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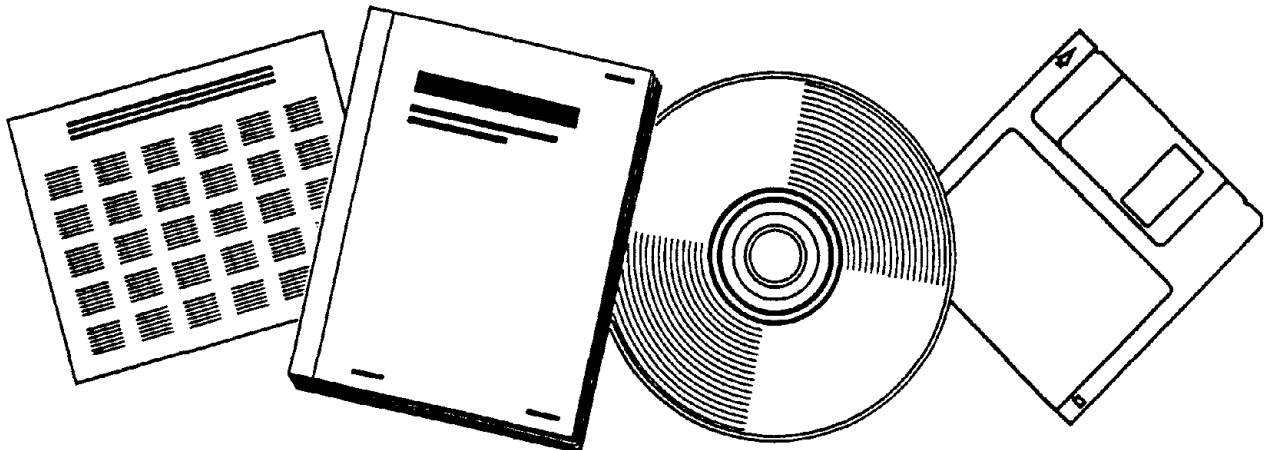
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# NEW PERSPECTIVES IN COMMUTING BASED ON EARLY DATA FROM THE 1990 DECENNIAL CENSUS AND THE 1990 NATIONWIDE PERSONAL TRANSPORTATION STUDY (NPTS)

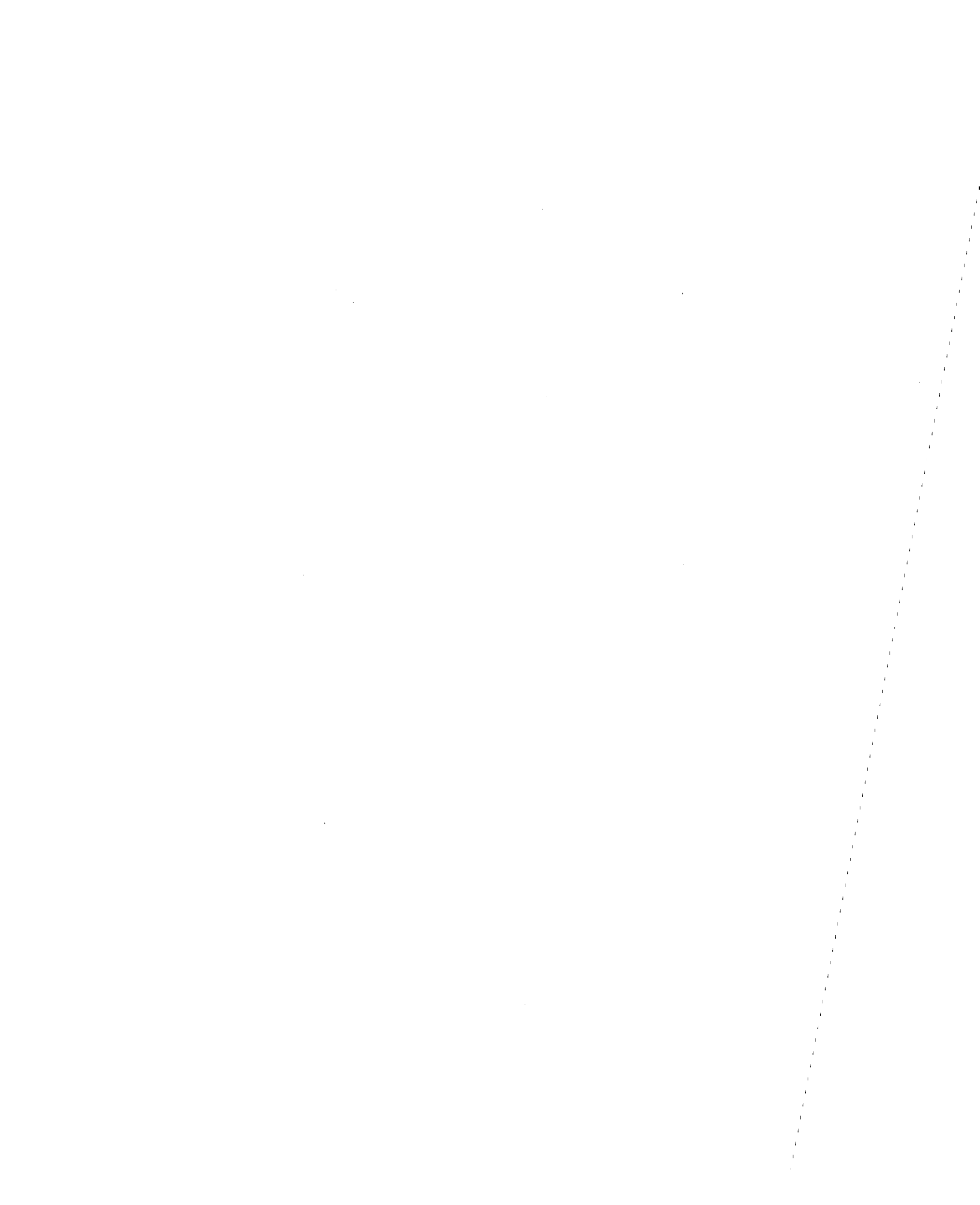
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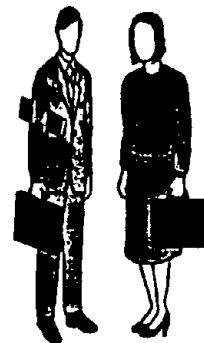
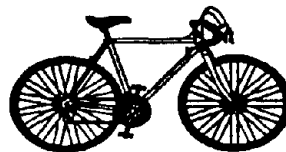
# ***NEW PERSPECTIVES IN COMMUTING***

*Based on*

***Early Data From the 1990 Decennial Census***

*and*

***The 1990 Nationwide Personal Transportation Study (NPTS)***



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## **NEW PERSPECTIVES IN COMMUTING**

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the 1990 Nationwide Personal Transportation Study

Prepared by  
Alan E. Pisarski

July 1992



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## INTRODUCTION

The U.S. Bureau of the Census has begun the release of data obtained from the 1990 decennial census describing the journey to work of America's workers. These early data are in the form of broad summaries at the State and county level. They cannot provide the sophisticated insights that will be available when the highly detailed census statistics are produced for small units of geography, providing origin to destination flows. But they do provide an exciting introduction to who, what, and where we are in commuting as a Nation, as measured by the snapshot taken by the Bureau of the Census in April 1990, and where we have come from, judging by the 1980 and previous census reports.

This document provides a first glimpse of the census material. It is not intended to be definitive. Rather, it seeks to call attention to some of the dramatic changes that have occurred in commuting across the Nation, and to identify some of the themes that will be developed further as more detailed information becomes available.

It is a great benefit to better understanding that the Nationwide Personal Transportation Survey, NPTS, was conducted by the Department of Transportation in the same year that the Census was taken. The NPTS, while lacking the extensive coverage of the Census, complements it effectively by providing the detailed links between travel and traveler characteristics, which often "explain" Census statistics. Some NPTS data are used here to assist in further understanding.

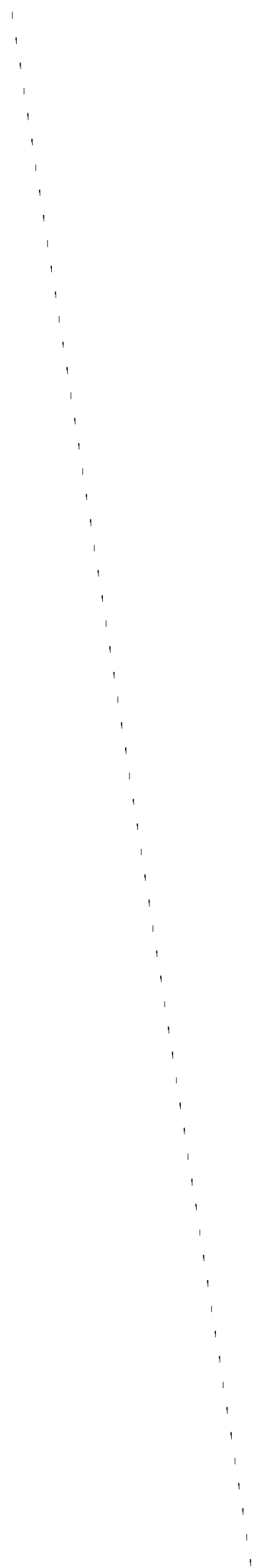
In addition to this report, there is a series of NPTS reports being prepared to examine many related issues in personal travel trends. The NPTS series will consist of:

- \* Summary of Travel Trends, an overview of data on travel behavior, transportation patterns, and demographic trends. (Advance copy currently available.)
- \* 1990 NPTS Data Book, a comprehensive report of survey results containing detailed data on personal travel as related to the characteristics of people, households, and trips.
- \* Travel Behavior Issues in the 90's, an indepth discussion of current issues in personal travel, using NPTS and other national transportation survey data.
- \* Urbanized Area Travel, a presentation and analysis of NPTS data on travel in urbanized areas.

The NPTS dataset is available for public use on nine-track tape or diskettes for a fee.

For more information on NPTS, contact the Office of Highway Information Management, Federal Highway Administration, at (202) 366-0160, or FAX (202) 366-7742.

Stephen C. Lockwood  
Associate Administrator for Policy



## NATIONAL TRENDS

Table 1 provides a broad summary of basic national work-related statistics obtained in the 1990 census compared to results for 1980.

### DEMOGRAPHY

The resident population of the United States grew by 22 million persons to 248.7 million people in 1990, a growth of 9.7 percent since 1980. This is the lowest decade growth rate in our recorded history, with the exception of the great depression period of 1930-1940, the only other time the rate dipped below 10 percent.

Twenty million of those 22 million persons were in urban areas while only 2 million were in rural areas, a 10 to 1 ratio. As a result, the urban share of national population grew from 73.7 percent to 75.2 percent. As more detailed data become available, it will be crucial to examine those urban growth trends to determine the distributions of jobs and workers among rural areas, suburbs, and center cities, and between larger and smaller metropolitan areas. For example, the State data indicate that almost all of the Eastern States actually declined in urban population between 1980 and 1990. The ranking of States by percentage of population urban yields surprises: California is the most urban with almost 93 percent of its population urban; New Jersey is second at over 89 percent; and then surprisingly followed by States that most would consider rural, Hawaii (89 percent), Nevada (88 percent), and Utah (87 percent). A significant factor in national assessments is that nearly 9 million foreign-born persons arrived in the United States in the eighties--most of them arriving in their early productive years. Thus, a large portion of the 22 million new population were not babies, but instant additions to the work pool and the driving pool.

For commuting purposes, the key variable is the change in the number of workers. There were 19 million more workers in 1990, a growth of 19 percent, only 3 million less than the increase in population, for a total of over 115 million workers. The Census, conducted in the spring of 1990, measured workers at their peak. Due to the recession, total workers have since declined by about 2 million.

The number of motor vehicles available to households grew by a larger number than workers or population--23 million vehicles--a growth rate of 17.4 percent. Thus:

NEW POPULATION	22 MILLION	+9.7%
NEW WORKERS	19 MILLION	+19.1%
NEW VEHICLES	23 MILLION	+17.4%

As a result of the interrelationships in growth of these variables--people, workers, and vehicles--workers, as a share of population, grew markedly from 42 percent to over 46 percent, and vehicles per worker declined slightly from 1.34 to 1.32. With household formations occurring almost as fast as workers and motor vehicles, workers per household

grew only slightly from 1.20 to 1.25, and similarly, vehicles per household rose only from 1.61 to 1.66, as persons per household continued its long-term decline to 2.63 persons per household. The NPTS showed higher growth from a different base, from 1.68 in 1983 to 1.77 in 1990.

## **COMMUTING IN CONTEXT**

While the focus of this document is on work commuting, it is important to recognize that such travel is only a part, and sometimes not a very large part, of urban travel. The long-term trend, measured from the earliest NPTS survey in 1969, has seen work travel become a diminishing part of all travel. In terms of person trips, work represents a share of 20.1 percent, down from 20.4 percent in 1983. Because work trips appear to have increased in length faster than other trips, the share of person miles of travel attributable to work increased from 20.1 percent to 22.7 percent. The trend, measured in vehicle trips, was very similar--a decrease in share of vehicle trips, but an increase in share of vehicle miles of travel.

The relatively minor changes in share of trips and travel for work are not the product of lack of growth. All segments of work travel have increased, in some cases, substantially. Rather, it is that the relative growth of other trip purposes has been equally great or greater. Trips for personal business have shown dramatic increases, in particular. *Figure 1* shows the shares of total person miles of travel, by purpose, for 1990.

One reason for the public interest in work trips is their tendency to cause peaks in the early morning and evening, therefore having a more significant impact on system capacities in transit and highway than trips that are more evenly distributed across the day. As the discussion of starting times describes, from data available for the first time from the Census, the peaking characteristics of work travel is also diminishing, making work travel a smaller component of peak-period travel.

## **COMMUTING PATTERNS**

The major surprises in national patterns were the extent to which motor vehicle travel and, particularly, driving alone in a motor vehicle, has come to overwhelm all other modes of work travel. Given the great growth in commuters, and in motor vehicle commuters specifically, a pleasant surprise was the very small increases in average travel times observed. Average travel time to work grew by only about 40 seconds in the 10-year period, from 21.7 to 22.4 minutes. With a 35-percent increase in persons driving alone from about 62 million to over 84 million, this is an extraordinary comment on the flexibility and capacity of the Nation's highway system. Three graphic figures are provided summarizing the trends. The first shows long-term broad trends in modal share since 1960; the second provides broad modal trends for 1980 to 1990; and the third provides highly detailed modal volume data for the same period based on Table 2. (*Figures 2 -- 4*)

## *Driving Alone*

The increase in persons driving to work alone, about 22 million, exceeded the number of new workers. In effect, all of the prodigious growth in workers from 1980 to 1990 was accommodated by the single-occupant vehicle on the road system. One explanation for the very slight rise in travel time, given the rapid growth in commuters and the popular public sense of increasing congestion and delay, is that the common thread in the patterns of mode selection in the eighties has been for commuters to always shift from slower to faster modes. Other factors, such as shifts in job locations to outer suburban areas where speeds are higher, will await confirmation with later data. Inferentially, given that the NPTS indicates that average work trip lengths have grown to over 10 miles and, therefore, grew at a rate substantially faster than travel times increased, suggests that average commuting speeds have actually improved.

All alternatives to the single-occupant vehicle for traveling to work declined in their share of commuting. Significantly, all of the alternatives also declined in absolute numbers, as shown in *Figure 5*. The distribution by region of the country shows a similar pattern (*Figures 6 and 7*). While the growing dependence on the single-occupancy vehicle is surprising to some, even shocking, there had been indications throughout the latter part of the eighties that this was the trend of events. The census data confirm it and, in some instances, establish that the trends were stronger than anticipated. A few travel surveys around the country had shown indications of rapidly falling auto occupancies for work trips. Transit ridership data, although difficult to interpret, had indicated static ridership nationally. Labor statistics on job activity had shown that working at home was at least growing at approximately the same rate as overall job growth. Many of these trend patterns are really simple extensions of the long-term trends, as shown in *Figure 2*.

## *Carpooling*

Most surprising of all was the sharp decline in the number and share of those driving with more than one worker in the vehicle, which the Bureau of the Census refers to as a carpool. This form of travel declined by almost 4 million workers, from about 19 million to about 15 million, resulting in a one-third decrease in its share of travel from almost 20 percent to just over 13 percent. The arrival of almost 19 million new workers overall and the shift of almost 4 million group riders explain the source of the 22 million worker increase in drive alone commuters. Further analyses will be required to fully understand this shift, but major contributing factors are the increase in drivers licenses and auto availability among women, those over 65 and under 21, as well as the continued low density dispersion of job sites. Overall vehicle occupancy declined from 1.15 to 1.09, an absolutely dramatic shift. It appears that the major shifts in carpooling were among those in the larger groups, as shown in the detailed *Figure 4*. Those in four-person and five plus carpools declined by more than 50 percent, three-person pools, almost 40 percent, and two-person pools, only about 10 percent. The NPTS shows similar results for work trips with an occupancy of 1.1 in 1990. Overall occupancy for all trip purposes decreased from 1.7 in 1977 to 1.5 in 1990.

### *Transit Use*

Transit ridership remained at about 6 million riders from 1980 to 1990, declining only slightly in absolute terms by about 100,000 riders. That 6 million represented a smaller slice of a larger pie in 1990, and, as a result of the great increase in total commuters, the transit share declined from about 6.4 percent to about 5.3 percent of work travel. Detailed data that shows the submodal distribution within the transit area indicate that the declines were all in bus travel, suggesting losses in the smaller metropolitan areas and shifts from bus to rail in the larger areas. Rail-related travel gained in absolute terms as a result of substantial subway development in the eighties, but its gains did not balance the declines in buses. Taxicab usage, included under transit by the Bureau of the Census, also increased slightly. The NPTS data indicate that transit use declined across all cross-sections of the society, notably among women, the young, and the old. The strong emphasis on transit on the northeastern portions of the country is illustrated by *Figure 8* showing the distribution of commuters by region of the country and the distribution for transit riders, indicating that the Northeast generates half of all transit trips.

### *Walking to Work*

Walking to work also declined in absolute as well as percentage terms. Walkers declined by almost a million workers, or almost 17 percent, and their share of commuters dropped from 5.6 percent in 1980 to 4 percent in 1990. A large segment of those who walk to work are rural and small town residents based on NPTS and American Housing Survey data. A decline in walking in cities might signal an undesirable increase in use of vehicles and attendant pollution, but in rural areas, the shift to the auto may indicate a beneficial increase in access to broader job markets. Later data will help interpret the extent to which urban walking has been a factor in these trends. Preliminarily, walking seems to have held up in metropolitan areas. Other patterns show about the same number of bicyclists in 1990 as in 1980. Surprisingly, there was a dramatic drop of almost one-half in motorcycle use for work trips.

### *Working at Home*

An interesting phenomenon for future consideration was the significant increase of over 1 million in those working at home, representing over a 50-percent increase, and bringing their share of workers up to 3 percent from 2.3 percent in 1980. This trend may be even more pronounced than the data suggest in that the numbers are likely to be the net product of declines in working at home in rural areas, i.e., farming, and increases in cottage industry in the cities and suburbs. Again, more detailed data becoming available will permit some clarification of this trend. However, this is an area of considerable statistical weakness, and the ability to fully understand patterns and trends will be limited.

### *Starting Times*

For the first time, the Census provides starting time information. This is summarized in Table 3. This will be most useful in detailed urban studies in which specific traffic patterns are being analyzed, but there is value at the national level as well. The central fact about commuting borne out by these data is that there is no such thing anymore as a "peak hour." The most heavily loaded hour in terms of starts of trips, from 7 a.m. to 8 a.m., only accounts for 32 percent of commuting trip start times. One concern of analysts has been that the congestion in peak periods was pushing travelers to earlier or later start times. The "shoulder hours" from 6 a.m. to 7 a.m. amasses about 20 percent of worker trip starts, and from 8 a.m. to 9 a.m., about 17 percent.

### **PLACE OF RESIDENCE--PLACE OF WORK RELATIONSHIPS**

Data to assess changing commuting flow patterns between residence and work are the most difficult to develop and require extensive geographic detail regarding home and work place locations. The present level of reporting permits only preliminary assessments to be made. These are of interest nonetheless. The early data show that those who work in their State of residence, which, at 96 percent, is almost everyone, was effectively unchanged between 1980 and 1990, decreasing slightly. There was a significant change, though, in those working in their county of residence. This share dropped from 79 percent to 76 percent; thus, the gain in intercounty commuting was significant, suggesting longer work trips.

At the metropolitan level, the proportion of population living in metropolitan statistical areas (MSA's) grew from 77 percent to almost 80 percent. The proportion of those workers who worked in their MSA of residence remained unchanged at about 72 percent. Those working downtown declined in share, while those working in the remainder of the MSA and outside the MSA area increased, in some cases significantly.

Those living outside MSA's correspondingly declined from 23 percent to 20 percent of workers. A declining majority of those, about 90 percent, also worked outside of an MSA. The numbers commuting from non-MSA areas into MSA's increased substantially. The detailed statistics for these changes are shown in Tables 4 and 5.

TABLE 1

## JOURNEY TO WORK COMPARISONS, 1980 AND 1990 1/ NATIONAL TOTALS AND PERCENT CHANGES

ATTRIBUTES	1980	1990	PERCENT CHANGE
Persons in Households	220,796,157	242,012,119	9.6%
Number of Households	80,389,673	91,947,410	14.4%
Persons per Household	2.75	2.63	-4.4%
Residential Population	226,641,402	248,709,873	9.7%
Urban Population	167,146,349	187,051,579	11.9%
Rural Population	59,495,053	61,658,294	3.6%
Percent Urban	73.7%	75.2%	2.0%
Workers 16 and Older	96,588,001	115,070,274	19.1%
Workers as Percent of Population	42.6%	46.3%	8.7%
Workers per Household	1.20	1.25	4.2%
Workers per Vehicle	0.74	0.76	2.7%
Vehicles per Worker	1.34	1.32	-1.5%
Mean Travel Time to Work (Minutes)	21.7	22.4	3.2%
Workers Driving Alone	62,193,449	84,225,796	35.4%
Percent Driving Alone	64.4%	73.2%	13.7%
Workers Carpooling	19,065,047	15,389,473	-19.3%
Percent Carpooling	19.7%	13.4%	-32.0%
Workers Using Public Transit	6,175,061	6,059,935	-1.9%
Percent Using Public Transit	6.4%	5.3%	-17.2%
Workers Using Other Modes	1,590,628	1,501,895	-5.6%
Percent Using Other Modes	1.6%	1.3%	-18.8%
Workers Walking or Working Home	7,563,816	7,893,175	4.4%
Percent Walking or Working Home	9.5%	6.9%	-27.4%
Households with no Vehicles	10,390,307	10,602,297	2.0%
Percent with no Vehicles	12.9%	11.5%	-10.9%
Households with 1 Vehicle	28,564,622	31,038,711	8.7%
Percent with 1 Vehicle	35.5%	33.8%	-4.8%
Households with 2 Vehicles	27,347,235	34,361,045	25.6%
Percent with 2 Vehicles	34.0%	37.4%	10.0%
Households with 3 or More Vehicles	14,087,509	15,945,357	13.2%
Percent with 3 or More Vehicles	17.5%	17.3%	-1.1%
Total Number of Vehicles 2/	129,747,872	152,380,479	17.4%
Vehicles per Household 2/	1.61	1.66	3.1%

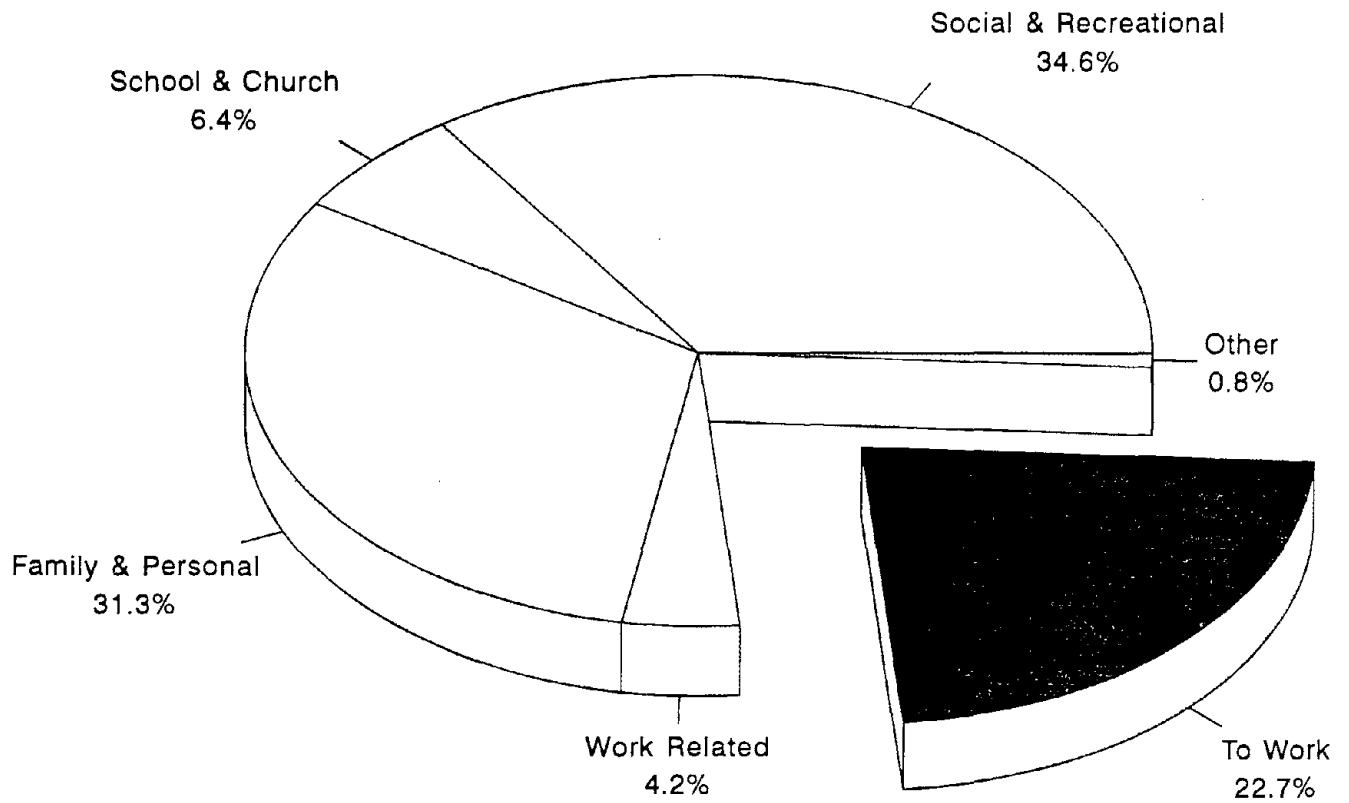
1/ Prepared by Volpe National Transportation Systems Center using the "1980 Census of Population" and the "1990 CPL-80" Census Press Release.

2/ Assumes 3.3 vehicles in households with 3+ vehicles.



FIGURE 1

# PURPOSES OF PERSONAL TRAVEL



Source: 1990 NPTS, Distribution of Person Miles of Travel by Purpose.

FIGURE 2  
LONG TERM MODAL TRENDS  
1960 - 1990

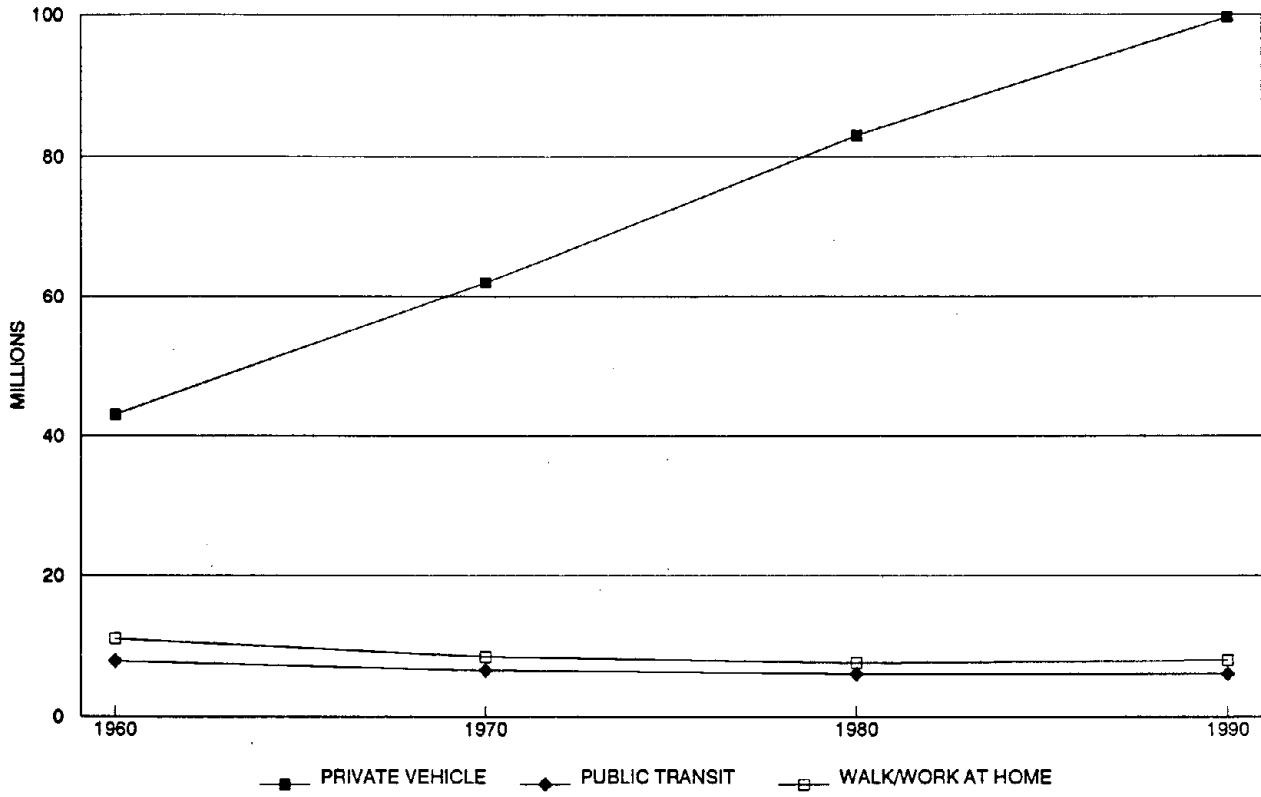


FIGURE 3  
**MODAL TRENDS 1980 - 1990**  
**BROAD MODE OF TRAVEL**

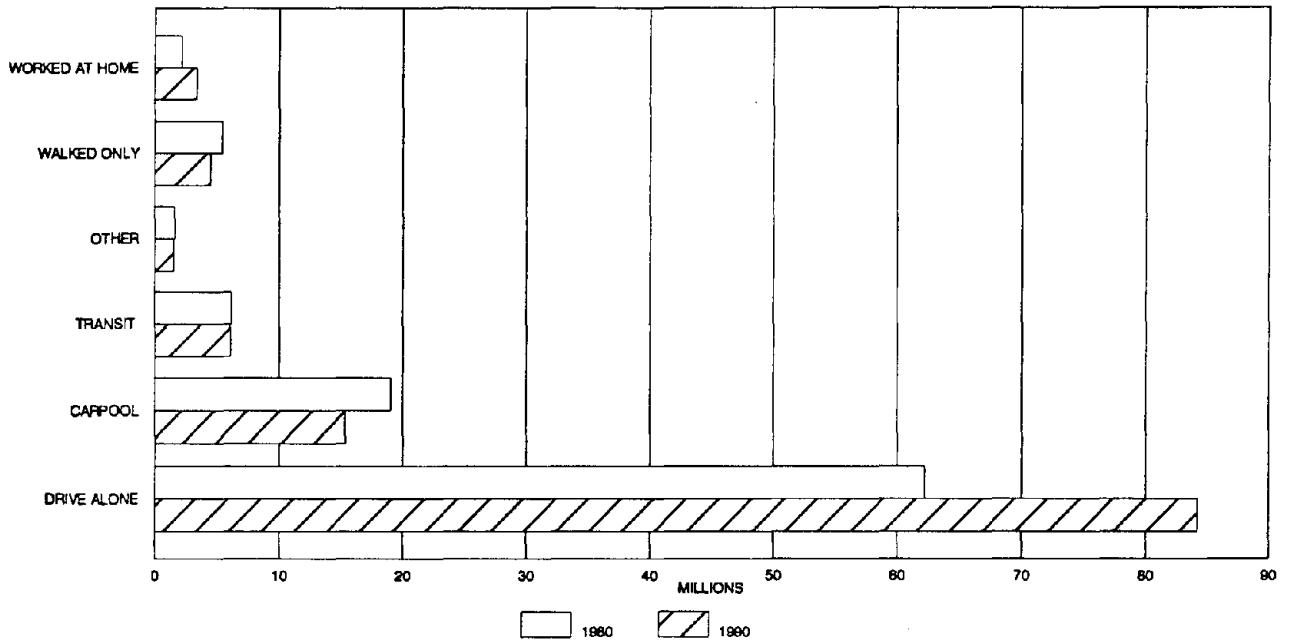
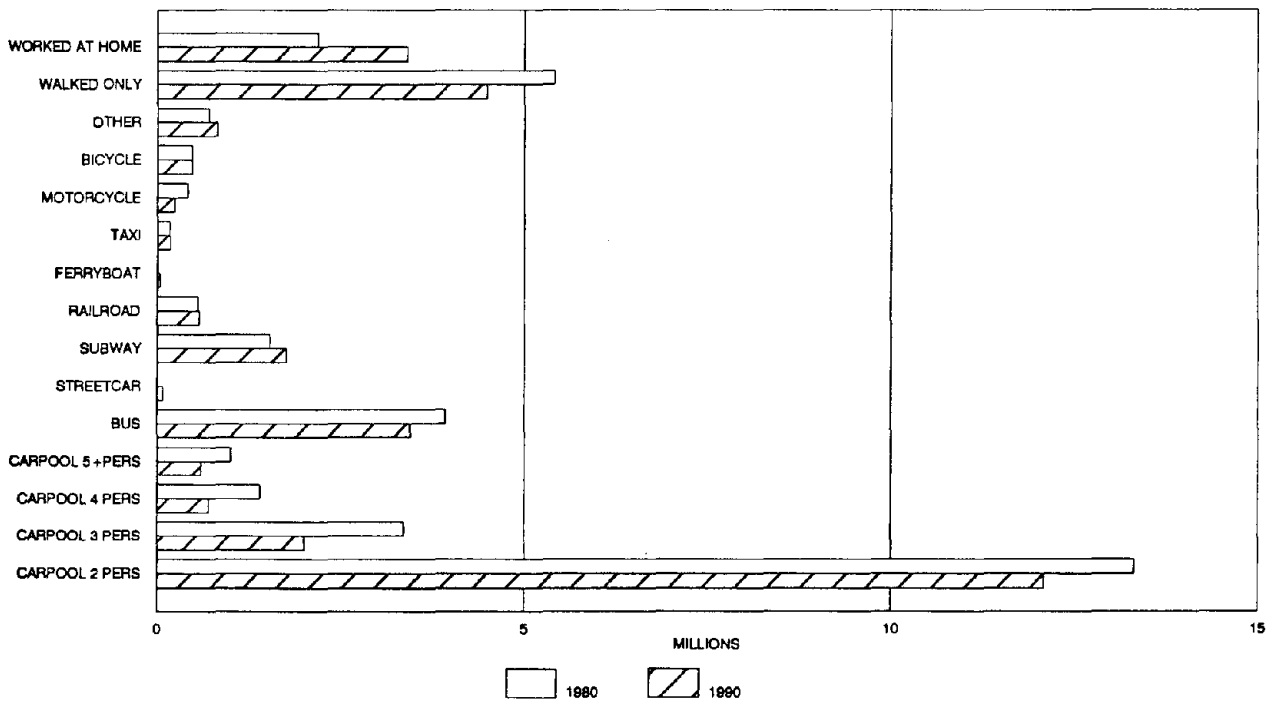


FIGURE 4  
**MODAL TRENDS 1980 - 1990\***  
**DETAILED MODE OF TRAVEL**



1/ Drive alone not shown. Represents 84 million in 1990.

TABLE 2

**MEANS OF TRANSPORTATION TO WORK FOR THE UNITED STATES  
1980 AND 1990 CENSUS**

MEANS OF TRANSPORTATION	1980 CENSUS		1990 CENSUS	
	NUMBER	PERCENT	NUMBER	PERCENT
Total Workers	96,617,296	100.0	115,070,274	100.0
Private vehicle	81,258,496	84.1	99,592,932	86.5
Drove alone	62,193,449	64.4	84,215,298	73.2
Carpooled	19,065,047	19.7	15,377,634	13.4
In 2-person carpool	13,303,701	13.8	12,078,175	10.5
In 3-person carpool	3,360,781	3.5	2,001,378	1.7
In 4-person carpool	1,400,527	1.4	702,222	0.6
In 5-or-more person carpool	1,000,038	1.0	595,859	0.5
Public transportation	6,175,061	6.4	6,069,589	5.3
Bus or trolley bus 1/	3,924,787	4.1	3,445,000	3.0
Streetcar or trolley car 1/	2/ -	2/ -	78,130	0.1
Subway or elevated	1,528,852	1.6	1,755,476	1.5
Railroad	554,089	0.6	574,052	0.5
Ferryboat	1/ -	1/ -	37,497	0.0
Taxicab	167,133	0.2	179,434	0.2
Motorcycle	419,007	0.4	237,404	0.2
Bicycle	468,348	0.5	466,856	0.4
Walked Only	5,413,248	5.6	4,488,886	3.9
Worked at home	2,179,863	2.3	3,406,025	3.0
All other means	703,273	0.7	808,582	0.7
Average travel time (minutes)	21.7		22.4	

1/ THIS CATEGORY WAS 'BUS OR STREETCAR' IN 1980.

2/ NOT AVAILABLE.

FIGURE 5  
JOURNEY TO WORK NET CHANGE  
1980 - 1990

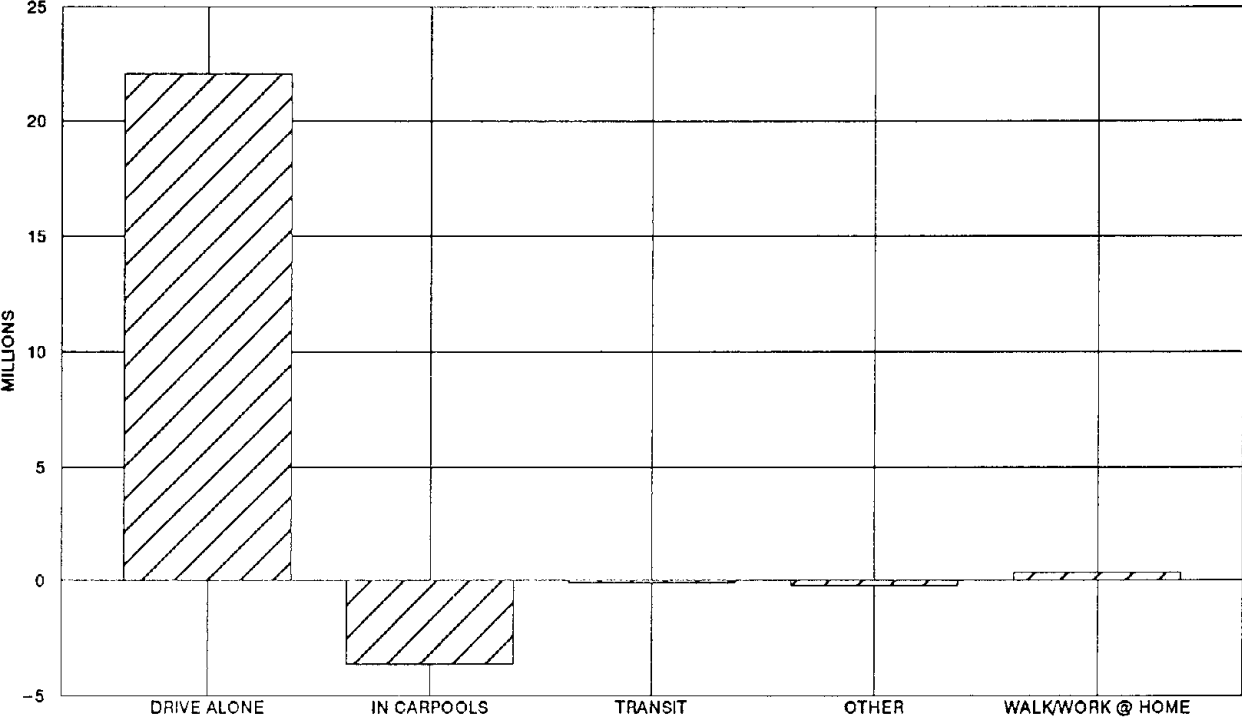


FIGURE 6

**JOURNEY TO WORK BY REGION – 1990  
NUMBER OF COMMUTERS BY MODE**

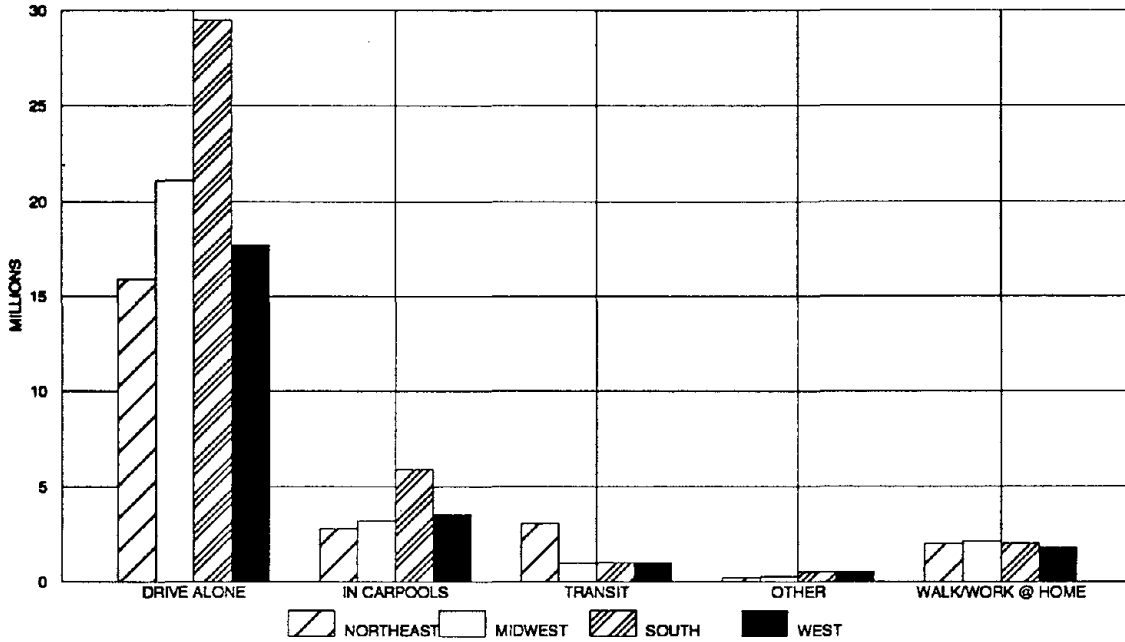


FIGURE 7

**JOURNEY TO WORK BY REGION – 1990  
PERCENT DISTRIBUTION OF COMMUTERS BY MODE**

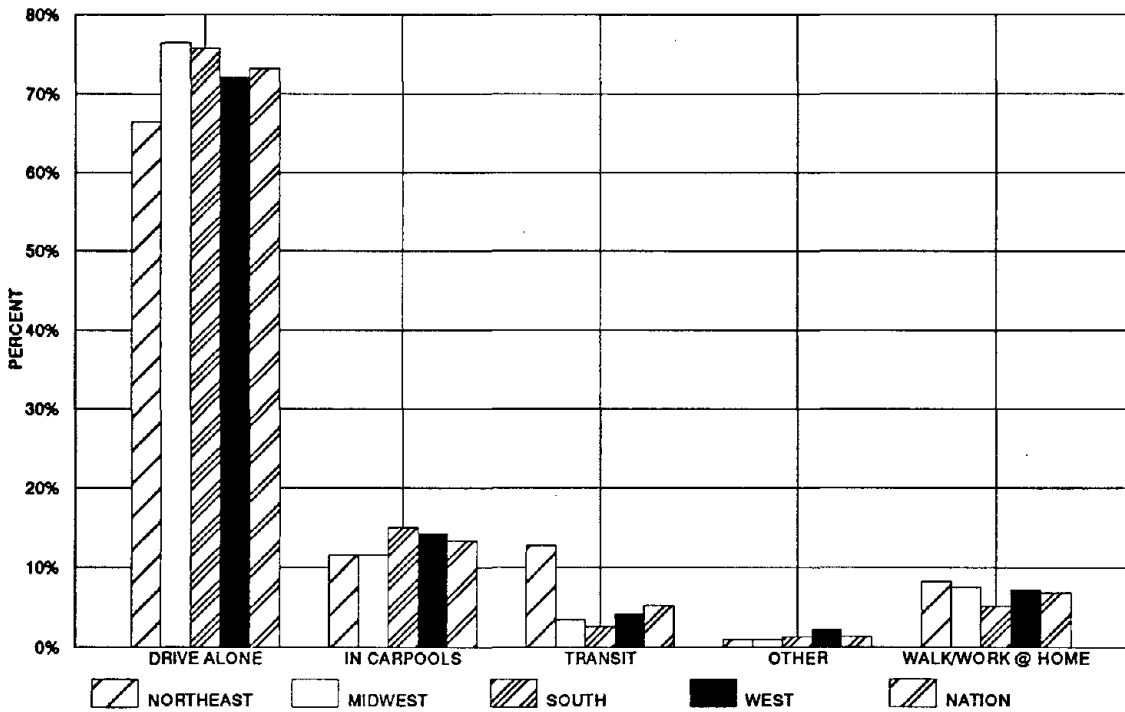


FIGURE 8

COMMUTERS BY REGION  
1990

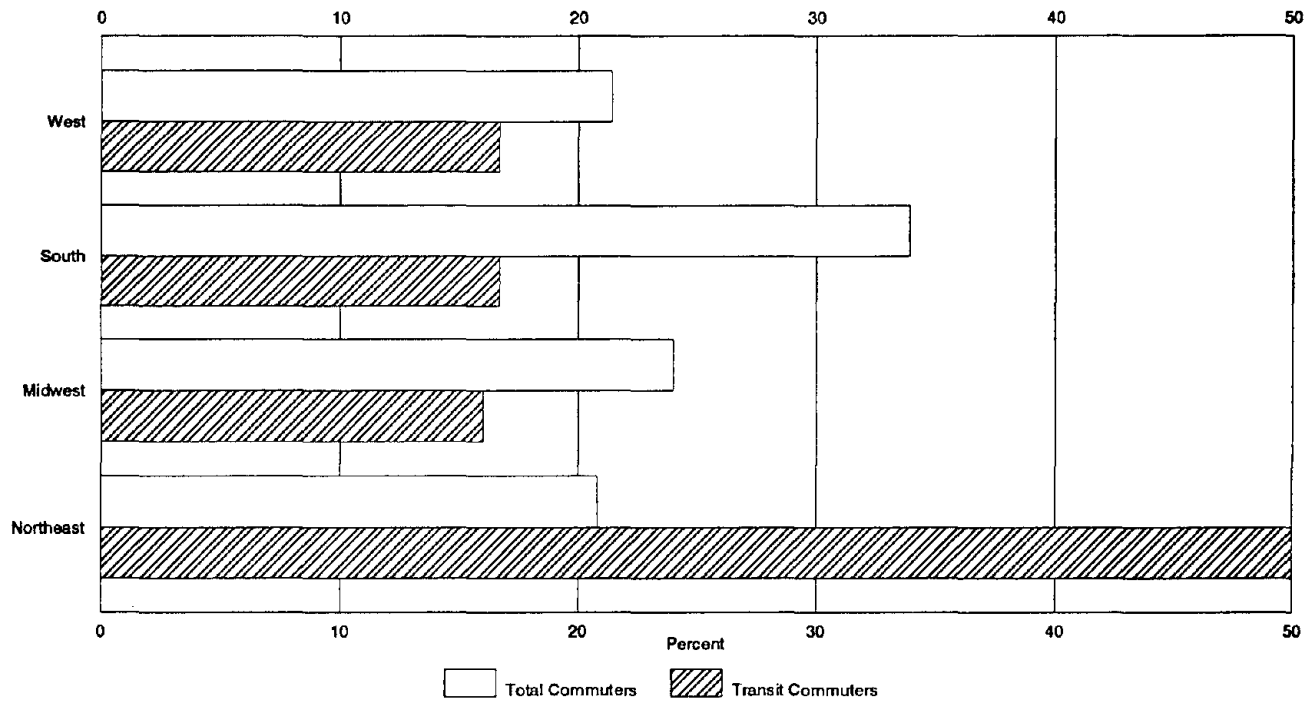


TABLE 3

TIME LEAVING HOME TO GO TO WORK FOR THE UNITED STATES  
1990

TIME LEAVING HOME TO GO TO WORK	1990 CENSUS	
	NUMBER	PERCENT
Workers 16 years and over	115070274	-
Did not work at home	111664249	100.0
12:00 a.m. to 4:59 a.m.	2747488	2.5
5:00 a.m. to 5:29 a.m.	2724375	2.4
5:30 a.m. to 5:59 a.m.	4421571	4.0
6:00 a.m. to 6:29 a.m.	9806529	8.8
6:30 a.m. to 6:59 a.m.	13013935	11.7
7:00 a.m. to 7:29 a.m.	17745201	15.9
7:30 a.m. to 7:59 a.m.	17601419	15.8
8:00 a.m. to 8:29 a.m.	12833626	11.5
8:30 a.m. to 8:59 a.m.	6033700	5.4
9:00 a.m. to 9:59 a.m.	5792355	5.2
10:00 a.m. to 10:59 a.m.	2249960	2.0
11:00 a.m. to 11:59 a.m.	1167633	1.0
12:00 p.m. to 3:59 p.m.	7965160	7.1
4:00 p.m. to 11:59 p.m.	7561297	6.8
Worked at home	3406025	-

TABLE 4

**PLACE OF WORK FOR THE UNITED STATES 1/  
STATE AND COUNTY LEVEL  
1980 AND 1990 CENSUS**

PLACE OF WORK -- STATE AND COUNTY LEVEL	1980 CENSUS		1990 CENSUS	
	NUMBER	PERCENT	NUMBER	PERCENT
Workers 16 years and over	96,672,203	100.0	115,070,274	100.0
Worked in state of residence	93,656,422	96.9	111,076,070	96.5
Worked in county of residence	76,564,176	79.2	87,587,677	76.1
Worked outside county of residence	17,092,246	17.7	23,488,393	20.4
Worked outside state of residence	3,015,781	3.1	3,994,204	3.5

1/ Non-reported category included in 1980 Census was reallocated in other categories based on known responses.

TABLE 5

**PLACE OF WORK FOR THE UNITED STATES 1/  
MSA LEVEL  
1980 AND 1990 CENSUS**

PLACE OF WORK -- MSA LEVEL	1980 CENSUS		1990 CENSUS	
	NUMBER	PERCENT	NUMBER	PERCENT
Workers 16 years and over	96,672,203	100.0	115,070,274	100.0
Living in an MSA	74,428,958	77.0	91,515,002	79.5
Worked in MSA of residence	69,192,889	71.6	82,808,059	72.0
Central city	36,796,293	38.1	43,286,226	37.6
Remainder of this MSA	32,396,596	33.5	39,521,833	34.3
Worked outside MSA of residence	5,236,070	5.4	8,706,943	7.6
Worked in a different MSA	4,026,462	4.2	7,415,334	6.4
Central city	1,802,084	1.9	3,185,340	2.8
Remainder of different MSA	2,224,378	2.3	4,229,994	3.7
Worked outside any MSA	1,209,607	1.2	1,291,609	1.1
Not living in an MSA	22,243,245	23.0	23,555,272	20.5
Worked in MSA	2,162,477	2.2	2,894,502	2.5
Central city	934,041	1.0	1,389,658	1.2
Remainder of this MSA	1,228,436	1.2	1,504,844	1.3
Worked outside any MSA	20,080,768	20.8	20,660,770	18.0

1/ Non-reported category included in 1980 Census was reallocated in other categories based on known responses.



## STATE PATTERNS

While most concerns about commuting center around our metropolitan areas, there are elements of the statistical patterns that are interesting and significant to examine at the State level. Auto ownership trends, for instance, and overall travel times are useful to examine at the State level.

### HOUSEHOLDS WITH NO VEHICLES

In this auto-oriented society, the availability of vehicles to a household is crucial to maintaining mobility. At the national level, although the number of vehicles grew rapidly and vehicles per household increased from 1.61 to 1.66, there were still 10.6 million of the Nation's 92 million households without vehicles available--about 11.5 percent of all households. This represents a decline in the percentage of households without vehicles from about 13 percent in 1980. However, there was an increase in the total number of households without vehicles, from about 10.4 million in 1980 to just about 10.6 million. The NPTS, alternatively, showed a strong drop in zero-vehicle households. Given the overall increases in average vehicles available, this seems hard to understand, yet the number of households without vehicles has remained relatively constant over time. It was 11.4 million in 1960. There may be several explanations. At least two possible explanations will need examination. First is the increased numbers of persons over 65, and second, the surge in immigrant populations.

Vehicle ownership tends to be a function of workers. The majority of American households have more vehicles than workers. Zero-vehicle households tend to be no-worker households; often, they are retired-person households. There are now almost 30 million persons over 65 years of age in the United States compared to less than 26 million in 1980. There is an inferential relationship between those over 65, those in single-person households, and those without vehicles. For instance, there are, according to the NPTS, 7.6 million persons who are retired and living alone. There are 10 million retired persons living together. Of those without vehicles, 6 million are in single-person households, about 4 million are in two-person households, and only about 1.5 million are in households of more than three adults. This indicates that the share of persons without vehicles is less than the share of households without vehicles, more like 7 percent or 8 percent. A large number of the single, retired over-65 persons are women, less than half of whom have drivers licenses.

The distribution among States is a factor. New York, with less than 8 percent of the Nation's population, and roughly the same share of workers, has almost 20 percent of the zero-vehicle households, 2.5 times the national average, as shown in Table 6. Other States with shares of such households greater than the 11.5 percent average for the country also tend to be high density States with large urban, poor, often Black, populations such as Massachusetts, Pennsylvania, New Jersey, and Illinois. These patterns also correlate well with where transit service is most available. Parts of the more rural south also exhibit higher than average rates, as in Kentucky, Louisiana, and West Virginia. A key point is that

the zero-vehicle households in the Northeast seem to be declining, where the trend in the rural south seems more sporadic.

**TABLE 6**

**PERCENT OF HOUSEHOLDS  
WITH NO VEHICLES**

	<u>1980</u>	<u>1990</u>
New York	32.5	30.0
Massachusetts	16.5	14.3
Pennsylvania	16.6	15.2
Illinois	15.9	14.0
New Jersey	14.8	12.9
Kentucky	12.7	11.5
Mississippi	13.1	12.1
Louisiana	13.9	13.9
West Virginia	13.7	13.7
<b>National Average</b>	11.3	10.2

Over 8 million foreign-born persons entered the United States in the eighties. Many of the States with high levels of immigrant population arrivals in the eighties also have had large increases in the absolute number of zero-vehicle households:

- \* Texas, which had an increase in all households of over 23 percent, had an increase in zero-vehicle households of almost 28 percent;
- \* Nevada, with a household increase of 53 percent, had an increase in zero-vehicle households of 75 percent;
- \* Arizona, with a household increase of 43 percent, had an increase in zero-vehicle households of 64 percent.

Both California and Florida, while not having higher growth in zero-vehicle households than in households in general, did have large increases in the number of zero-vehicle households. While New York lost 100,000 zero-vehicle households, California and Florida gained about 50,000 each, and Texas added about 100,000. These patterns were already discernible in 1980. An important issue for the future will be to trace these populations over time and see how long it takes before they join the auto owning mainstream.

## HOUSEHOLDS WITH THREE OR MORE VEHICLES

At the other extreme of the vehicle ownership spectrum are those households with three or more vehicles, which, according to the census, increased in number from 14 million households to almost 16 million, roughly retaining share of all households at about 17.5 percent. The NPTS showed similar growth, but from a different base; from 16.4 million in 1983 to 18.2 million in 1990, for a 19-percent share of households. (These differences are likely to be definitional in nature.) These households are important because, as the NPTS indicates, vehicles tend to be driven almost the same number of miles per year regardless of the number in the household--about 12,500 miles per year. This means that three-car households drive almost three times as many miles per year as one-car households, and half again more than two-car households, thus accounting for more than a third of the miles of travel in the country. Further inspection of the NPTS data indicates that about a third of these households have three or more drivers, and about 45 percent have two drivers. Thus, they represent approximately an equivalent share of drivers as their share of miles of travel. Interestingly, 20 percent of the three or more vehicle households have only one driver.

The census data for States are very revealing with respect to the location of these households. For the most part, the States with higher than average shares of households with three or more vehicles are not the States with affluent suburbs, but those with working farms and ranches. The States with the highest shares are in Table 7:

TABLE 7

### PERCENT OF HOUSEHOLDS WITH THREE OR MORE VEHICLES

WYOMING	27.4
S. DAKOTA	25.4
MONTANA	25.2
UTAH	24.3
N. DAKOTA	23.6

Midwestern farm States also tend to have above average shares of three plus vehicle households. New York, of course, is at the other extreme with only 11 percent of households with three or more vehicles. Other low States include Florida (13 percent) and Texas (16 percent). California is the one State that may fit the potential concern about the three-vehicle household. The State average is 20 percent of households, which seems to hold in metropolitan areas as well, e.g., the San Francisco region also has about 20 percent. Los Angeles County has close to that with roughly 28 percent of homeowner households and less than 10 percent of renter households having three or more vehicles.

American auto ownership patterns, by household, may be hitting a plateau. As household size declines and workers per household begin to stabilize, vehicles per household will not change dramatically, and changes will matter less. Vehicles per worker actually

declined from 1980 to 1990, but at 1.32 vehicles per worker, it is clear that most workers have access to vehicles, and with the personal vehicle share of commuting at 86 percent, they use them.

*Figure 9* traces trends in vehicle ownership in millions of households over the last four censuses. This figure demonstrates that zero-vehicle and one-vehicle households have been relatively stable in numbers over 30 years, while all growth has occurred in two and three or more vehicle household groups. *Figure 10* shows the same data expressed in percent of households. It is clear that in terms of changes in shares of households, past decades have been more volatile, while all categories have tended to stabilize in the recent decade.

### **TRAVEL TIME TRENDS**

The decennial census collected travel time information for the first time in 1980 and again in 1990, permitting some measure of changing trends in average travel times to work. Table 8 provides a detailed travel time distribution for the Nation. As noted earlier, the average travel time measured in 1980 was 21.7 minutes. In 1990, travel times had risen by only about 40 seconds to 22.4 minutes despite extensive growth in highway travel. The NPTS, tracing travel time from 1969, has shown a slow, continuous improvement to 19.7 minutes in 1990 from 20.4 minutes in 1983. Individual metropolitan data will be very significant to evaluate in terms of congestion, delay, and environmental effects. State-level data provide a broader measure of general service quality in this one aspect of commuting. These data show averages by State across all modes. Later datasets will provide detailed travel times by individual mode of travel. This will permit differentiation of travel time changes attributable to speed changes in each mode from changes attributable to shifts between modes of travel by commuters.

At the State level, there tends to be a relatively tight clustering around the national average. The most extreme variants from the national average are New York at 28.6 minutes, 1.277 times the national average, and North Dakota, at 13 minutes, 58 percent of the national average. As expected, the farm and western States, those noted earlier as having a disproportionate share of three-car households, had low travel times, and some of the eastern States associated with zero-vehicle households, transit use, and high density tend to have higher travel times.

There are only nine States that have higher than average travel times, but the size of their populations and their high travel times compensate for the 41 States that have less than average travel times. These States and their changes in travel times are shown in *Figure 11*. California and Hawaii were among those having the largest increases in travel time; both incurred about a 2.2-minute increase. Among other States incurring big jumps were New Hampshire, adding 2.5 minutes but still staying just below the national average, and Arizona, Idaho, Maine, Massachusetts, Minnesota, Nevada, Rhode Island, Washington, and Wisconsin, adding over a minute. Some States enjoyed actual declines in travel times--

Alabama, Kentucky, North Dakota, Pennsylvania, West Virginia, Wyoming and, of course, New York (*Figure 12*). Unfortunately, this improvement was often associated with loss of population, with the exceptions of Alabama and New York.

FIGURE 9  
**HOUSEHOLDS BY VEHICLES AVAILABLE**  
 1960 - 1990 TREND

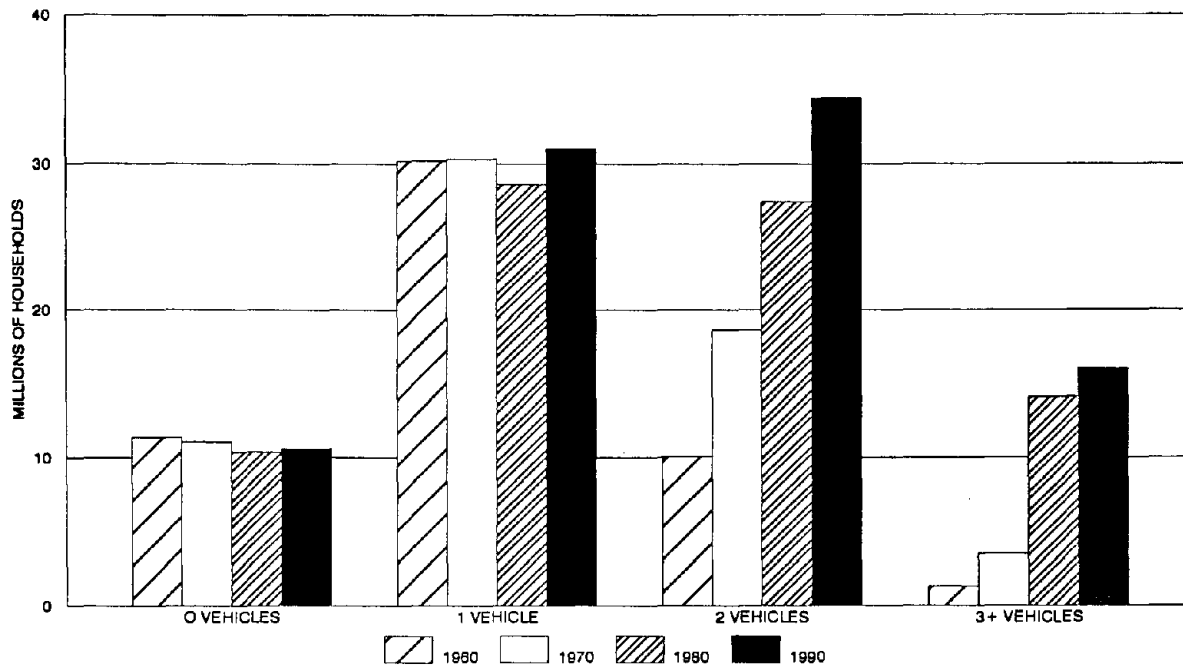


FIGURE 10  
**HOUSEHOLDS BY VEHICLES AVAILABLE**  
 1960 - 1990 TREND

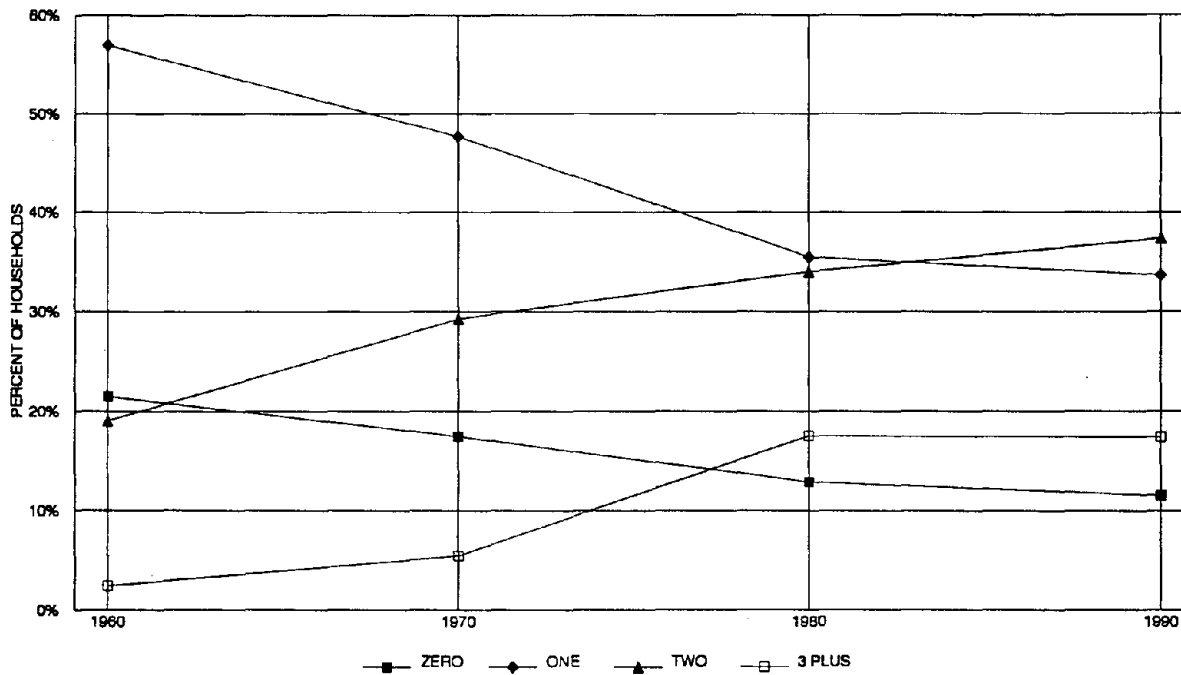


TABLE 8

TRAVEL TIME TO WORK FOR THE UNITED STATES  
1980 AND 1990 CENSUS

TRAVEL TIME TO WORK	1980 CENSUS		1990 CENSUS	
	NUMBER	PERCENT	NUMBER	PERCENT
Workers 16 years and over who did not work at home	94,487,095	100.00	111,664,249	100.00
Less than 10 minutes	16,871,572	17.86	18,257,921	16.35
10 to 19 minutes	31,846,602	33.70	36,980,181	33.12
20 to 29 minutes	18,849,260	19.95	22,436,930	20.09
30 to 44 minutes	15,996,009	16.93	20,053,109	17.96
45 or more minutes	10,923,652	11.56	13,936,106	12.48
Mean travel time (minutes)	21.7		22.4	
Workers traveling 45 or more minutes	59.6		58.5	

FIGURE 11

TRAVEL TIME TRENDS 1980 - 1990  
FOR STATES WITH TIMES ABOVE NATIONAL AVERAGE

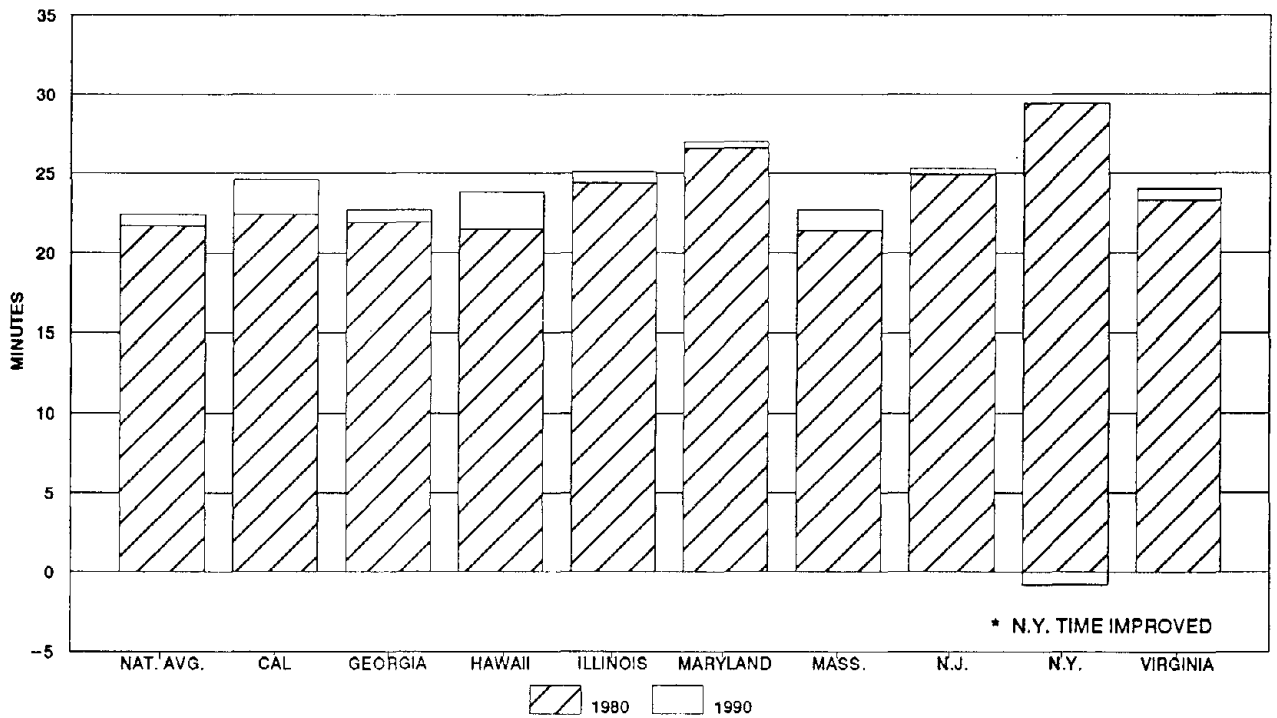
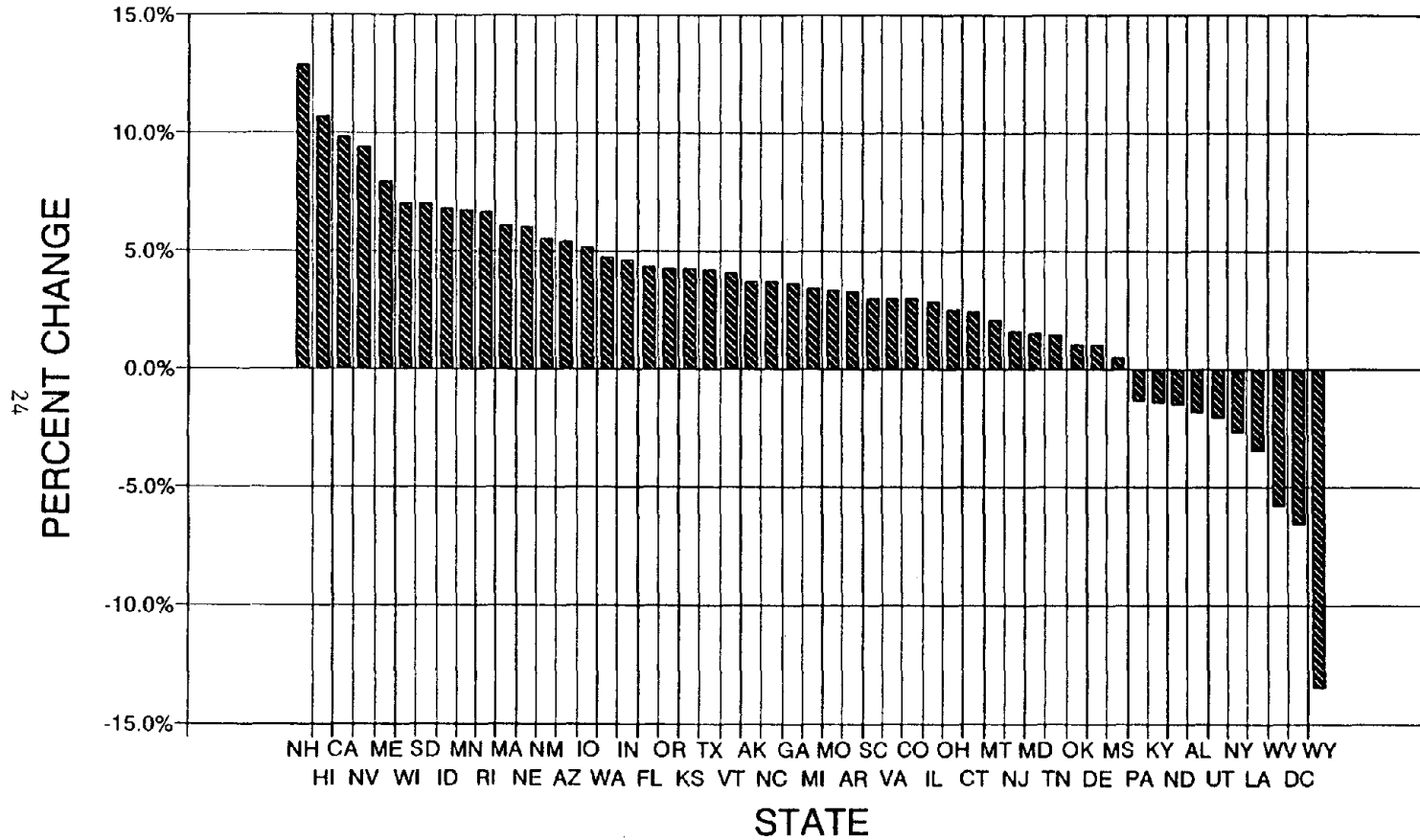


FIGURE 12

# PERCENT CHANGES IN TRAVEL TIME TO WORK STATE DISTRIBUTIONS, 1980 - 1990



24

Source: Volpe National Transportation Systems Center

TIME (MINUTES)



## SELECTED METROPOLITAN PATTERNS

The following coverage of selected metropolitan areas is necessarily incomplete. Only selected datasets are presently available. Individual metropolitan areas and States are developing the census data for their areas at different paces. Some have seen the value in immediate mining of whatever data resources have been provided so far. Others are waiting for more detailed or more complete data to be disseminated. The available material, provided by local areas, mostly focused on modal shares, travel times, and selected other data, varying from area to area, and provides some useful early insights to the changes in American commuting. One of the most evident conclusions from these data is that the national trend is paralleled throughout the country.

### MODAL TRENDS

The general modal trends in the metropolitan areas reviewed parallel the national patterns confirming that the patterns are broad based.

In terms of shares, the drive-alone category gains in share everywhere, carpool declines everywhere, transit and walking decline just about everywhere, and working at home actually gained in share in certain areas.

In terms of absolute amounts of travel, the drive-alone category again is the dominant gainer, often increasing by more than the total increase in commuters for the period due to shifts from other modes, as in Portland, Dallas, Houston, and the major parts of Seattle. In Buffalo, the total increase in driving alone was more than double the increase in total commuters. Carpooling was mixed predominantly showing actual declines but increasing in others, notably Los Angeles. Transit use declined in Portland, Oregon, and Buffalo, but showed small gains in Los Angeles, Houston, and most notably, Washington D.C. Working at home kept pace with total worker growth showing considerable gains in almost all areas, particularly in San Francisco and Los Angeles.

The associated figures for large and small areas (*Figures 13 and 14*) show the net changes in travel from 1980 to 1990. In the figure presenting smaller cities, Buffalo is the one eastern area among all the western areas. The use of net figures can be misleading where areas are of substantially differing sizes or have very different growth rates. Buffalo was a slow growth area in terms of commuter growth, whereas the western cities incurred high rates of commuter growth. Harris County, representing the Houston area, was the only area in the group with a transit-use increase, gaining that increase on a very small base of ridership, going from 40,000 riders in 1980 to 60,000 riders in 1990.

Among the large areas, the interesting pattern differences include the fact that:

- \* Los Angeles was among the few areas to show absolute gains in carpooling,

- \* all showed absolute gains in transit ridership, especially Washington, and,
- \* all showed gains in those working at home.
- \* The Chicago area, not shown, based on Cook County statistics, showed little change in total commuters and sharp declines in transit and carpools, all shifting to driving alone.

### **TRAVEL TIME TRENDS**

Travel time trends also seemed to follow the national pattern which increased slightly from 21.7 minutes to 22.4 minutes. The areas shown in *Figure 15* are among those with the worst travel times of the areas reviewed. Of interest:

- \* Los Angeles and San Francisco, with the identical travel times in 1980, saw a much larger increase in travel times in Los Angeles, gaining 2 minutes compared to the 1-minute gain in San Francisco. Other counties in the Los Angeles area had horrendous increases in travel time.
- \* Washington, D.C., with among the worst average travel times due to the downtown focus, incurred a small increase of about 1 minute.
- \* Houston actually showed a substantial travel time improvement of about 1.7 minutes. Most areas with travel time improvements were those losing population, but Houston showed substantial growth in commuters in the period.
- \* In the Chicago area, Cook County was almost unchanged in travel time at about 29.4 minutes.
- \* Given the dramatic increases in vehicle travel in these areas, the amount of increase in travel times was surprisingly limited.

## **SELECTED AREA OBSERVATIONS**

### **Portland Area (Figure 16)**

The Portland area trends from 1980 to 1990, shown in Figure 16, are a model of the national trend. In Multnomah County, carpooling dropped from 17.7 percent to 12.9 percent, and transit use declined from 13.1 percent to 9.6 percent. Outlying counties showed similar patterns. Transit declines in the city of Portland itself were particularly marked with shares dropping from 15.9 percent to 10.9 percent. Only working at home and driving alone showed significant gains in share. Despite the large increases in drive-alone vehicles, average travel times in the County grew less than a minute. Portland was one of the cities in which driving alone increased more than the increase in workers.

### **Seattle Area (Figure 17)**

The Seattle area statistics provide an opportunity to suggest insights into national trends. Early data provide auto ownership information by race and ethnicity. These data indicate that those of Asian ancestry have a higher percentage with zero vehicles than the average, but American Indians and Blacks have even higher percentages with zero vehicles. About 16 percent of Black households have no vehicles compared to about 6.6 percent for White households. The data also show three-fourths of those with zero vehicles are renters rather than home owners. Other data indicate that the Seattle work day starts earlier than the national average and about two-thirds of commuters complete their trip in less than half an hour, with travel times well above the national average.

### **Sacramento Area (Figure 18)**

The Sacramento County data reflect the Seattle data with 18 percent of Black households with no vehicles contrasted to an 8-percent rate for White households. The data also fill in the picture further by showing that, of the 33,000 zero-vehicle households in the County, more than a third were in households over 65 years of age. Average travel times were slightly better than the national average at 21.7 minutes.

### **Los Angeles Area (Figures 19 and 20)**

Los Angeles County incurred high rates of growth, about a 20-percent increase in commuters, accompanied by at least some growth in most modal areas. The predominant shifts were to driving alone, but carpooling increased, as did transit, and working at home. Although none of the travel alternatives to driving alone grew in share of travel, working at home did show an actual increase in share. Despite a decline in share, the fact that Los Angeles did far better in carpooling relatively in contrast to most other areas needs further investigation. *Figure 20*, showing Los Angeles, Orange and Ventura Counties, depicts the overall modal pattern. As noted previously, the area incurred a substantial increase in average travel times. The outer Counties were worse. Riverside County jumped

from a 22-minute average to over 28 minutes, and San Bernardino went from below 22 to about 27.5 minutes. Orange and Ventura Counties increased more moderately.

### **San Francisco** (*Figures 21 and 22*)

The Bay Area added about 600,000 workers, a growth of almost 25 percent. About 60,000 of those worked at home, 10,000 chose to travel by transit, and about 540,000 drove alone. Carpoolers actually declined slightly with the result that average auto occupancies dropped from 1.132 to 1.097, still above the national average. An excellent early data series produced by the Metropolitan Transportation Commission (MTC) provides indepth data for further review. It indicates that those making their commute in under one-half hour dropped from over 64 percent to 61 percent, and that workers started on their commute later than the national average. The MTC has developed early flow patterns data, indicating that 60 percent of the 600,000 new workers worked in their county of residence, although the share of intercounty commuting increased. County-level data indicate that modal share trends at the county level mirror the region totals. Carpooling and transit declined in share in all counties in the area, and working at home increased in share in all counties. Only Solano County incurred the kinds of increases in travel time typical of Los Angeles, going from 22 to 28 minutes.

### **Houston** (*Figure 23*)

The Houston area saw an increase of about 230,000 workers, or a 17-percent growth, more than half of it in Harris county. Its increase in drive-alone commuters was over 275,000, primarily due to shifts out of carpooling of about 70,000 workers. Transit also gained from the shift of carpoolers, increasing by about 20,000 workers from a base of 40,000, for a 50-percent increase. Effectively, all of the transit use was in Harris County. The precipitous drop in share of carpooling from 22 percent to below 15 percent helped raise transit from 3 percent to almost 4 percent, and work at home from 1 percent to 2 percent. Although Houston has one of the smallest shares of workers using transit (Portland, an area of about one-third Houston's size, had the same transit ridership in 1980), it is also one of the few that saw a gain in share for transit for the period.

An interesting facet of Houston's work travel environment is the apparently immense distances traveled by commuters. Although average travel time for Harris county was only 25.8 minutes it had about 88,000 commuters traveling over an hour, and over 125,000 commuting more than 45 minutes. The outlying counties were even more dramatic--Montgomery County had 13,000 commuters over 1 hour and 24,000 over 45 minutes, out of a commuting population of less than 80,000. Waller County had over 2,000 of 9,000 commuters travel more than 45 minutes. A total of 6,000 of 18,000 commuters in Liberty County took longer than 45 minutes.

### **Washington, D.C.** (*Figure 24*)

The Washington D.C. area paralleled the national trend in many respects--heavy expansion of driving alone, extraordinary declines in carpooling and declines in shares of all

alternatives to driving alone except for working at home. However, as a previous figure indicated, there were large gains in transit ridership, not enough to maintain share, but substantial in number, largely as a result of extensive transit investment in the eighties. The Washington Council of Governments (COG) has produced useful early data with statistics, by ring, that tell an interesting story. Inner city ring jurisdictions overall showed a slight decline in transit share. The inner suburbs gained in share, particularly in the Maryland jurisdictions; outer ring jurisdictions showed general declines in transit use. The net effect was a gain of about 60,000 new transit riders out of a new worker force of about 600,000. Walking and bicycling also showed gains in users. Working at home more than doubled to gain share. The pattern of growth of working at home was roughly evenly spread over the region with somewhat greater emphasis in the outer rings.

Overall regional travel times increased by 1 minute from 28.5 to 29.5 minutes. Overall travel times declined by more than a minute in the core jurisdictions, rose by the equivalent amount in the inner suburbs, and by 2 minutes, from 31.3 to 33.4 minutes, in the outer suburbs.

#### **Dallas County Area** (*Figure 25*)

Complete data for the entire Dallas metropolitan area could not be compiled for this review, but those county-level data that were available provide substantial insight into the state of trends in the area. Dallas County, which had accounted for over half the workers in the metropolitan area in 1980, had an increase in workers of almost 19 percent, or about 151,000 workers. The increase in driver-alone commuters was 159,000, about 8,000 more than total commuters, carpoolers declined by about 20,000, and all other doubled from 10,000 to 20,000. Review of modal shares for Denton and Collin Counties showed enormous parallel growth from about 70,000 workers to about 150,000, with all significant growth only occurring in the drive-alone mode and working at home. Dallas City and Fort Worth City showed similar patterns, with carpooling and transit use declining and the only gains in driving alone and working at home. Both cities showed moderate growth.

Auto ownership characteristics in Dallas County mirrored the patterns seen in other areas, with about 20 percent of Black households without vehicles in contrast to 9 percent of Hispanic households and 5 percent of White households. Denton and Collin Counties showed similar Black auto ownership levels, with Black rates dropping to around 12 percent and 13 percent respectively. Both Dallas City and Fort Worth City showed very high shares of Black households without vehicles--23 percent in Dallas City and 19 percent in Fort Worth City.

Dallas County travel times increased from 23 minutes to 24 minutes, while Dallas City was relatively unchanged. Collin County travel times actually improved appreciably from 26.8 minutes to 25.2 minutes. Denton County jumped from 23.6 to 25.6 minutes. Fort Worth City travel times increased from 19.7 minutes to 21 minutes.

FIGURE 13

NET CHANGE IN MODAL TRENDS 1980 - 1990  
SELECTED SMALL AREAS

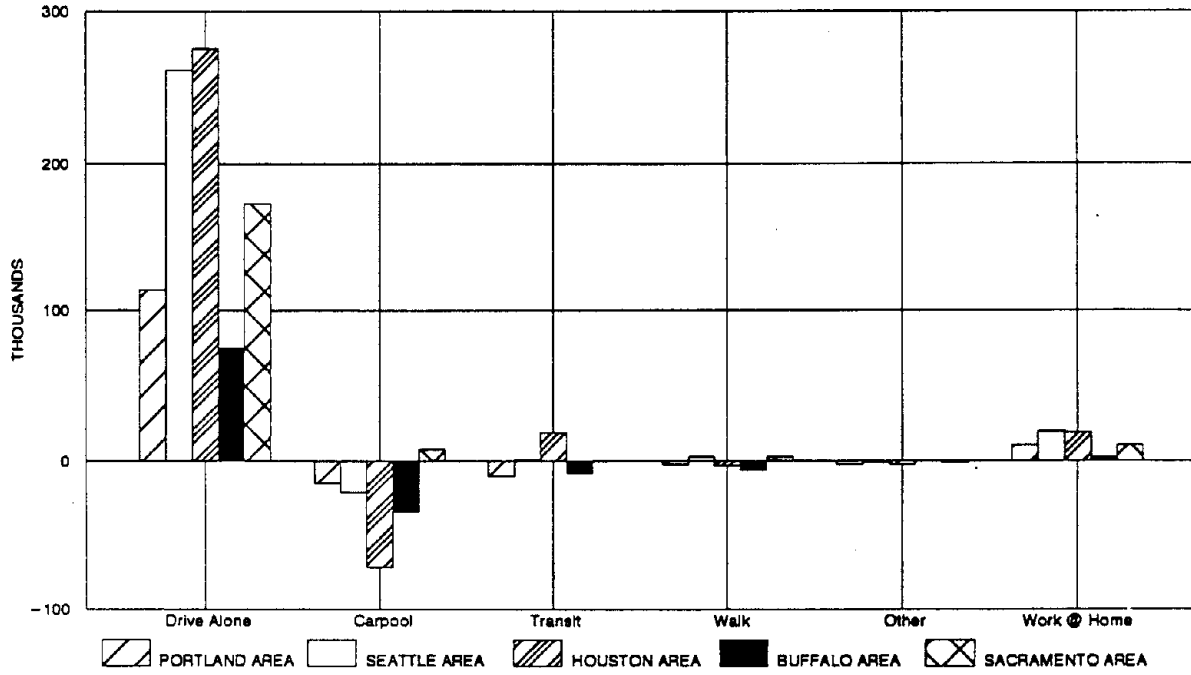


FIGURE 14

NET CHANGE IN MODAL TRENDS 1980 - 1990  
SELECTED LARGE AREAS

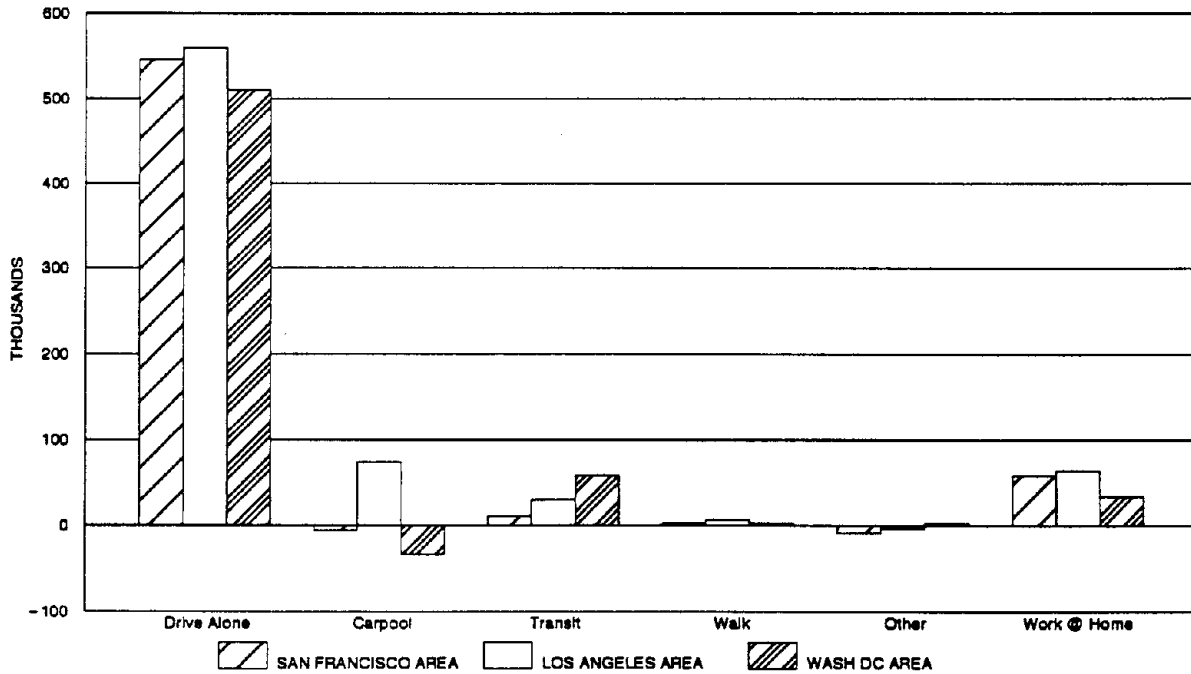


FIGURE 15

CHANGE IN TRAVEL TIMES 1980 – 1990  
SELECTED LARGE AREAS

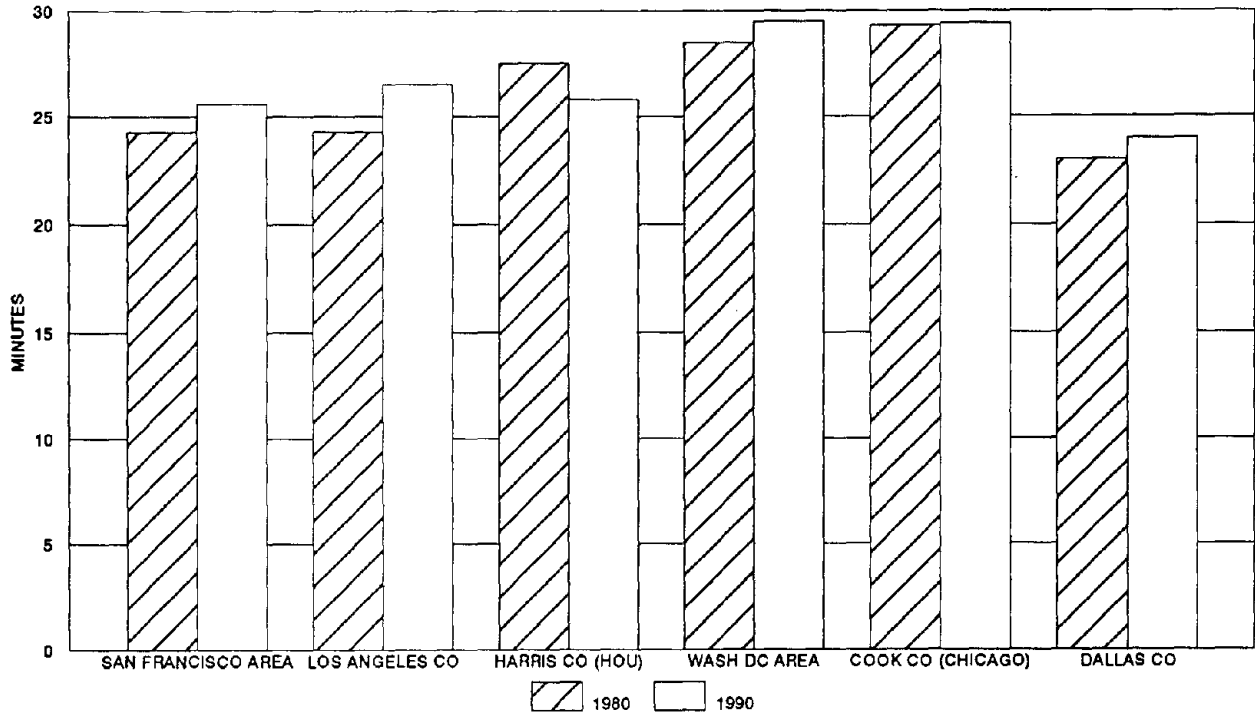


FIGURE 16

**MODAL TRENDS 1980 – 1990  
PORTLAND/OREGON AREA**

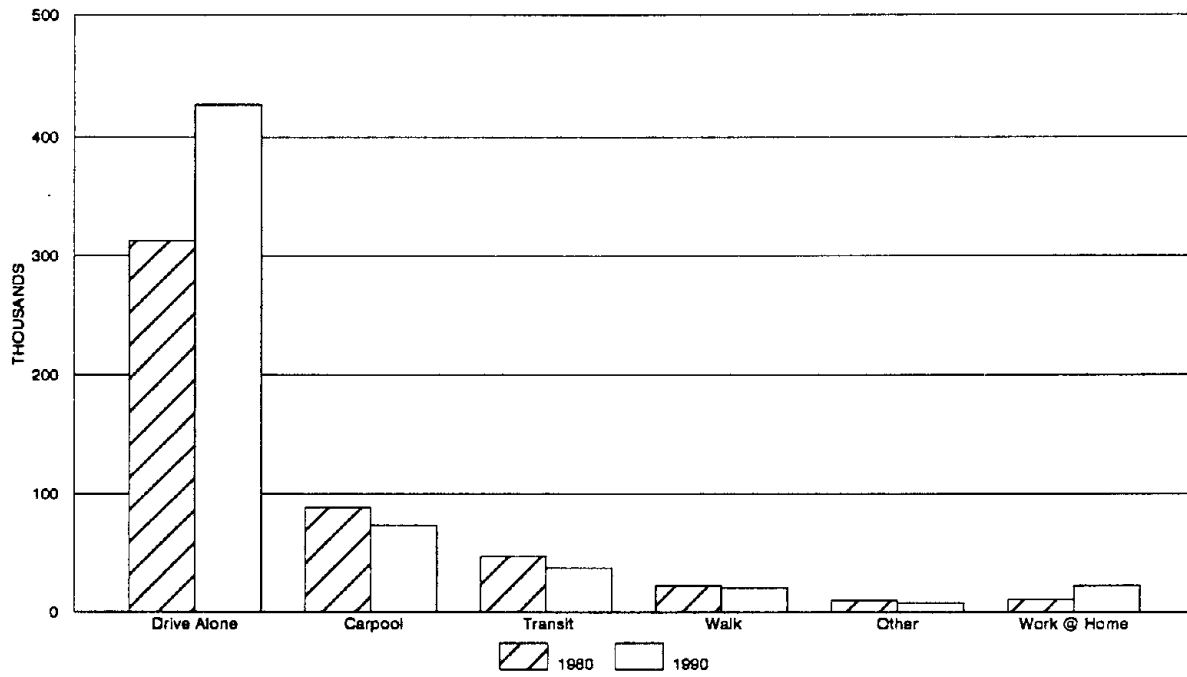


FIGURE 17

**MODAL TRENDS 1980 – 1990  
SEATTLE AREA**

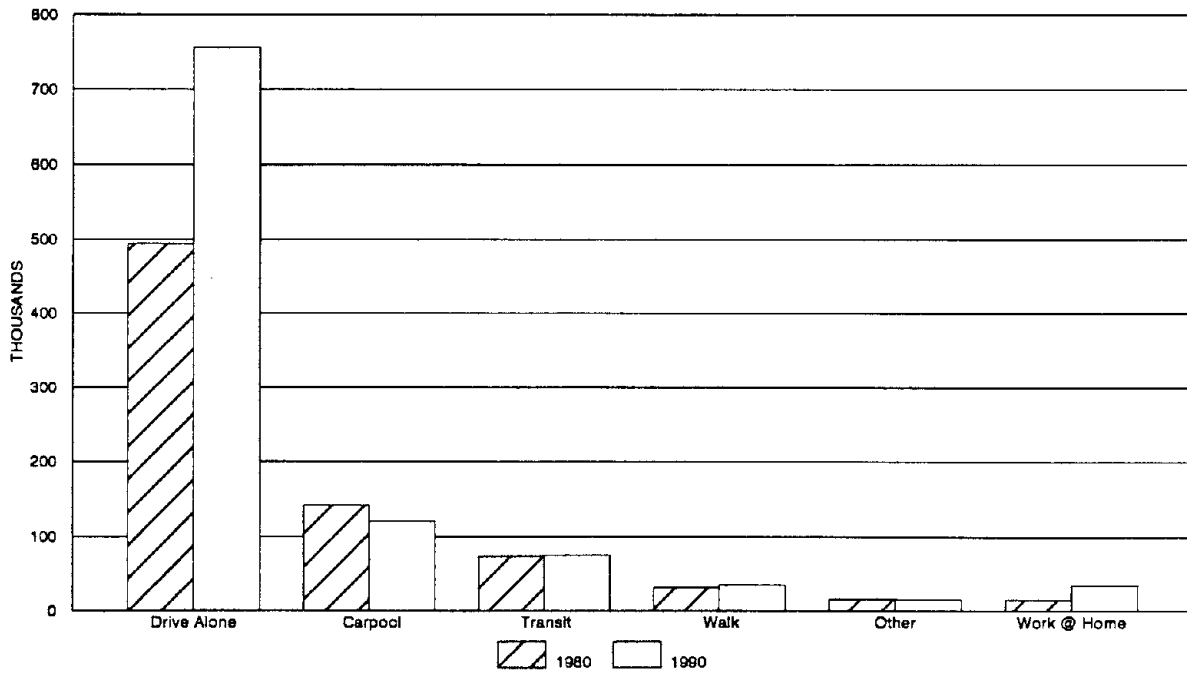




FIGURE 18  
MODAL TRENDS 1980 - 1990  
SACRAMENTO AREA

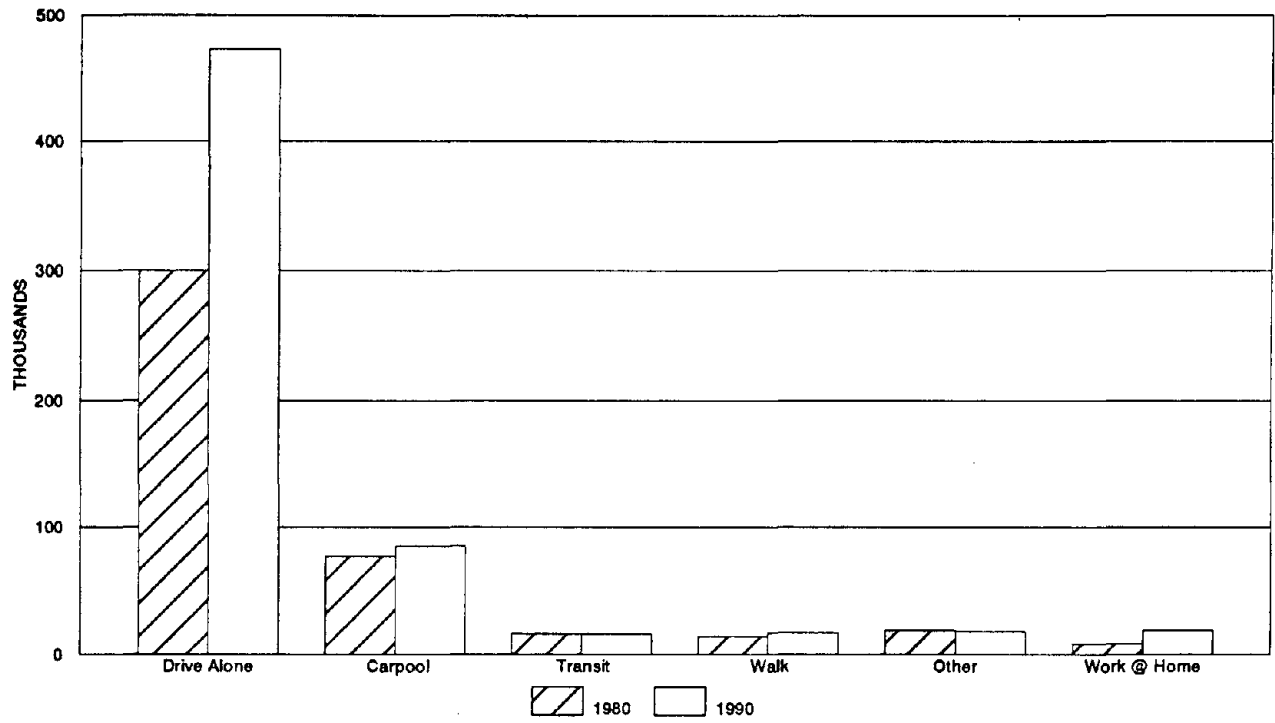


FIGURE 19  
**MODAL TRENDS 1980 – 1990**  
**LOS ANGELES AREA**

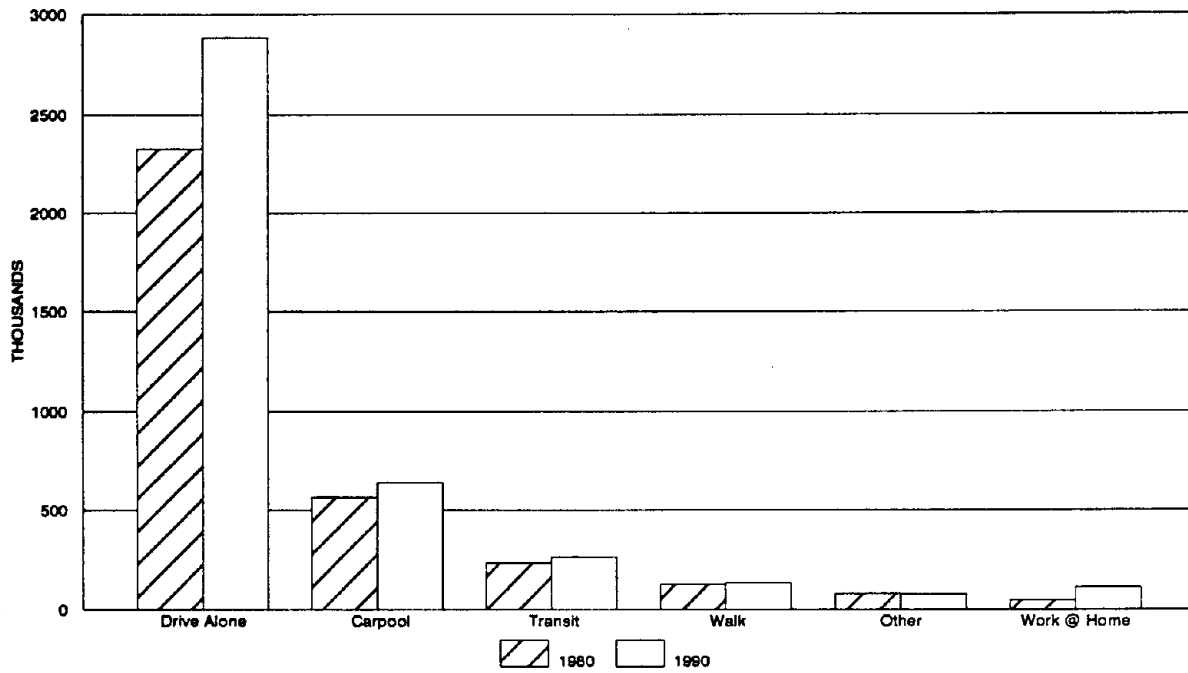


FIGURE 20  
**NET CHANGE IN MODAL TRENDS 1980 – 1990**  
**LOS ANGELES AREA**

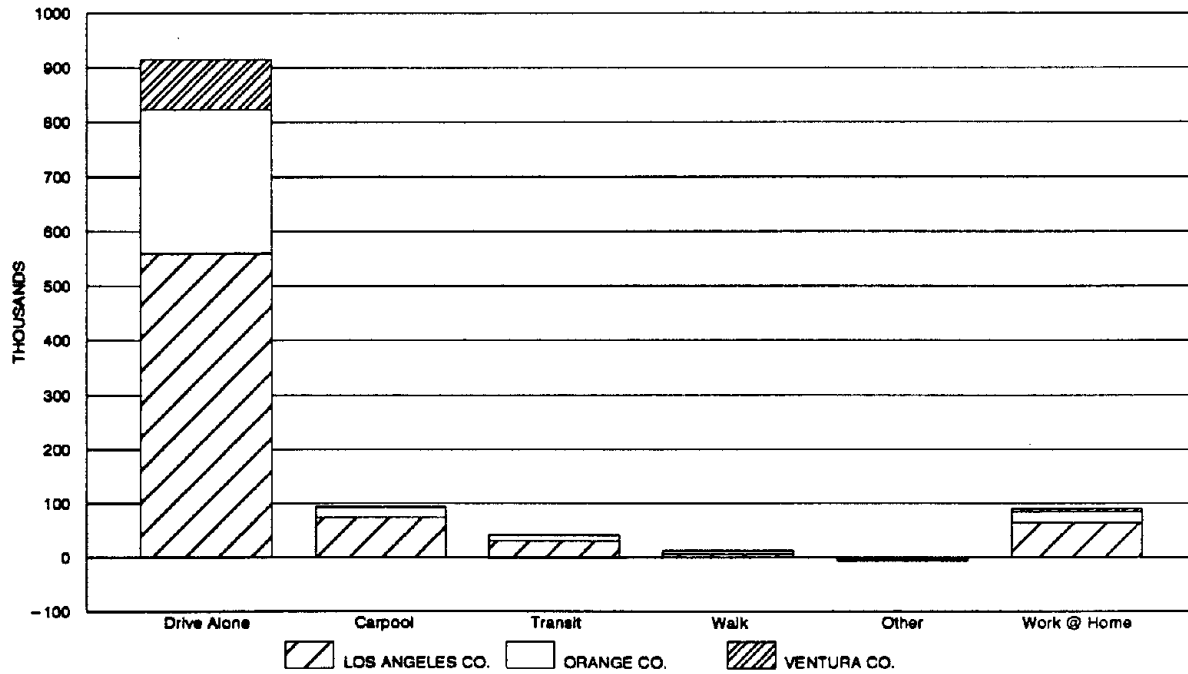


FIGURE 21  
**MODAL TRENDS 1980 – 1990**  
**SAN FRANCISCO AREA**

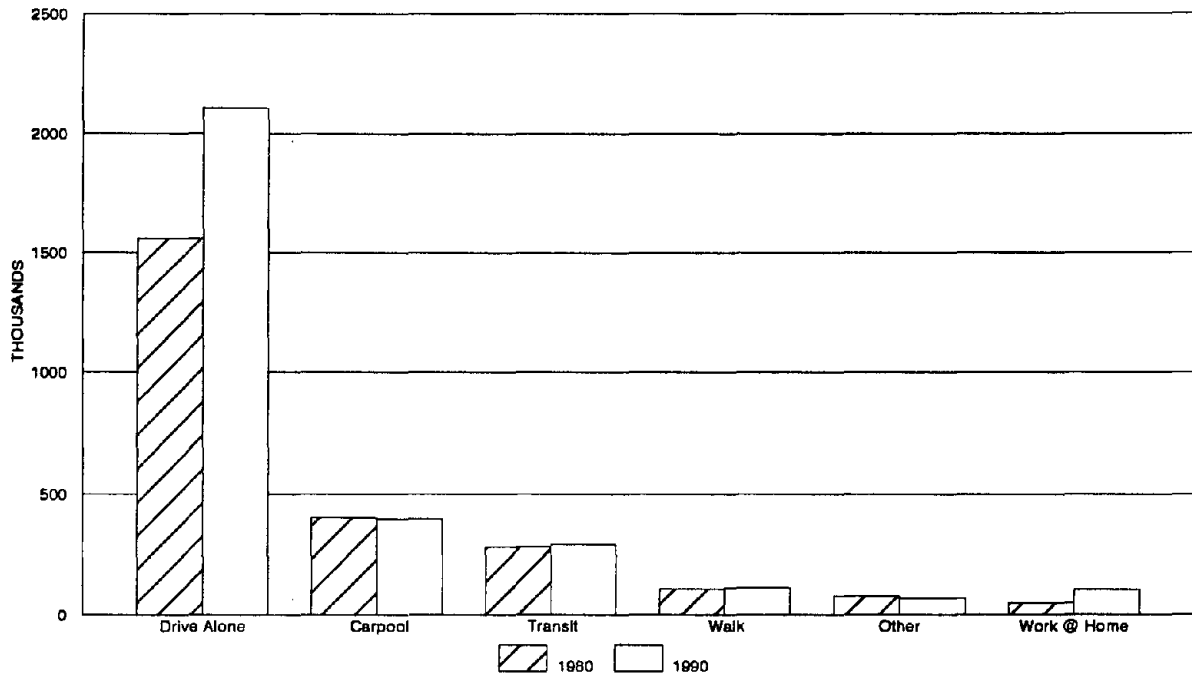


FIGURE 22  
**NET CHANGE 1980 – 1990**  
**SAN FRANCISCO AREA**

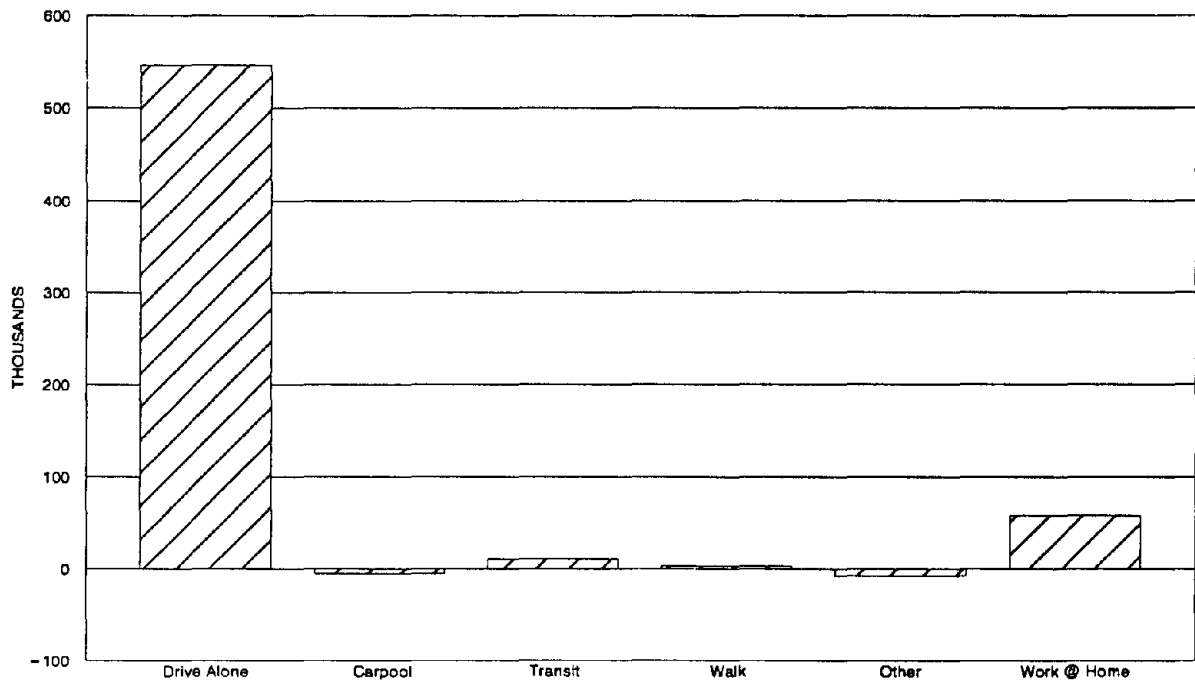


FIGURE 23

**MODAL TRENDS 1980 – 1990  
HOUSTON AREA**

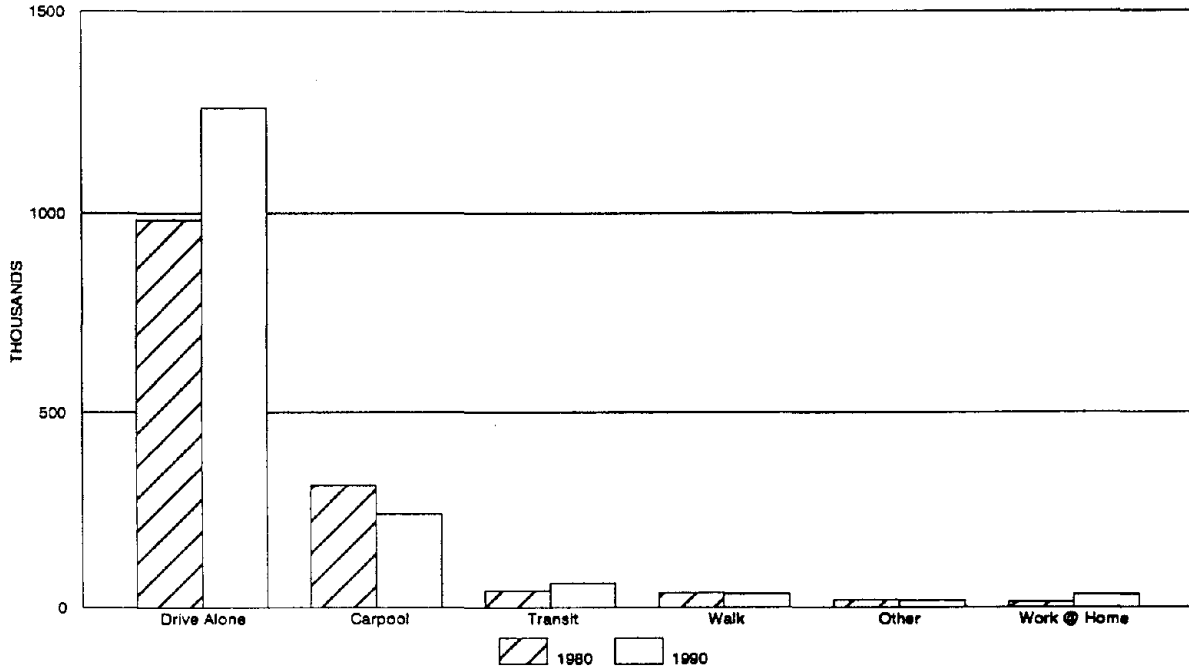


FIGURE 24

**MODAL TRENDS 1980 – 1990  
WASHINGTON DC AREA**

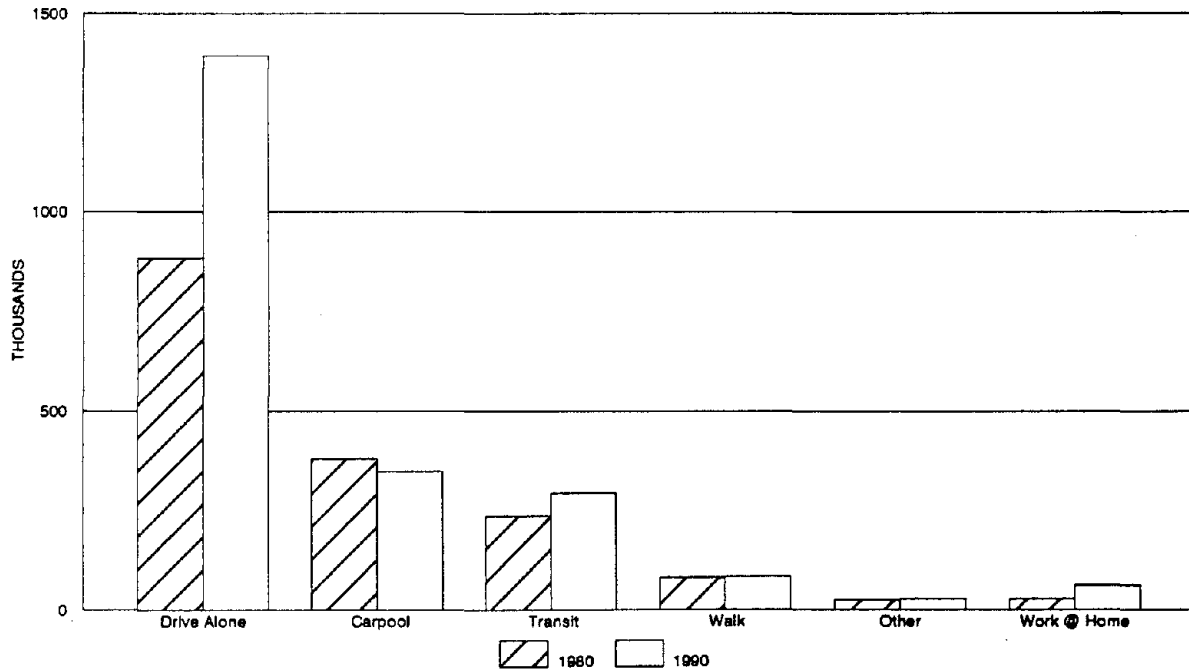
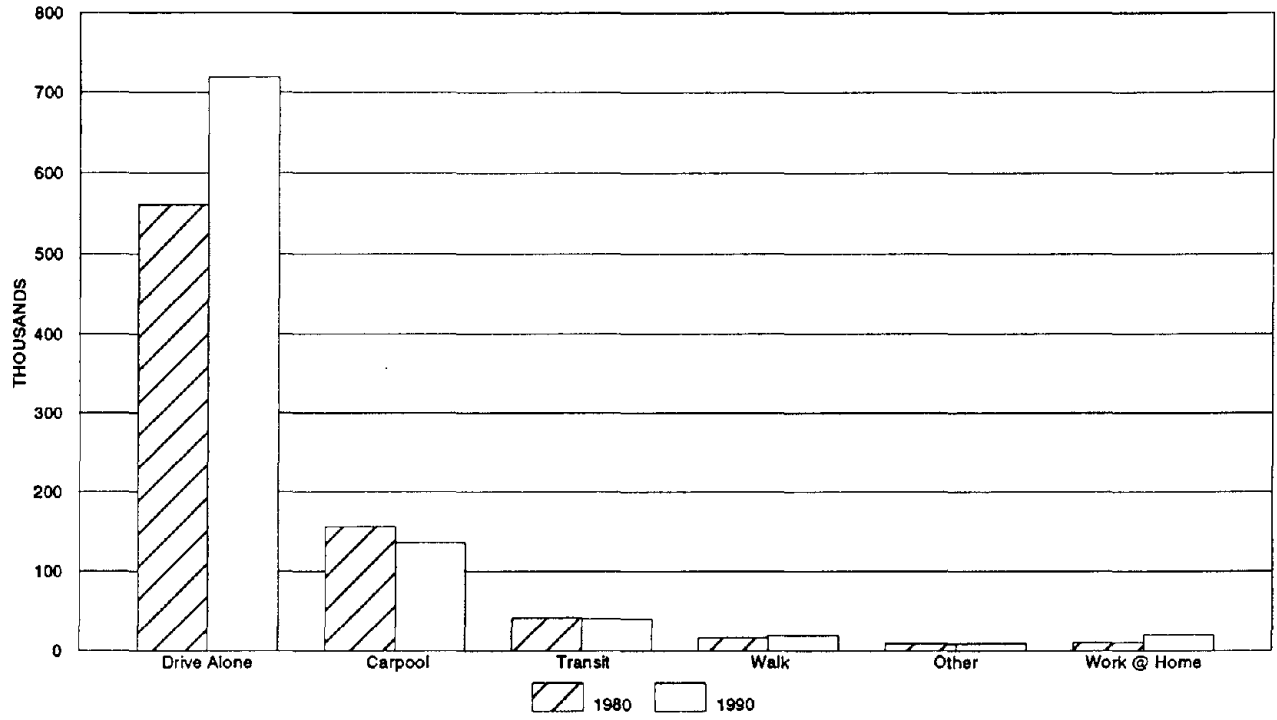


FIGURE 25  
MODAL TRENDS 1980 - 1990  
DALLAS COUNTY AREA





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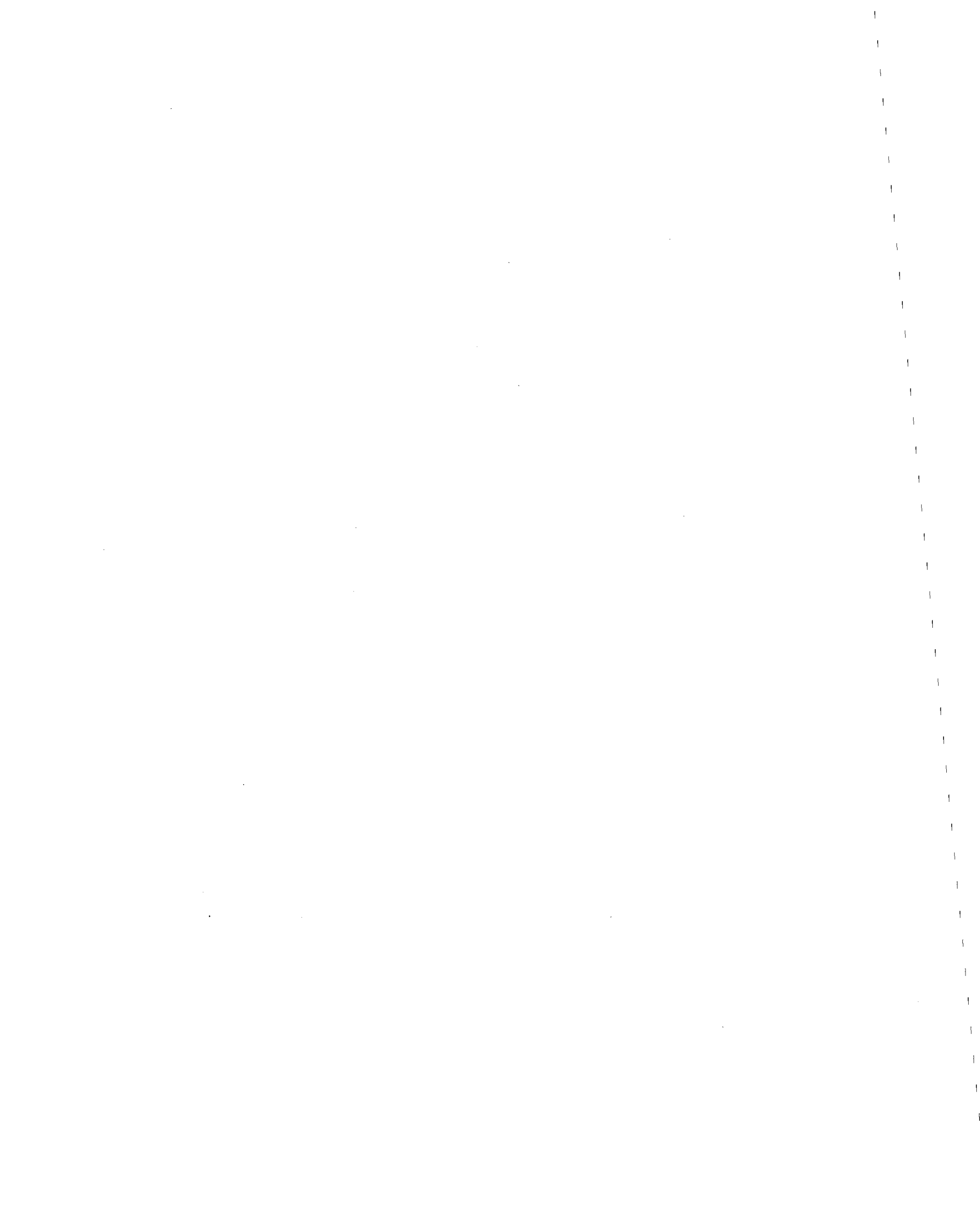
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