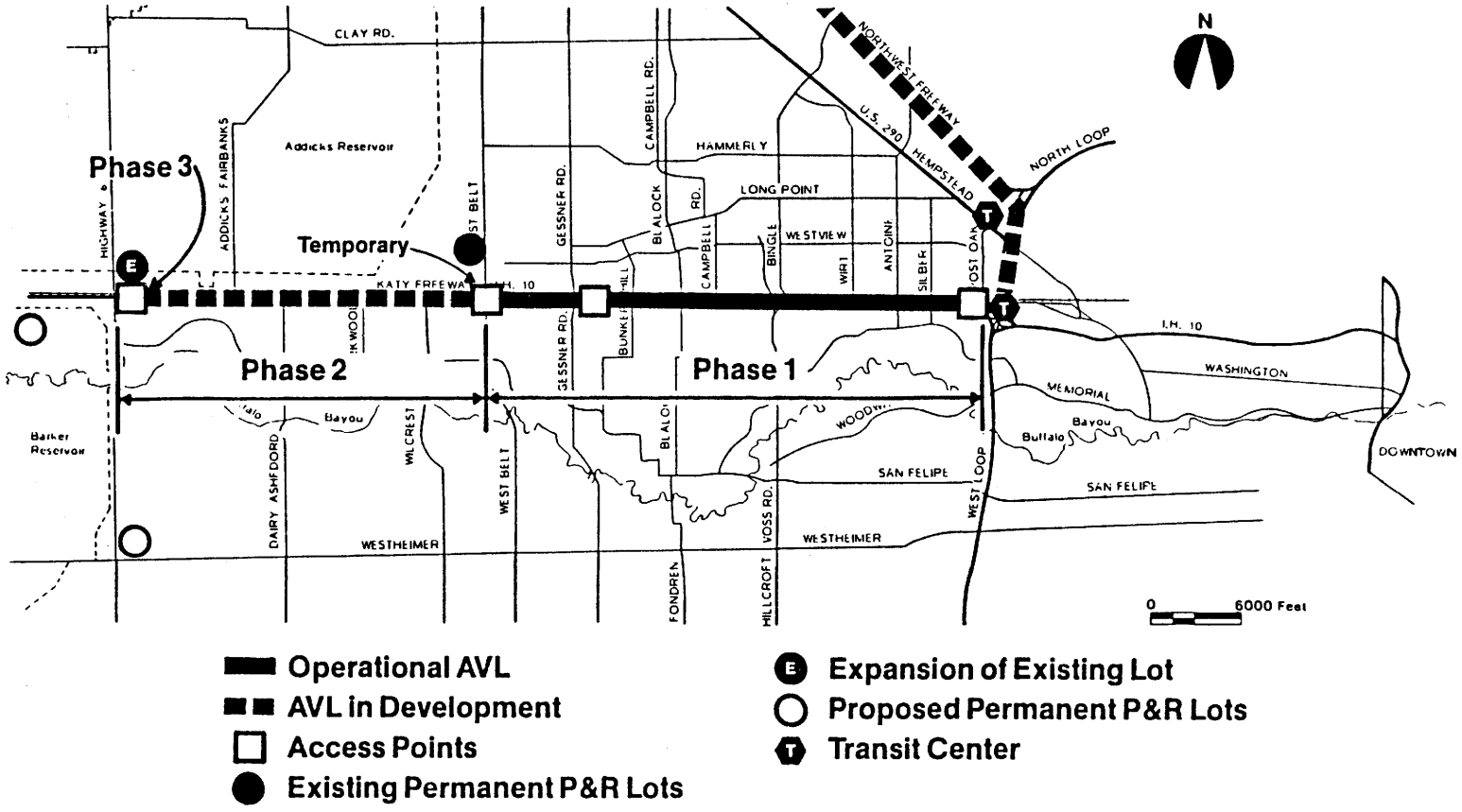
Phase 2 of the project will extend the Katy Freeway AVL from West Belt to west of State Highway (SH) 6 (6.5 miles). Completion of Phase 2 will permit the transitway to operate from I-610 to SH 6. This portion of the transitway construction is scheduled to coincide with a freeway maintenance project (11). Phase 2 of the project will also include an expanded park-and-ride facility and arterial improvements.

Phase 3 of the project will connect a grade-separated interchange just east of SH 6, using ramps from the transitway to the north and south sides of the freeway (11).

The transitway is a joint project between the State Department of Highways and Public Transportation (SDHPT) and the Metropolitan Transit Authority of Harris County (METRO). The facility will be separated from normal traffic by two concrete median barriers spaced 22 feet apart (center-to-center). It is designed for and intended to be restricted to authorized buses, vanpools, and carpools. Authorization is performed by METRO under agreement with SDHPT.

The transitway will operate in reversible flow fashion, inbound during the morning and outbound during the evening. The number of directional lanes along the freeway will remain the same although the inside emergency shoulders will be removed to provide adequate room for the transitway.

From the West Loop to SH 6, the Missouri, Kansas and Texas (MKT) Railroad right-of-way fronts the north side of the freeway. The south side of the freeway is becoming a continuous strip development consisting of



Source: (11).

Note: "AVL" (Authorized Vehicle Lane) is the local term for a "Transitway".

Figure 6. Location of Katy Freeway Transitway, Houston

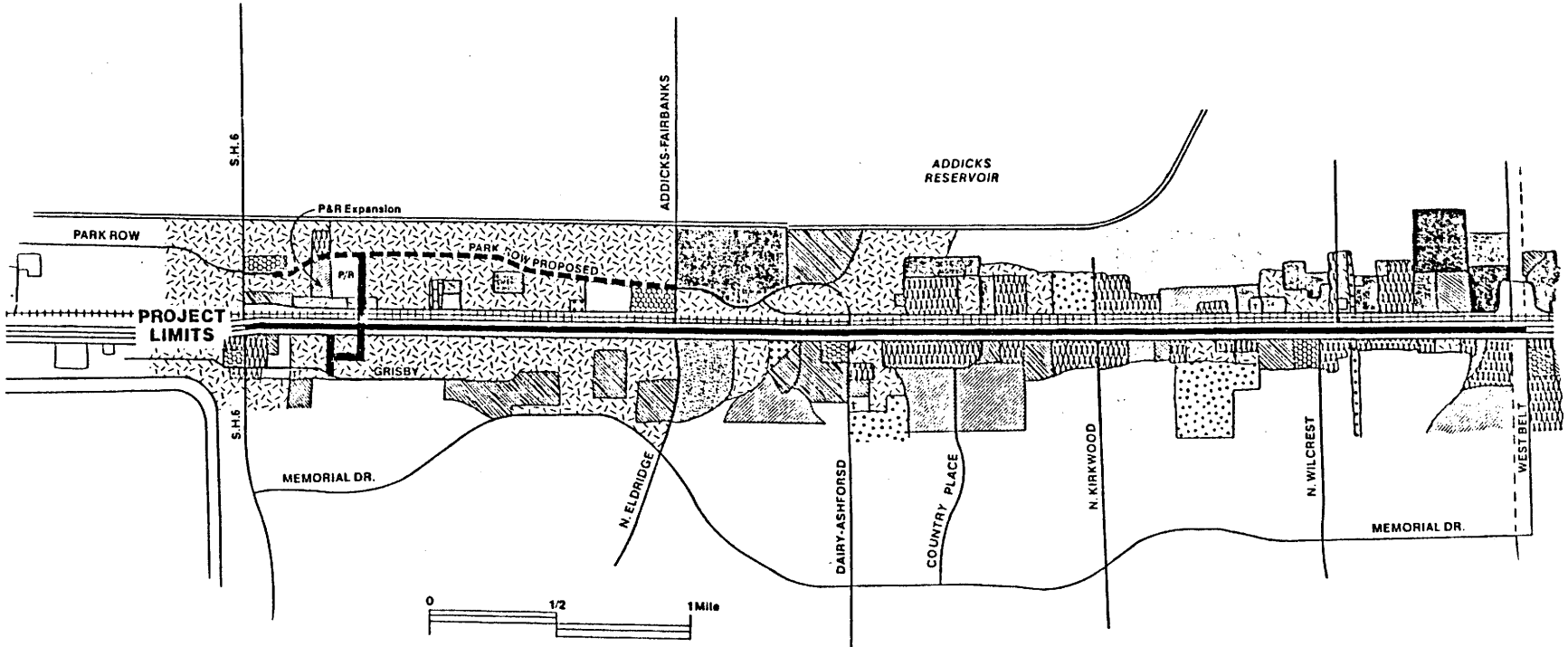
office buildings, restaurants and small shops. The majority of these enterprises are single story with the exception of the office buildings, which are mostly three or four stories. The Town and Country Village Shopping Center is located east of West Belt just south of the freeway. Between Eldridge and SH 6, there is very little development at the present time. On the north side there is a single family residential area immediately west of Eldridge, and scattered single family residences located just east of the existing Addicks Park-and-Ride lot (11).

On the south side, vacant land abuts the freeway from Eldridge to Addicks-Howell. This land is held by a single developer and is likely to continue the westward pattern of multi-story office and commercial development between the freeway and Grisby that is already in evidence to the east. Farther south, a single family residential area backs up to Grisby. Principal access to this area is from Memorial Drive. In the area between Addicks-Howell and SH 6 there is a predominantly office/commercial use, with a small single-family development, and a public school. Many corporations are relocating to this area, and it is anticipated that many large office buildings will be located here in the future (11). Figure 7 shows current (1986) land uses along the Katy Freeway corridor.

After nine months of operation, the Katy Transitway is carrying more than 5400 persons per day. An 82% increase in park-and-ride demand has accompanied this rise in transitway utilization. The corridor as a whole is carrying 20% more people in the peak period than it did before the introduction of transitway (12).

2.2.8 North Transitway (Houston)

The North Freeway Transitway, or Authorized Vehicle Lane (AVL), is a one-lane reversible authorized bus and vanpool facility located in the median of IH-45N, locally known as the North Freeway. The transitway replaces a contraflow lane which has operated on the freeway on a demonstrated basis since 1979. Implementation for the project has been divided into four phases (Figure 8) to be performed in conjunction with freeway rehabilitation. Phases I and II have been completed and extend a distance of 9.6 miles from

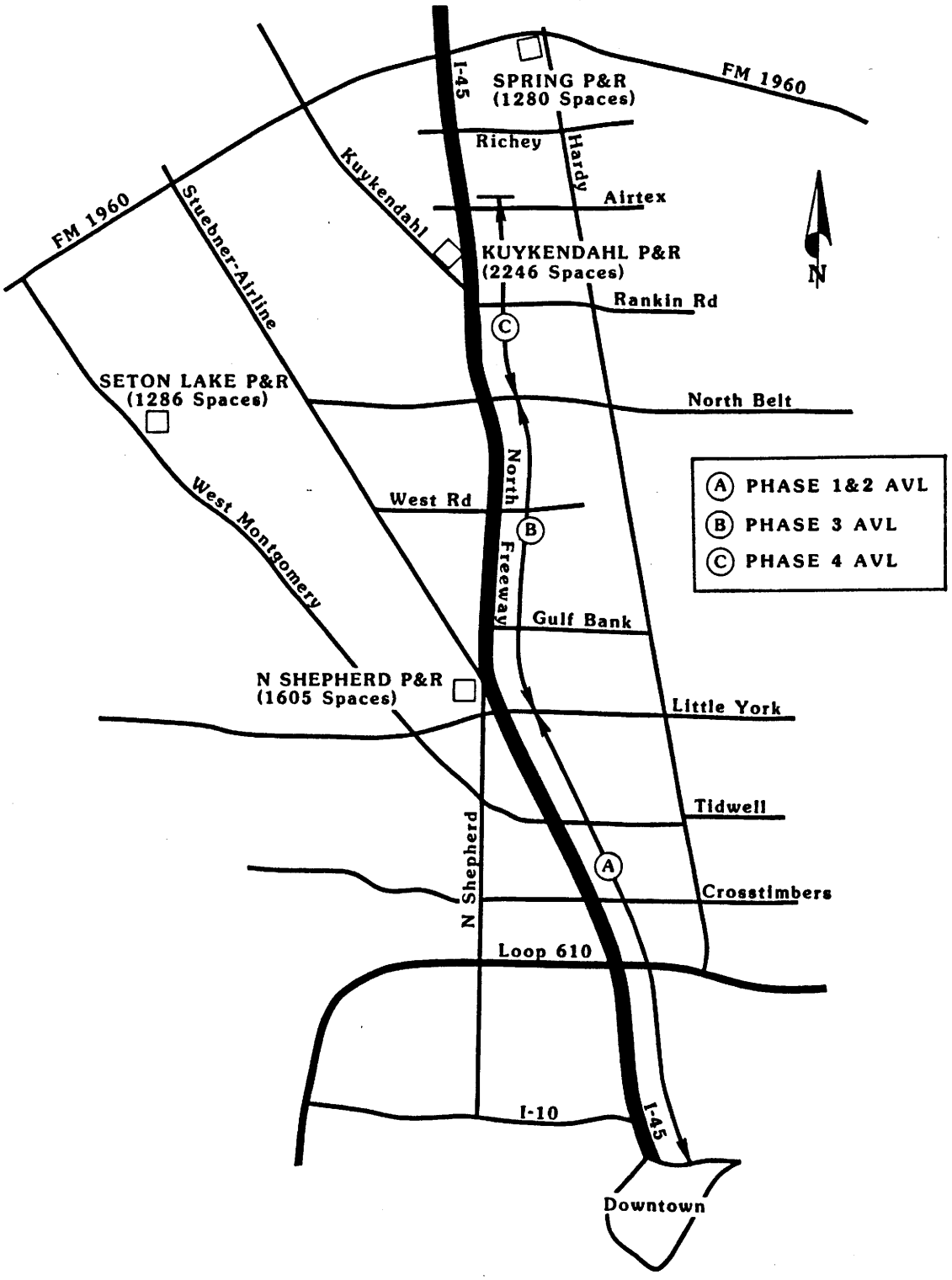


LEGEND

Single Family	Heavy Industry
Condos, Apartment Complexes	Churches
Vacant Land	Utilities
Commercial	Schools
Offices with Parking	Cemetery
Hotels/Motels	Public Building
Light Industry	P/R Park & Ride

Source: (11).

Figure 7. Land Uses Within the Katy Transitway Corridor, Houston (1986)



Source: (13).

Note: "AVL" (Authorized Vehicle Lane) is the local term for a "Transitway".

Figure 8. Location of North Freeway Transitway, Houston

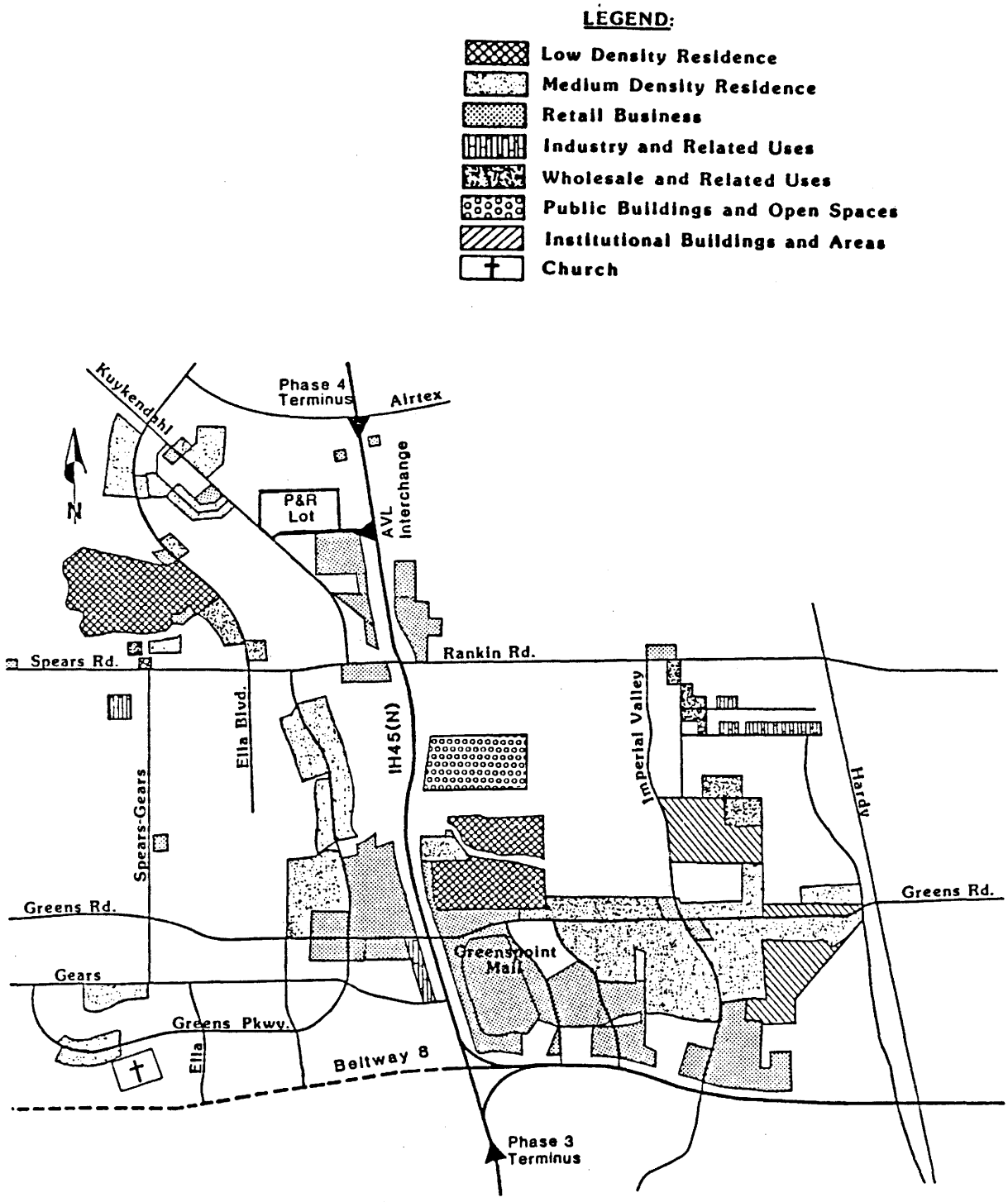
the Houston Central Business District (at Franklin Street) to North Shepherd. Phase III will extend the transitway 4.9 miles from North Shepherd to Beltway 8 (locally known as the North Belt), and Phase IV will take the facility another 3.1 miles to Airtex near FM 1960. Four existing park-and-ride lots in the 17.6 mile corridor will be used to serve the transitway market area (Figure 8) (13). The transitway currently serves over 16,000 passengers daily. Current land uses in the North Transitway corridor are shown in Figure 9.

While the North Transitway has not been in operation long enough to assess its impacts on land uses in the corridor, data from the contraflow lane which preceded it does suggest that the presence of HOV facilities may affect choices regarding where people live and work. Table 4 summarizes data from surveys of park-and-ride lots served by the IH-45N contraflow lane and surveys of lots not served by the contraflow lane or other HOV lane. The table presents a break-down of whether the presence of the park-and-ride and/or contraflow lane influenced peoples decisions regarding job and residential locations (for those respondents who indicated they had changed their residential or job location since the park-and-ride or contraflow lane opened). These data indicate that the presence of both park-and-ride and priority treatment (in this case, contraflow) may influence location decisions. The trend is particularly strong for those who indicated a change of residential location.

The evidence suggests that the presence of a busway may affect choices regarding where people live and work. This would seem to indicate that transitways may induce some shifts in development and settlement patterns, rather than generating entirely new development.

2.2.9 Ottawa Transitway System (Canada)

The Ottawa transitway system will consist of 18 miles of two-lane roadway and 28 stations for the exclusive use of rubber tired buses (Figure 10). Over most of its length, the transitway would be grade-separated from crossing streets. The only exceptions to this rule being the downtown sections which will be an at-grade transit mall and a few minor streets in



Source: (13).

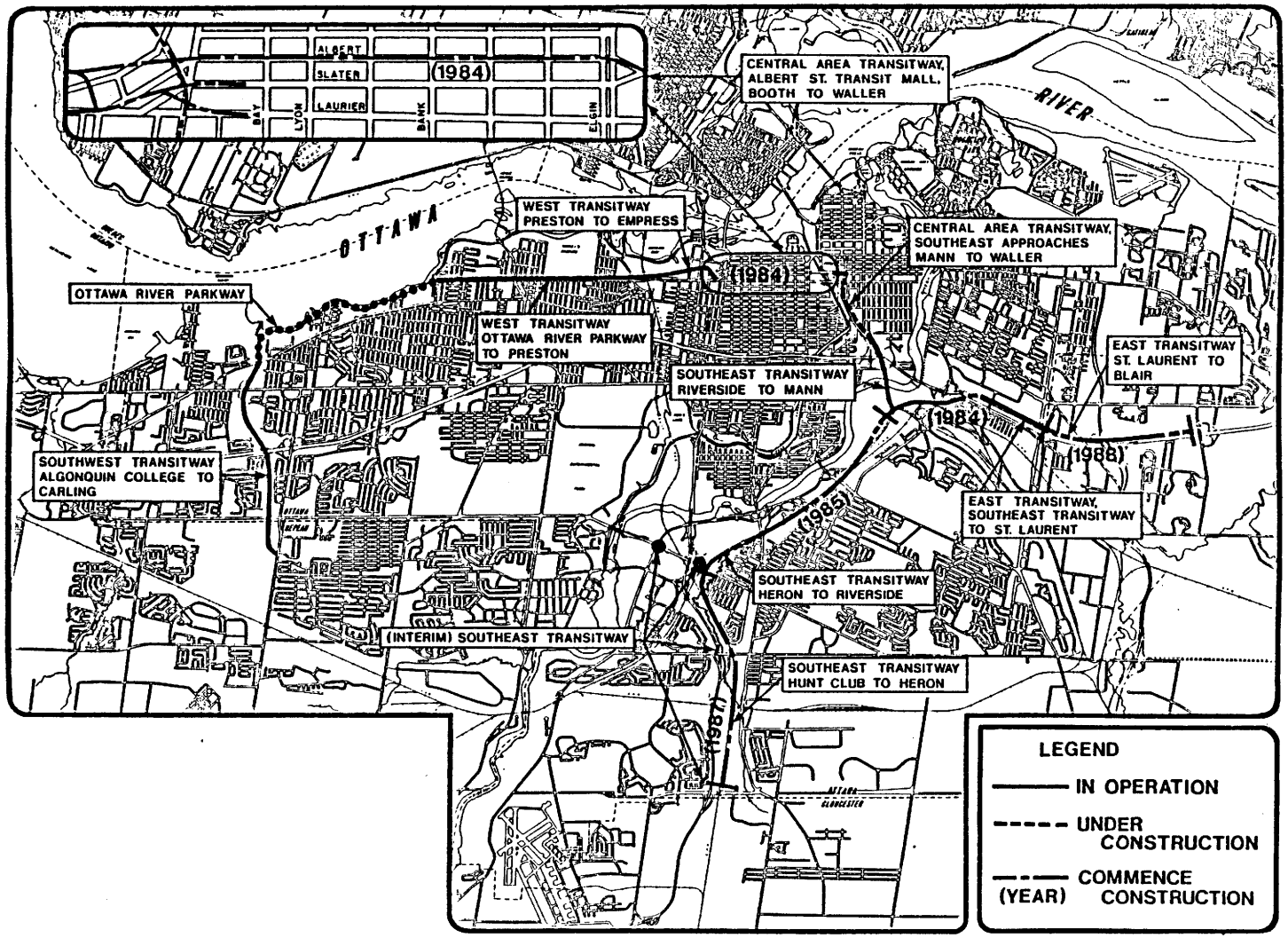
Figure 9. Land Uses Within the North Transitway Corridor, Houston (1986)

Table 4. Changes in Job and Residential Locations Since Park-and-Ride Lot Opened, With and Without Priority Freeway Lanes

Question	Contraflow Lane Lots	Non-Contraflow Lane Lots	Total Sample
Have you changed job locations since Park-and-Ride (or park-and-ride and contraflow lane) opened?	(n=1118)	(n=558)	(n=1676)
Yes	41%	27%	36%
No	59	73	64
If "yes", did the availability of Park-and-Ride (or park-and ride and contra-flow lane) influence decision?	(n= 445)	(n=147)	(n= 592)
Yes	51%	40%	48%
No	49	60	52
Have you changed residential locations since Park-and-Ride (or park-and-ride and contraflow lane) opened?	(n=1122)	(n=563)	(n=1685)
Yes	55%	54%	55%
No	45	46	45
If "yes", did the availability of Park-and-Ride (or park-and-ride and contra-flow lane) influence decision?	(n= 603)	(n=303)	(n= 906)
Yes	57%	50%	54%
No	43	50	46

Source: (14).

outlying areas where traffic volumes do not warrant the cost of grade-separation (15). Approximately 7 miles of the system, with 5 stations, are currently in operation. The system operates just like any other rapid transit facility with buses stopping at every station. In addition, ramp access is provided for express and limited stop routes so that a direct no transfer service can be provided between the residential street system and downtown and other major trip generators. The stations provide weather protection and a full range of information services (15).



Source: (15).

Figure 10. Location of the Ottawa Transitway System, Ottawa, Canada

Though the transitway system is only about 40% complete, current ridership is high. In the peak hour, approximately 13,000 persons utilize the transitway system to reach employment centers in downtown Ottawa.

Preliminary indications are that the development impacts of the system may be substantial. The building industry has expressed interest in pursuing major developments at a number of existing and planned transitway stations. Table 5 summarizes preliminary development proposals near seven transitway stations.

2.2.10 Planned Transitways

In addition to the eight operational transitways described in the previous sections, the research also identified a number of transitway projects in various stages of planning, design, or construction. These projects are summarized in Table 6. The status of these projects will be monitored for possible analysis in subsequent phases of this research.

Table 5. Development Proposals in Vicinity of Ottawa Transitway Stations

Station Name	Description of Proposed Development	Approximate Investment Value ($Million)
Baseline	• Government Offices	$15
	• General Office Space (1M sq. ft.)	$50
	• Care Center	$15
	• 2 Apt. Towers	$20
		$100
Tunney's Pasture	• 500 Residential Units	NA
	• 200,000 sq. ft. Office	NA
	• 100,000 sq. ft. Retail	NA
		$80
Lees	• Apt. tower (226 Units)	$10
Hurdman	• Three Apt. Towers (900-1000 Units)	$90
St. Laurent	• Retail (130,000 sq. ft.)	NA
	• Office (110,000 sq. ft.)	NA
		$15
Cyrville	• Office (120,000 sq. ft.)	NA
	• Residential (600 Units)	NA
		$70
Blair	• 140 Acres Res./Off./Retail	$200
	• Office Tower (500,000 sq. ft.)	$50
		$250
Total		$615

Source: Regional Municipality of Ottawa-Carleton (1985).

Table 6. Summary of Transitway Projects Currently in Planning, Design, or Construction Phases

Location	Description	Status
I-45S, Houston	15-mile, one-lane reversible median transitway	Under Construction
US-59S, Houston	8.5-mile, one-lane reversible median transitway	Design Phase
US-59N, Houston	13.5-mile, two-way median transitway	Preliminary Design
US-290, Houston	14-mile, one-lane reversible median transitway	Preliminary Design
US-101, San Francisco	13-mile, transitway on abandoned S.P. RR right-of-way	Proposed
I-15, San Diego	8-mile reversible transitway	Proposed
H-1, Honolulu	2-lane, reversible median transitway	Proposed
I-394, Minneapolis	Combination of concurrent flow and separated transitway	Under Construction*
I-670, Columbus, OH	Two-way, two-lane separated median transitway	Proposed
I-275/576, Pittsburgh	Two-lane, reversible median transitway	Under Construction
I-64 and I-264, Norfolk, VA	11.5-mile separated transitway	Under Study
North Central Busway, Baltimore	5.6-mile, two-way, two-lane transitway on exclusive ROW	Preliminary Design

*NOTE: The initial phase of the transitway became operational in November 1985. However, only preliminary operating data are available at this time.

2.3 GENERAL COMPARISON OF U.S. URBANIZED AREAS

Table 7 presents an overview of various characteristics for the four U.S. urbanized areas included within the transitway survey. As shown in the table, urban areas demonstrate considerable variation in socioeconomic factors and travel patterns (17). The comparative indicators are included to illustrate these variations which must be considered in the evaluation and analysis of land use impacts resulting from implementing transportation improvements such as transitways.

Table 7. Comparative Socioeconomic Indicators for U.S. Urbanized Areas Having Transitways

	Washington, DC	Los Angeles	Pittsburgh	Houston
Total Number of Households	1,022,896	3,435,875	672,963	869,373
Total Housing Units	1,084,259	3,591,521	709,201	978,538
Percent Renter Occupied Housing	44.9%	47.0%	32.1%	39.4%
Workers as Percent of Population	52.3%	47.5%	42.2%	51.0%
Percent of Families Earning:				
Less than $10,000	11.5%	18.1%	16.4%	14.6%
$10,000 to $19,999	20.4%	26.1%	28.3%	23.4%
$20,000 to $34,999	32.6%	32.6%	37.4%	36.2%
$35,000 or More	35.5%	23.2%	17.9%	25.9%
Median Family Income	$27,885	$22,041	$21,542	$24,463
Labor Force Status:				
Armed Forces	48,685	22,369	784	1,396
Civilian Employed	1,397,408	4,478,958	762,907	1,228,533
Total Families	683,382	2,337,436	489,738	617,454
Total Daily VMT (1,000's)	47,551	135,634	25,960	49,728
Daily VMT Per Capita	17.21	14.31	14.34	20.62
Percent of Worker Trips By:				
Auto	71.0%	77.9%	70.4%	76.1%
Rail	4.9%	--	0.1%	--
Bus	11.7%	5.8%	13.7%	3.5%
Truck or Van	5.5%	10.2%	8.0%	16.4%
Other	6.9%	6.0%	7.7%	4.1%

Source: Ref. (17). Based on the 1980 Census.

3. CONCLUSIONS

This review of operational transitways in the U.S. and Canada has focused on identifying the general design and operating characteristics of transitways and the transportation and land use impacts these facilities have had (or are expected to have) on the urban areas in which they are located. The transportation impacts of transitways are well documented elsewhere. Consequently, this review has focused primarily on the land use and development impacts of transitways.

The results of the review indicate that virtually no research has been conducted on the land use impacts of transitways. Additionally, the majority of the transitway operators surveyed indicated that no such research is being considered in the near future. The prevailing opinion among transitway operators is that given the exclusive, line-haul nature of transitways, their land use impacts are likely to be highly localized; occurring around station areas and major access points. Preliminary evidence from Ottawa suggests that these localized developments may be substantial. However, transit use in Ottawa is the highest for all bus-only systems in North America and experiences there may not be representative of the potential development impacts of transitways. Additionally, indications from the Ottawa experience are that the presence of a transitway may be but one factor in decisions regarding the timing and location of developments. Specifically, discussions with transitway officials in Ottawa indicate that the presence of the transitway system may merely have accelerated the timing of developments, rather than influencing location decisions.

In a more area-wide context, preliminary evidence from Houston suggests that the presence of a transitway may affect choices regarding where people live and work. This would seem to indicate that transitways may induce some "shifts" in development and settlement patterns, rather than generating entirely new development.

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