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SECTION I
INTRODUCTION

Introduction

The change in the millennium provides a timely opportunity to reflect on the significance of transportation to our quality of life and to explore how what we currently know about transportation and its roll in our society can help the public, decision makers, and transportation professionals as we plan for the future.

Indeed, all the evidence suggests that transportation is a critical element of our lives today and inevitably will continue to be in the future. Transportation activities comprise 11.6 % of our gross domestic product, a measure of the share of the economic activity associated with transportation.[1] The US Department of Transportation indicates that 7 percent of jobs are in the transportation sector and other definitions have indicated that as many as one of seven jobs is directly or indirectly involved in transportation.[2] Nineteen percent of household expenditures are devoted to transportation, a share second to only shelter.[3] Transportation is a leading cause of untimely deaths for many age cohorts in our society. Transportation rights-of-way and supporting uses such as parking, occupy a few percent of the total land area of our country but up to 50% or more of the land area of some of our urban cores. Transportation consumes the majority of our fossil fuels and is a major contributor to air pollution and a factor in the quality of our land and water resources.[4] Transportation corridors and technologies have historically shaped macro development patterns around the globe with waterways, railroads, the interstate system and airports driving economic development domestically and abroad. Increasingly transportation is similarly acknowledged as important to the more micro scale quality of life in our workplaces and neighborhoods. Sprawl, sustainability, growth management, concurrency and accessibility are increasingly recognized as critical issues influencing quality of life and economic health and are all integrally related to our transportation system.

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[1] Bureau of Transportation Statistics, Pocket Guide To Transportation, USDOT, December 1999. Page 25.
[2] U.S. Department of Transportation, Office of Human Resource Management, Transportation in America, http://dothr.ost.dot.gov/careers/transin,.htm
[3] Bureau of Transportation Statistics, Pocket Guide To Transportation, USDOT, December 1999. Page 26.
[4] Bureau of Transportation Statistics, Pocket Guide To Transportation, USDOT, December 1999. Page 32.

Perhaps the importance of transportation can best be appreciated in terms of the finite resource each individual has, their time. The average adult spends approximately 70 minutes a day in travel.[1] As transportation consumes our time and affects virtually every aspect of our lives, it is critical that we understand as fully as possible the relationships between transportation and our lives. Looking ahead, different individuals envision different futures. Some foresee crippling gridlock as the failure to invest as well as the growing dependency on the auto that will lead to disastrous consequences that will potentially be recognized too late to forestall their arrival. Others envision a dramatic renaissance of public transit as urban areas become denser and downtowns reclaim their historic role of centers of commerce, entertainment and even residential location. Others see a renewed emphasis on economic development resulting in increased attention to transportation systems that may have been under invested in during the recent past. Joel Garreau, the author of Edge City, recently stated his belief that the next decades will see an explosion in dispersion of population as economic health and technology enable people to live farther from traditional urban areas – certainly creating significant transportation implications.[2] Still others see technology and alternative fuels easing the environmental and energy concerns that have dramatically influenced current transportation policies and programs. Finally, there are those that foresee the "Jetson" style of personal mobility crafts as regularly portrayed on the covers of "Popular Science" or perhaps the mysterious rumored "Ginger" revolutionary mobility device as providing an inevitable solution to transportation problems as we know them today.

The current reality is one where transportation safety is improving, our levels of mobility are unprecedented, travel times are relatively stable and the US transportation system, in spite of its shortcomings, is the envy of the rest of the world. The concept of intermodalism is well established in our planning processes, system efficiencies have been realized, and there is continuing progress in integrating technologies to improve the safety, reliability and capacity of our system. Yet, there are growing travel demands accompanied with modest increases in transportation system infrastructure. There are significant shortages of funds to address "needs" as defined in most long-range plans and there is a ten to thirty year time frame to fund and implement many projects whose

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[1] CUTR analysis of 1995 NPTS data.
[2] Comments by Joel Garreau at the American Public Transit Association Annual Meeting where he presented in a session titled Anticipating the Future – Where are We Going in Transit Oriented Development, Monday, September 25, 2000.

need is well known today. In spite of growing concerns about congestion and safety, there has been a limited willingness by the public at all levels of government to increase revenues for investment in transportation systems. Simultaneously, we are more concerned than ever about the full range of impacts on our quality of life that are influenced by transportation decisions.

This research is intended to help build the transportation knowledge base that can be used to understand current conditions, explore how those conditions might change in the next several years, and examine what the implications might be. This effort is intended to help build the data and knowledge base that can help support informed decision-making about transportation policies and investments.

This research report is an interim product in an ongoing effort to provide university-based research to support a Florida Department of Transportation (FDOT) initiative to produce a document, The Trends and Conditions Report. This report will provide context information to support FDOT reports and programs such as the Florida Transportation Plan.

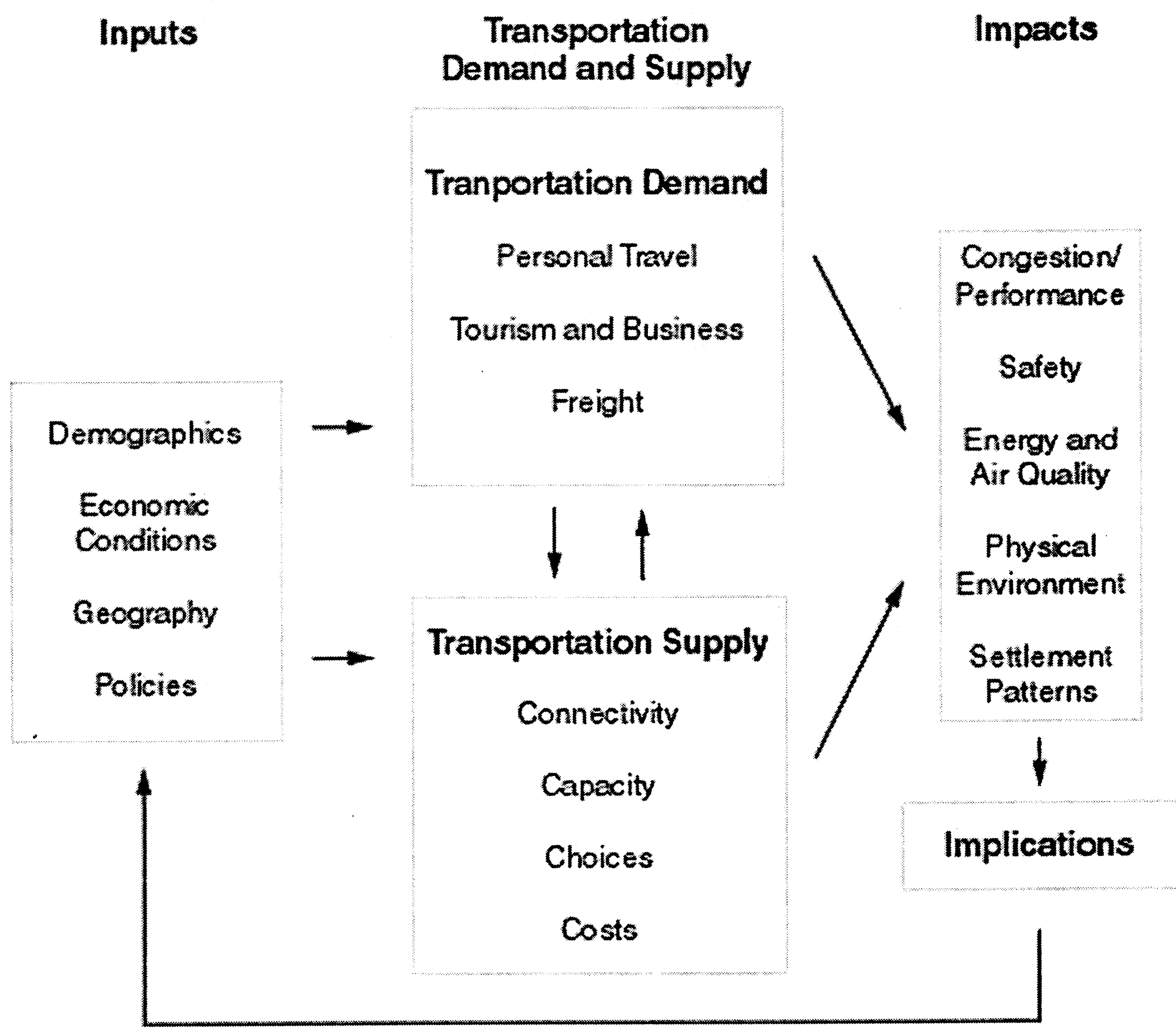
This document is organized to provide information that addresses each of several tasks outlined in the contractual scope of work for FY 2000. The sequences of sections address each of the subject areas of research as ordered in that original scope. The level of detail and depth of reporting varies across sections reflecting varying degrees of importance, information availability and progress to date. Some areas of exploration are anticipated to continue in greater detail in subsequent efforts whereas others are complete. In all cases, this report uses the best available data and applies it in a manner that is instructive and insightful for readers. In many cases the data is descriptive leaving the reader the opportunity to draw conclusions and implications. In other cases the authors, in the context of distilling the masses of descriptive data, have used their discretion in synthesizing and presenting the data. In some cases the implications are explored and in many cases, the focus and level of attention to various issues reflects the authors' and project team's perceptions of what is most important. Since the original scope of work, the focus has shifted some in response to both the project team meetings and the findings in the research.

The Work Scope

A research team composed of CUTR at USF, BEBR at UF and the FAU/FIU Joint Center is conducting this project. The work will be conducted in two stages; a work plan for FY 2000 and a work plan for FY 2001. This document provides a report on the work that was in the FY 2000 work scope.

The research plan is organized around a conceptual model shown in Figure 1. Each of the five boxes in Figure 1 addresses different components of the analysis. On the far left in the first box are the inputs that drive transportation demand. Trends and conditions for these items are displayed or discussed in various section of the overall research plan. This deliverable spends a great deal of time addressing the relationship between population and travel demand. The center section of the graphic speaks about transportation demand and supply. Sections of this report address each of the elements of demand including population, visitors, and freight. These three components of total demand are separated out since it is assumed that each are driven by different factors and, hence, the changes in each may be influenced by these differences. The bottom center box on transportation supply itemizes factors that characterize the supply of capacity. Each of the elements is discussed in Section VI where methodologies for measurement are proposed. The right hand side of the graphic shows impacts of the relationship between demand and supply. These impacts are presented in some of the materials in Section V and are also the topic of some of the research by our partners at other universities. The implications box refers to the consequences of the impacts of the various demand and supply changes. These implications are discussed in various sections of this report but, more importantly, will be discussed in the resultant deliverable, The Trends and Conditions Report and will also be left to the reader to contemplate at they review the information presented in this report. As implications are dependent on the values and perceptions of the reader, much of the implication of this work is left to the reader to discern.

FIGURE 1: Conceptual Model of Transportation Supply and Demand Relationships



The original scope tasks are listed below.

Task 1. Develop a framework for individual chapters 4 through 6.
Task 2. Understand the Determinants of Travel Demand.
Task 3. Estimate Forecasting Models
Task 4. Develop Methodology to Measure System Connectivity
Task 5. Develop Methodology to Measure Choices in Major Corridors
Task 6. Develop a Framework to Characterize Transportation Supply

This report is organized into eight major sections. Section I is this introduction. Section II addresses person travel, Section III addresses visitor travel and Section IV addresses freight travel. These discussions relate to the three elements in the transportation demand box in Figure 1 and correspond with elements of Tasks 2 and 3. Section V presents a compilation of descriptive statistical data on the transportation system. This represents data that has been assembled. This data supports a number of tasks in this and subsequent analyses. In addition to supporting the analysis, some modest share of this data will be appropriate for inclusion in the Trends and Conditions Report produced next year. Section VI addresses Tasks 4 and 5 on choice and connectivity methodologies. Section VII addresses the outlines of chapters referenced in Task 1.

SECTION II
PERSON TRAVEL

Introduction

Perhaps the single most important consideration when exploring the recent history as it relates to transportation, is gaining a rich understanding of the growth in travel demand. By developing an understanding of travel demand one gains insight into the extent to which travel demand might continue to grow in the future. This is the most critical transportation policy issue as it drives investment and policy decisions for transportation. Thus, this issue was featured prominently in the work scope for this Trends and Conditions Research Initiative. As indicated in Figure 1 in Section I, the factors influencing demand and the consequences of that demand are the framework around which this work scope and subsequent exploration effort were built.

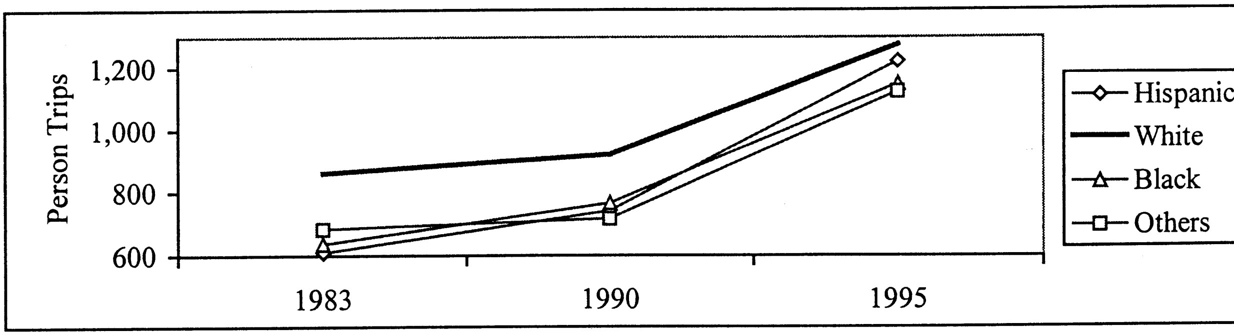
In Florida, when one thinks of growth in transportation demand, one typically thinks of population growth. Indeed with a growth rate at least twice that of the overall national population, much of the growth in Florida's travel demand is a result of growth in population. However, a closer look at the data reveals that the growth in population has not been the only important factor in the growth of demand for transportation and it may not be in the future. Thus, one of the focuses of this initiative has been an exploration of the factors contributing to the growth in travel. As indicated in the outline, the freight and tourist (now labeled visitor) markets are explored in other sections of this report; this section focuses on the growth in demand associated with person travel.

The recently released Mobility 2000 Policy Paper from FDOT stated on its first page "Between 1980 and 1997, total vehicle miles traveled increased 99 percent, but state highway lane-miles rose only 20 percent." This single sentence characterizes the transportation supply-demand challenge in Florida and creates an image, even to lay readers, of a pending crisis. This increase in demand was not solely the result of population growth. In addition to contributions from visitor and freight travel (discussed in subsequent sections of their report), this increase in demand is a result of both population growth and increases in per capita demand. This section of this report will explore that increase in demand in greater detail with the objective being to shed some light on future changes in total travel demand that one might expect to result from per capita changes in travel demand.

Over the past few decades as travel demand has increased, there have been various research efforts to both quantify that explosion in demand and to understand and quantify the underlying trends and conditions that are thought to contribute to that demand. Perhaps the single richest source of data and insight is the reports Commuting in America and Commuting in America II. Each of these documents, relying predominately on data from the Nationwide Personal Transportation Survey (NPTS), shows what is happening at the individual and household level regarding transportation in the U.S. A multitude of factors, including the aging of the baby boomers, an extraordinarily strong economy, the predominance of females who now are employed outside the home, the rapid suburbanization of our rapidly growing areas, the relative affordability of auto travel and availability of fuel, the shift to an information and service economy, and related factors are each hypothesized as factors that help explain the dramatic growth in per capita travel demand.

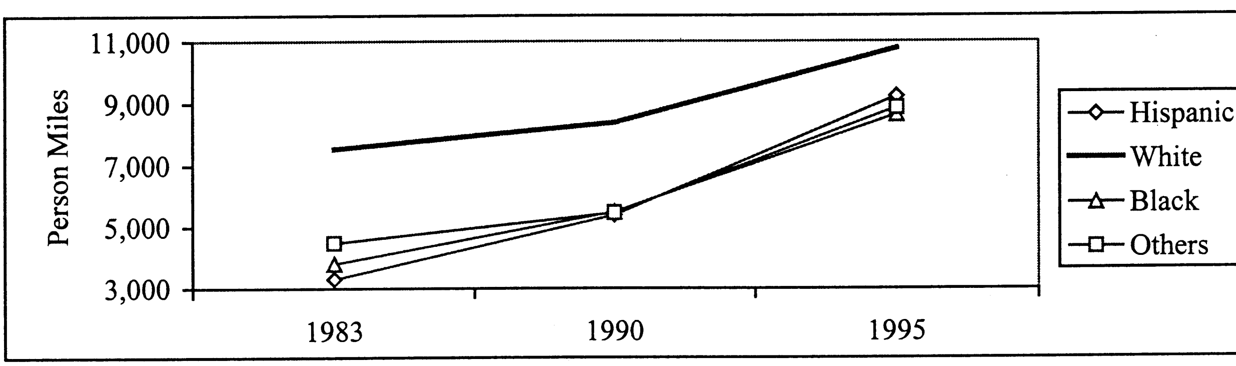
Figures 1-3 shows in graphic form the changes in several measures of mobility over time. These figures are of national data and are restricted to non-work trips; the largest and fastest growing segments of travel. The data is broken down by ethnicity, showing both the differences across groups and the relative changes. The three measures of mobility are person trips, person miles, and person hours of travel. In all cases, there have been dramatic increases since the 1983 data were collected. While experts in survey methods have analyzed the extent of the differences that may be attributable to the methodological improvements for subsequent travel surveys and even discounting for these improvements, there is an unmistakable and significant increase in person trips, person miles, and person hours of travel.

FIGURE 1: Trends in Annual Mobility per Capita for Non-Work Activities, 1983-1995 (Person Trips)



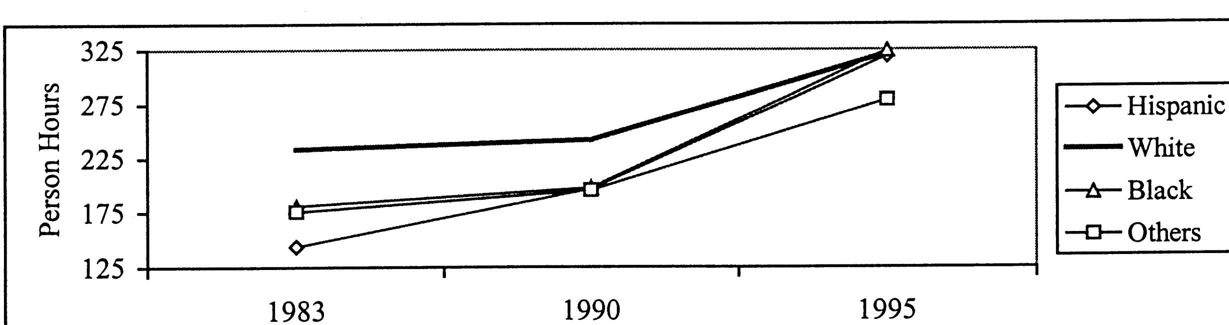
Source: CUTR analysis of NPTS data.

FIGURE 2: Trends in Annual Mobility per Capita for Non-Work Activities, 1983-1995 (Person Miles)



Source: CUTR analysis of NPTS data.

FIGURE 3: Trends in Annual Mobility per Capita for Non-Work Activities, 1983-1995 (Person Hours)



Source: CUTR analysis of NPTS data.

One of the most interesting observations is the fact that for the large population groups, White, Black, and Hispanic, the person hours of travel coincided in 1995. The gaps in demand between groups narrowed in all cases and total demand increased for all groups.

The interest in the rate of growth in individual travel demand is not new. There has been heated discussion for many years within the travel demand forecasting profession. Sensitivities arise from the forecasters' inability to anticipate the changes in travel demand that resulted from such fundamental trends as the labor force participation rate increase for females. The issue of saturation in travel demand and the prospect that demand growth will not be as high in the future as in the recent past has fueled speculation about how best to forecast future demand. In general, trip generation rates and trip length distributions used in travel demand models are not sensitive to some social-economic conditions such as household size and labor force participation. The sensitivity of our forecasting capabilities to auto ownership and real income changes are also poorly refined. Thus, it is important to reflect on what we do know about personal travel demand in order to more fully understand how demand might change in the future.

Several factors acknowledged to be important to trip and travel demand are briefly discussed below before turning to a more detailed examination of changes in per capita travel demand.

Analysis of National Mobility Changes

Analysis of national mobility often explores the issue using the NPTS database. This source provides the single best source of data for such analysis. The analysis presented below is based on national trends. Actual travel trends in Florida are somewhat different as a result of a number of factors that are discussed subsequently, but the understanding we can gain by studying the national data is relevant in Florida.

As Table 1 shows, indicators of travel have increased dramatically over the past few decades. These conditions have contributed to the dramatic increases in travel that are apparent on the transportation systems throughout the country.

Figure 4 graphically portrays these trends. What is most apparent in these trends is the fact that the growth in travel demand has far outpaced the growth in population. This raises the fundamental question that is relevant to understanding future travel demands. Figure 5 portrays these trends with an index of 1.0 in 1969. This approach to presenting the data better portrays the magnitude of the changes for data that have significantly different scales.

"What level of per capita changes in travel demand might we see in the future?"

TABLE 1: US Market and Mobility Trends

Amount of Travel	1969	1977	1983	1990	1995	Annualized Growth Rate, 1969-1995	Percent Change 1969-1995
Number of Persons (000)	197,213	213,141	229,453	239,416	241,675	0.87%	22.5%
Households (000)	62,504	75,412	85,371	93,347	98,990	2.25%	58.4%
Vehicle Trips (000,000)	87,284	108,826	126,874	158,927	229,745	6.28%	163.2%
Vehicle Miles (000,000)	775,940	907,603	1,002,139	1,409,600	2,068,368	6.41%	166.6%
Person Trips (000,000)	145,146	211,778	224,385	249,562	378,930	6.19%	161.1%
Person Miles (000,000)	1,404,137	1,879,215	1,946,662	2,315,300	3,411,122	5.50%	142.9%

FIGURE 4: U.S. Mobility Trends

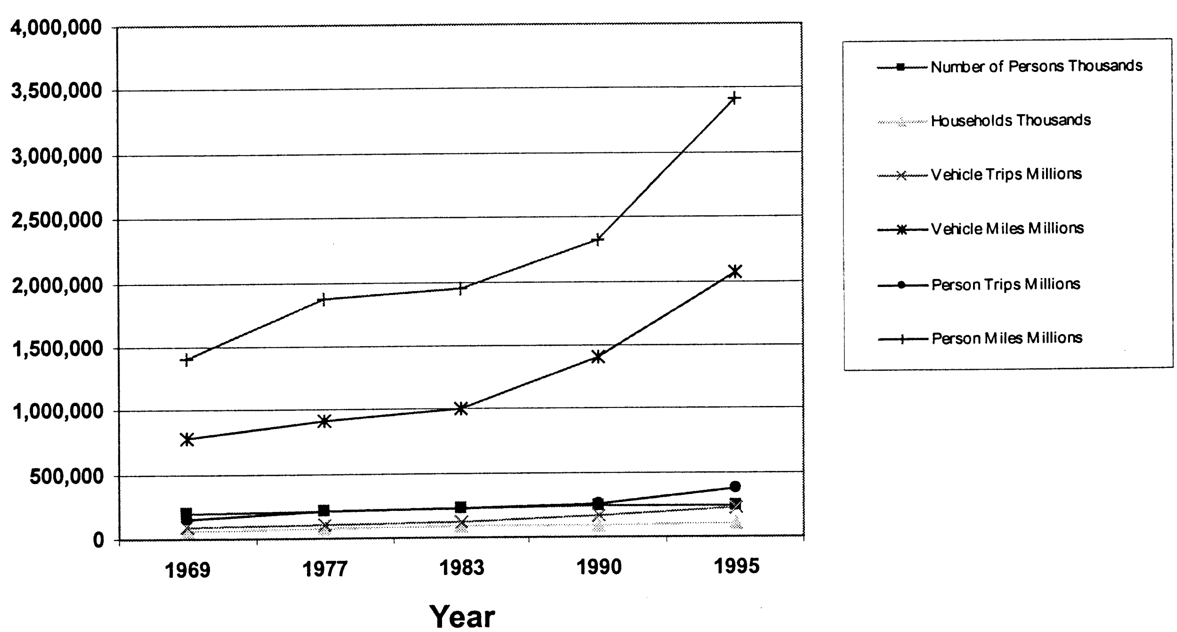
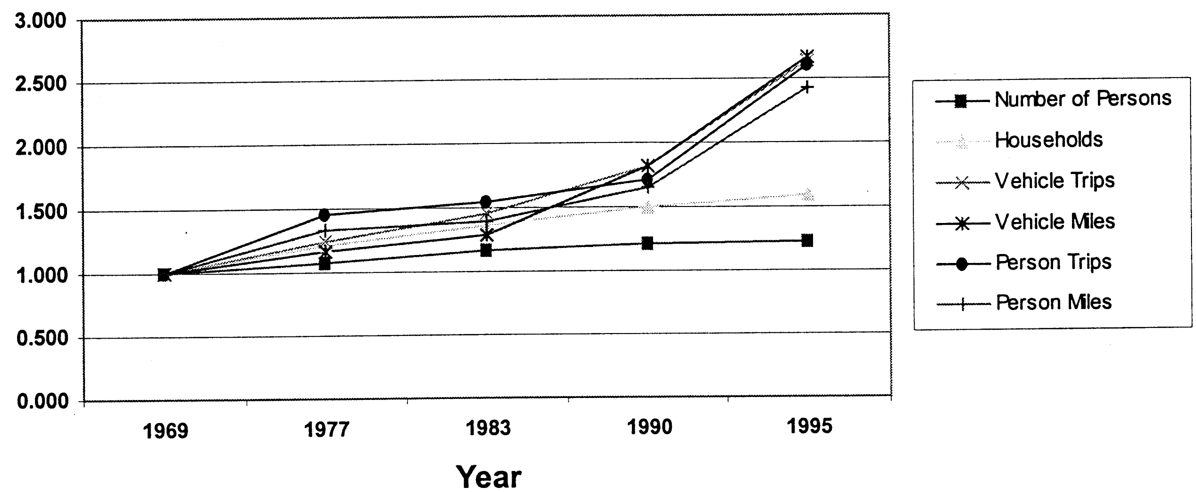


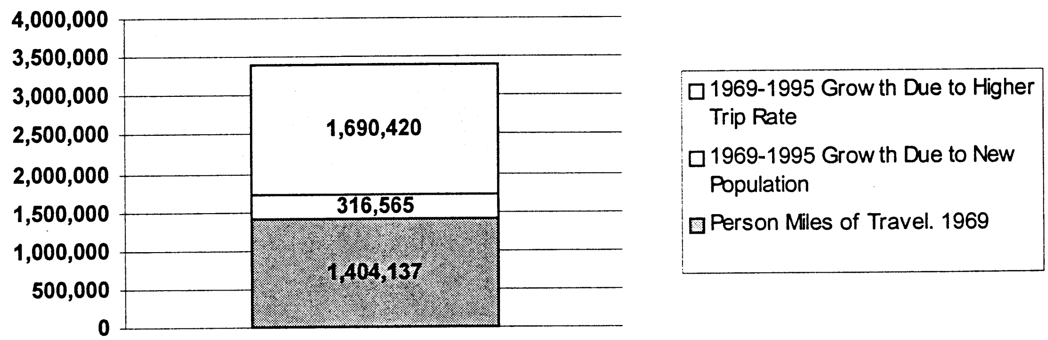
FIGURE 5: U.S. Mobility Trends Indexed to 1.0 in 1969



To address this, it is first relevant to explore and understand the historical changes in travel. This is done by reviewing factors that are felt to have contributed to changes in travel demand for both person travel and then vehicle travel.

Figure 6 presents a graphic allocation of the growth of person miles of travel. The growth in U.S. person miles of travel is approximately 15 percent attributable to growth in population (assuming that the new growth would have had 1969 per capita travel rates) and 85 percent explained by growth in per person travel demand. Note, if the whole country would have had Florida's growth rate but retained the changes in person trip making indicated by the national data, then the shares of changes in travel attributable to population growth would have been 32 percent with 68 percent attributable to per person trip making increases. Over the 1969 to 1995 time period, the nationwide NPTS data indicated a less than one percent per year increase in population and approximately a 4.5 percent annual increase in VMT per capita. This analysis is based on determining the growth in demand by assuming a base scenario where each new person would have traveled at the same person trip rate as the travelers in 1969 did. Thus, at the national level, 85 percent of the growth in person travel is a result of individuals traveling more, not a result of having a larger number of people traveling.

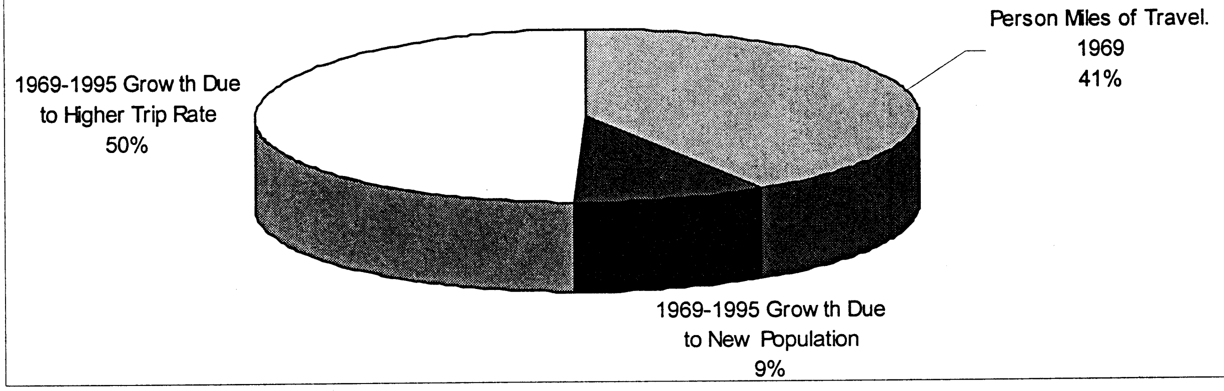
FIGURE 6: Analysis of Changing Person Miles of Travel 1969-1995, (millions of miles)



This can be exemplified in locations such as some no growth Midwestern and Northeastern cities where there have been actual population declines yet significant growth in travel. Cleveland, Detroit, St. Louis, and other cities have gone through such periods. Developing a rich understanding of the share of growth in travel demand that derives from per capita increases is important to understanding future travel demand growth trends.

Figure 7 presents this data in a slightly different manner. Here the total 1995 person travel is presented as shares attributable to three things: the original travel demand that existed in 1969, the amount added by new population if the travel rate would have remained constant, and finally, the amount attributable to the change in per person travel rates. Presented this way, 41 percent of the total 1995 demand is comprised of demand that existed in 1969, 9 percent is attributable to new residents, and 40 percent is attributable to the increase in per capita travel for both prior and new residents.

FIGURE 7: Analysis of Person Miles of Travel in U.S. in 1995 (millions of miles)



The growth in per capita travel demand is attributed to a host of factors. The list includes economic conditions such as the relative affordability of travel and the generally strong state of the economy. The maturation of the baby boom generation into their peak childbearing, earning, and traveling years is considered a major factor. Particularly important in driving travel demand is the fact that female labor force participation has increased dramatically over past generation and with that increase has been a dramatic increase in trip making as work trips have been added and the additional household income has driven consumer spending and the related travel requirements. Child serving trips are also significant as day care, school and youth activity travel demands have increased travel particularly for females.[1]

A Closer Look at VMT and Per Capita Trip Rates in Florida

The preceding analysis looked at person trip rates for the nation by looking at the travel of individuals for trips of one day or less. Thus, this data does not reflect total travel on the roads. Much of the tourist/visitor travel and freight travel would be excluded from this data set, thus to the extent that there are trends in these areas that differ from the person trip trends, person travel trends gives a purer estimate of per capita needs. As is pointed out in subsequent sections of this report, evidence indicates that both visitor and

[1] For a more detailed analysis of factors contributing to changes in travel demand review documents available on the USDOT FHWA NPTS web site at http://www.fhwa.dot.gov/ohim/nptspage.htm

freight travel are growing faster than overall travel in Florida. Prior analysis of Florida NPTS derived travel data compared to nationwide NPTS derived travel data indicate that Florida does have systematic differences in travel. The older population and other social-economic conditions appear to produce lower levels of per capita travel in Florida.[1] The rates of change in per capita travel for Florida, however, have not previously been reviewed. Other analyses have questioned the validity of the NPTS sampling and the resultant growth rate in VMT per capita.[2]

Based on the queries into the validity of using national trends in per capita travel changes as relevant to the Florida situation, we explored in greater detail the VMT and VMT per capita growth data for Florida. In exploring these trends it is clear that there are some significant differences between Florida and national VMT per capita trends. Figure 8 presents the VMT per capita in Florida and for the U.S. total based on FHWA data. As this data simply takes total vehicle miles of travel and divides by the number of persons, it includes changes in travel for tourists and seasonal visitors as well as freight in the measure of total miles of vehicle travel. This is different than person survey-based data like NPTS that does not include data from long distance freight travel or long distance tourism travel or non-domestic travel. Thus, one would expect the total travel per capita using FHWA figures to be higher than data developed by collecting information on individual travel trends.

Interestingly, the Florida VMT data shows very significant differences from the national data in both magnitude and trend. Figure 8 provides a graphic of per capita data from 1966, the first year the data were collected at the national level, to 1998. There are several interesting observations that can be made.

- From 1966 through 1980 VMT in Florida exceeded the VMT per capita data for the US significantly, from 13 percent greater in 1966 to more than 20 percent greater in 1980.
- In 1981 VMT per capita in Florida dropped dramatically suggesting a redefinition of terms or change in methodology. The drop was equivalent to about 7 years growth in per capita VMT.

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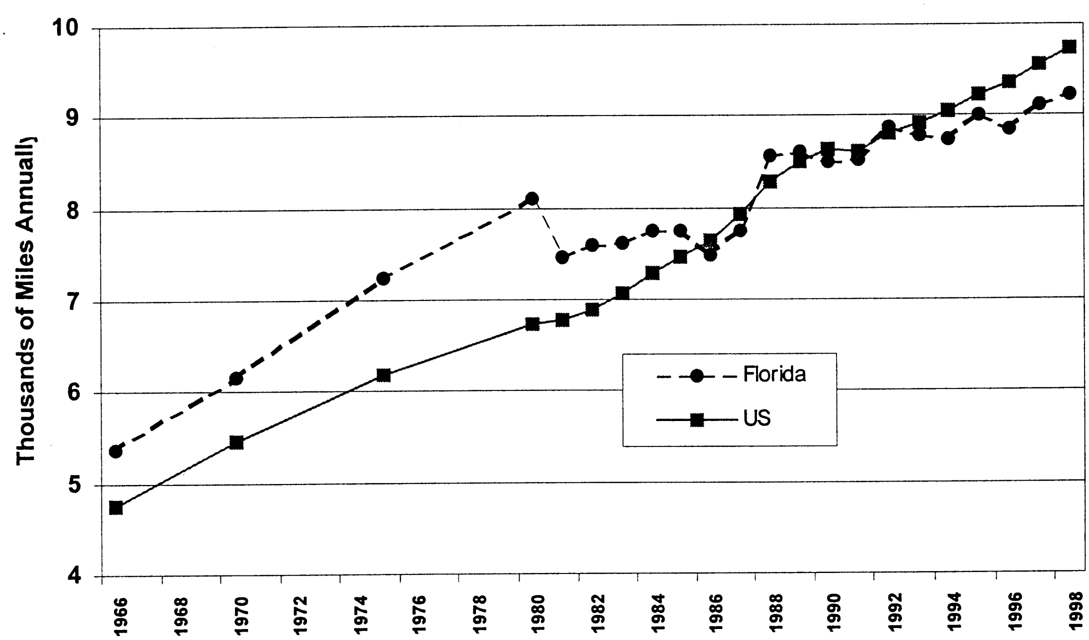
[1] CUTR, NPTS Demographics and Travel Behavior: A comparison of Florida and the United States, January 1993.
[2] Lave, Charles. What Really is the Growth of Vehicle Usage?. Transportation Research Record No. 1520, 1996.

- VMT per capita in Florida increased modestly through the eighties before dipping in 1986 then increasing dramatically in 1988. Again, it appears that a change in measurement methodology may have impacted the data.
- From 1988 onward VMT per capita increased very modestly, resulting in VMT per capita in Florida being 5 percent below the national average in 1998.[1]

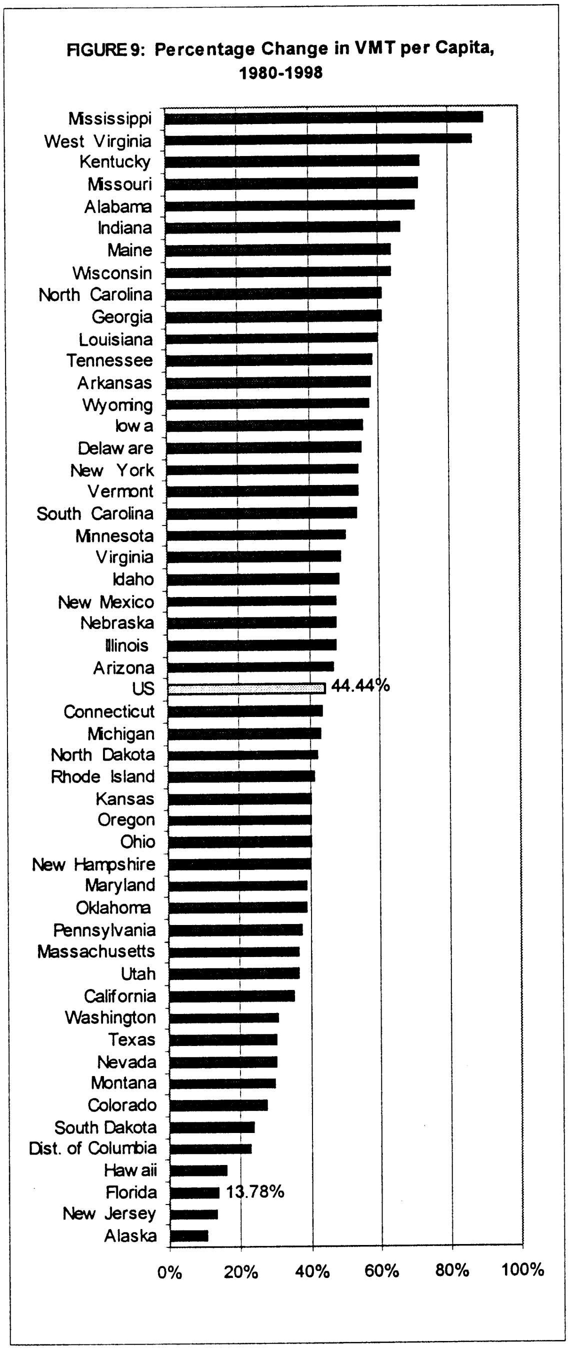
FIGURE 8: Florida Versus Nation, VMT per Capita

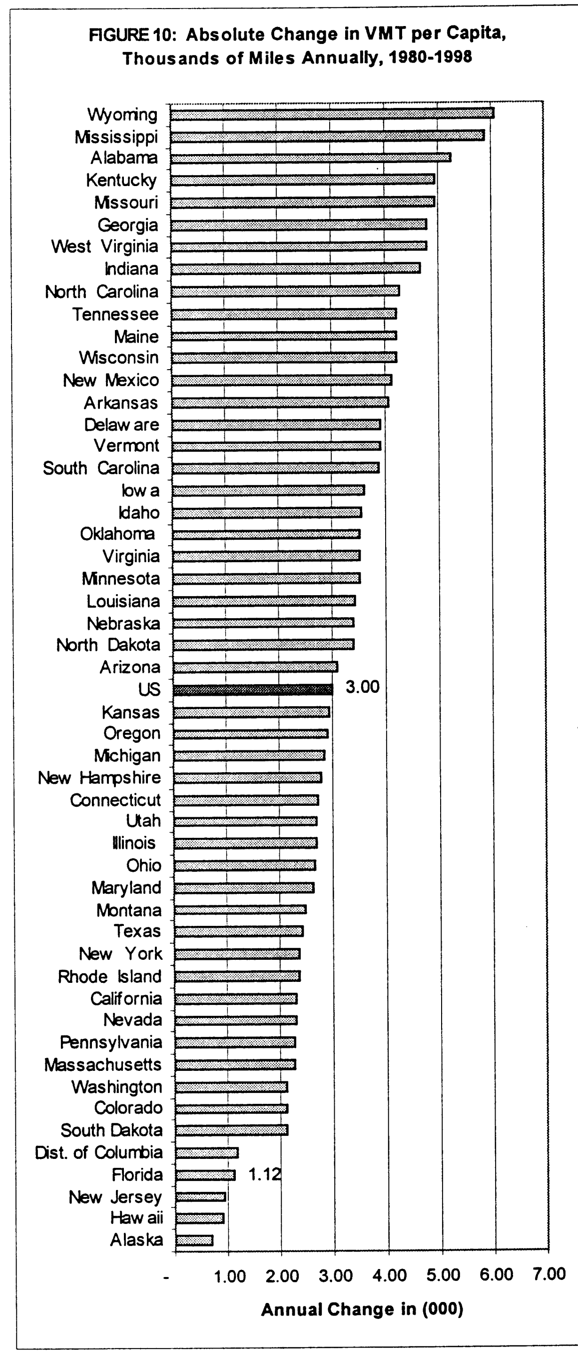


Source: FHWA VMT Data and Census Population Data.

Figures 9 and 10 look at Florida compared to the rest of the nation between 1980 and 1990. As this graphic indicates, the change in VMT per capita for Florida in this period is well below the national average, only a fraction of the growth in VMT per capita as the rest of the states and national average.

[1] The significant changes in VMT per capita for Florida result in some dramatic differences in analysis results depending on the time period selected. For example, the analysis by Ed Lee of FDOT using the changes between 1980 and 1998 would have had significantly different results if it has used period 1981 to 1998 or 1986 to 1998.





Source: CUTR analysis of FHWA VMT Data.

VMT per capita in Florida increased 14 percent between 1980 and 1998, or about one-third the 44 percent increase of the nation as a whole. Turning back to the issue of the relevance of these trends, both national and state, to the future travel demand in Florida, one can make a number of observations.

- There have apparently been some changes in methods or definitions for Florida VMT data collection as the abrupt shifts in the VMT per capita numbers between years suggests that something other than actual travel changes has impacted the data. While energy crises and other factors may be influencing the data, the sharp deviation of the Florida trends from the national trend results in the need for caution when using the Florida data.
- Even ignoring the discontinuities of data in the 1980's, Florida appears to have shifted from a state where per capita travel was 20 percent more than the national average to one where per capita travel is 5 percent below the national average. Understanding this change, particularly its implications as we look to the future, merits analysis. One might speculate that some of the growth in per capita travel that the country observed in the 70, 80 and 90's occurred earlier in Florida. Did the travel impacts of dispersed destinations and low density, high levels of auto availability, small family size, female workforce participation, and other factors occur earlier in Florida than the country as a whole?
- Regardless of the time frame, generally per capita travel increases explains about 75 to 80 percent of the total change in US travel demand between the 60's and 90's whether using NPTS-individual based or FHWA empirical roadway count based travel data.
- In Florida the share of growth in travel demand attributable to per capita demand growth will be lower as a result of the higher population growth rate regardless of the actual changes in per capita travel. For example, in the extreme, in no growth states, 100 percent of the change in demand is attributable to per capita changes. The higher the growth rate the lower the share of new demand that will be attributed to per capita increases.
- If Florida VMT data are accurate, per capita VMT growth still explains at least 20 and more likely more than 30 percent of the growth in travel demand over the past two decades. As population growth slows in percentage terms in the future, the share of travel demand growth attributable to changes in per capita demand might grow unless per capita travel rates flatten.
- In this author's opinion, aggregate travel forecasts are more likely to have uncertainty associated with them as a result of an inability to accurately predict changes in per capita demand than as a result of an inability to predict changes in population.

Contributing Factors to VMT per Capita Changes Nationally

Figure 11 details the national person trip rates as a function of age for three time points. The data indicate that the peak age for trip making is in the working age years with lower rates for both younger and older individuals. The figure also indicates that the greatest increases in trip rates have been for the younger and older groups where auto availability and participation in organized activities have increased youth travel, and the income, labor force participation and higher female licensure and auto availability levels have driven older adult mobility rates.

Figure 12 provides a more detailed look at vehicle travel. Vehicle travel takes into account the changes in person travel and the changes in mode choice. As the graphic indicates, the majority of growth in vehicle travel is a result of increases in person travel (including contributions from population growth and per capita travel increases), approximately 86 percent and the remaining 14 percent is a result of changes in mode. These mode changes refer to shifts from shared ride, transit, and walk modes to single occupant auto travel.

FIGURE 11: Trip Rate Trends

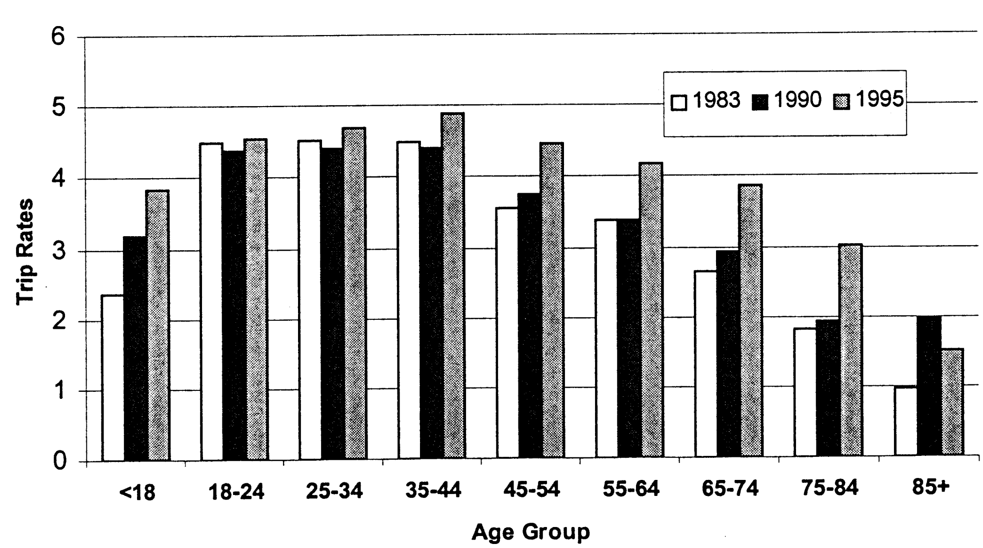
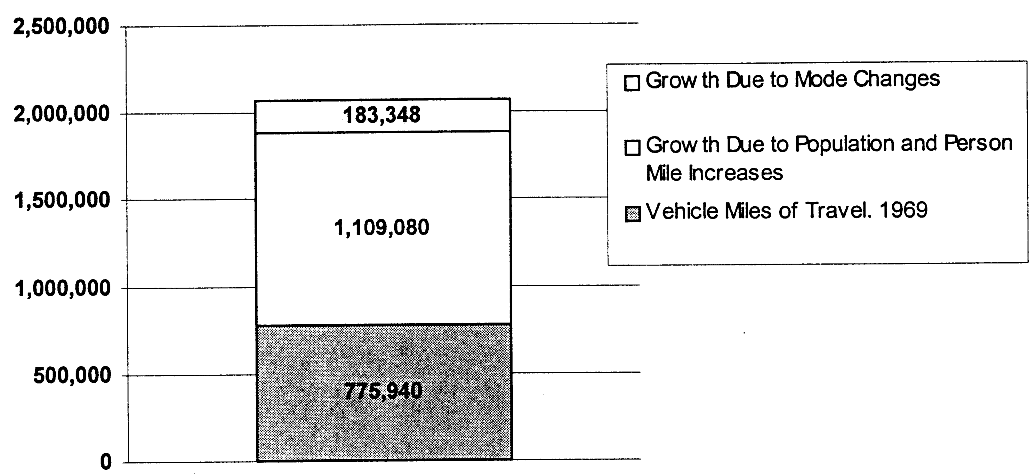
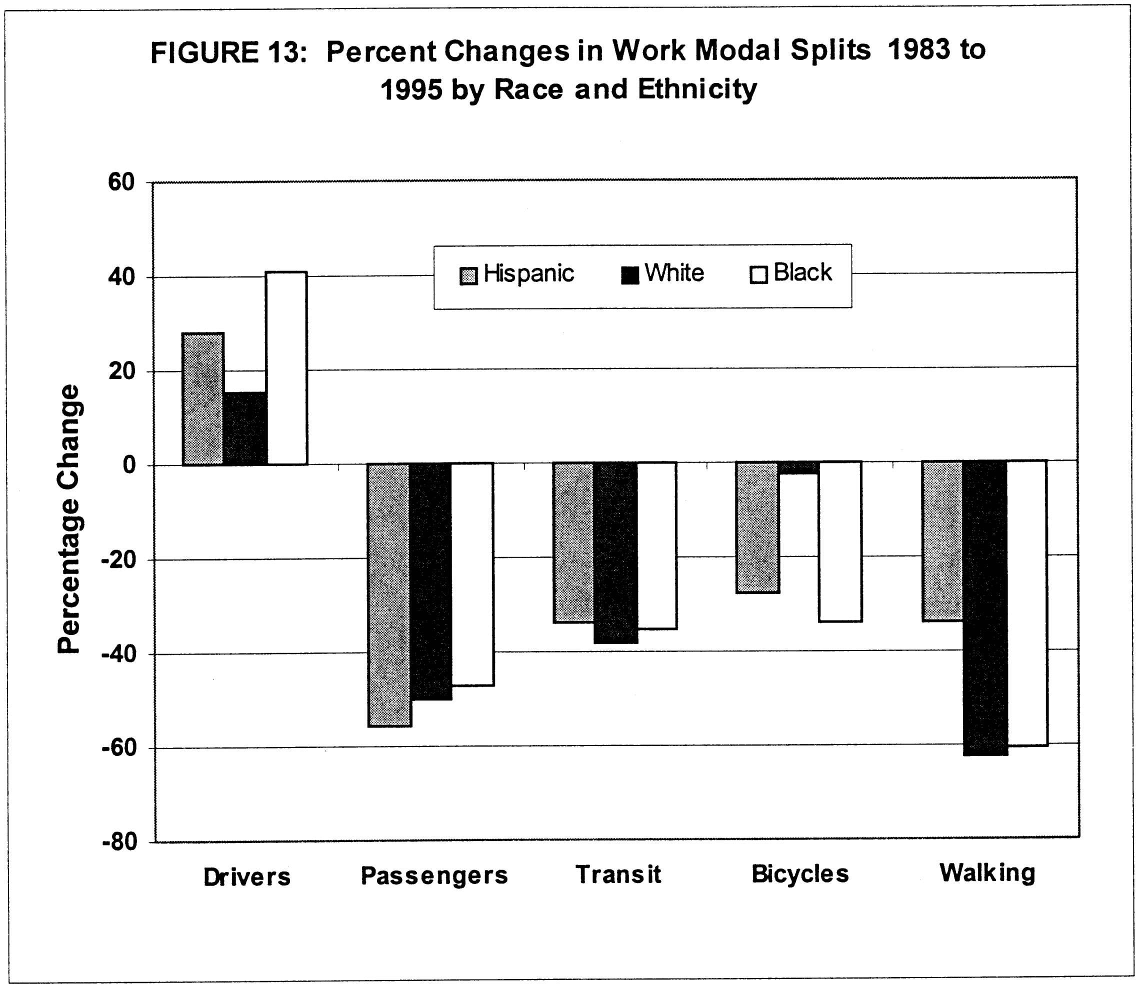


FIGURE 12: Analysis of Changing Vehicle Miles of Travel 1969-1995, (millions of miles annually)



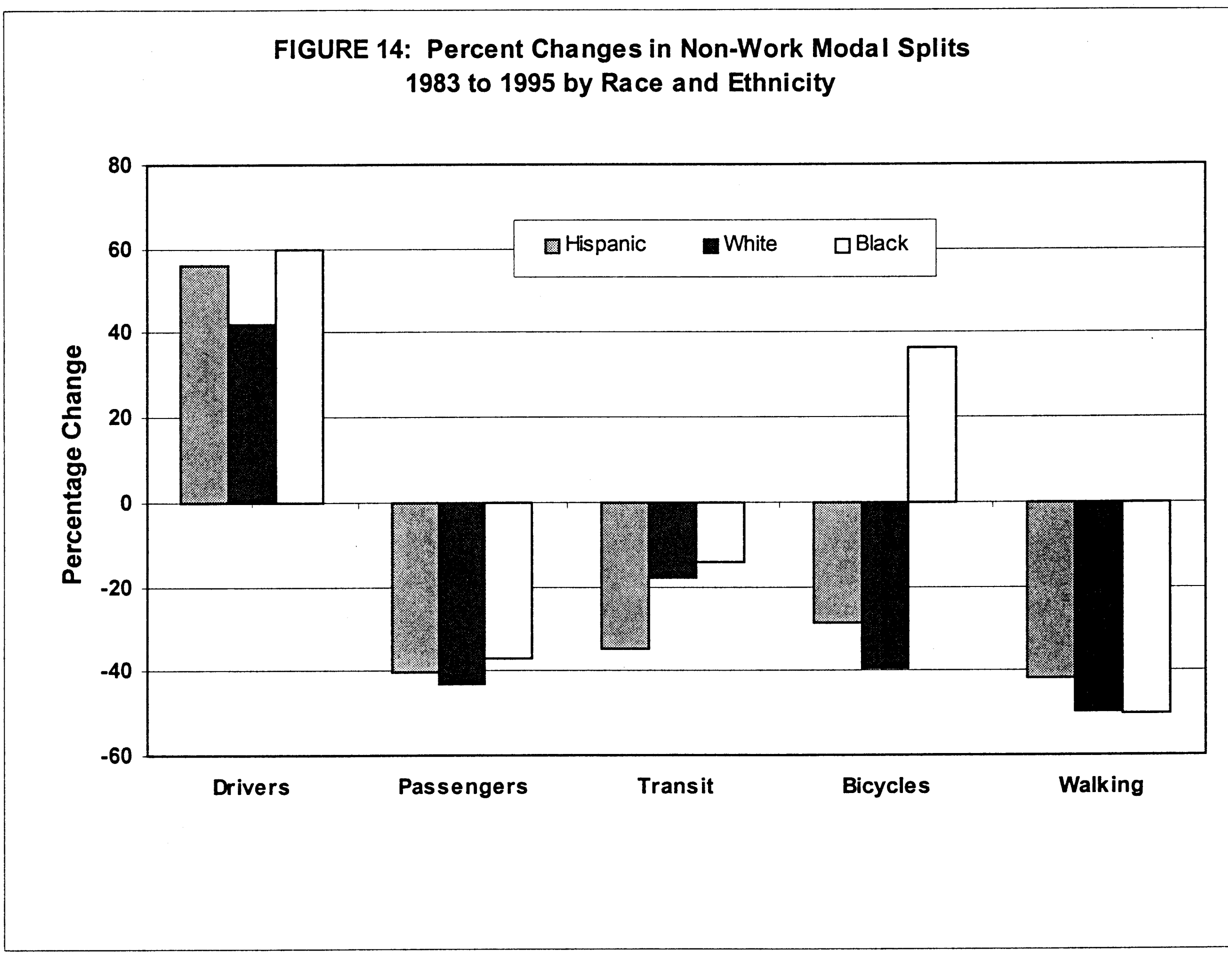
Figures 13 and 14 portray the changes in mode share between 1983 and 1985. Most revealing about these changes is the systematic shift to Single Occupant Vehicle (SOV) modes. The common element here appears to be the appeal of the SOV mode in comparison to alternatives. Analysts have speculated that changes are substantially driven by the travel time and flexibility advantages of SOV travel. Table 2 provides 1995 mode shares for Florida and the nation. As the table indicates, the relatively modest non-auto shares speaks to the dominance of auto based travel but also limits the extent to which additional shifts between modes are likely in the future. In Florida, transit shares are approximately half the national average and under one percent. Thus, even if there were further declines in transit mode share, it is not significant enough to provide a major impact in terms of increased auto travel (some of the transit demand would either not be satisfied by other travel options, a significant share would be accommodated as shared ride travel and some would result in increased vehicle trips. The worst case would be if the full approximately one percent of travel that uses transit shifted to auto travel increasing VMT by approximately one percent). Recent ridership data for the past few years indicated that transit appears to be growing at the same rate or perhaps slightly faster than auto VMT thus, transit's mode share may be stable or growing. It will take a longer period of time and additional confirmation from such sources as the 2000 census journey to work data and the 2000 NPTS to substantiate these industry trends. The ultimate role of transit is likely to be influenced by service



Source: CUTR Analysis of NPTS Data.

levels, but in any case, the low current share precludes it from being a major contributor to addressing future demand unless there are dramatic increases in both service and use.

Finally, when reviewing trends in person travel it is important to understand the role that changes in speed may be playing. The data used to develop Figures 1-3 indicate that travel speeds have increased over the recent past enabling vehicle miles of travel to grow at a faster rate than trips or time spent traveling. This situation often confuses the lay analyst who sees speeds on given facilities declining as congestion levels increase. While indeed speeds on any given facility may be falling due to congestion, overall travel speeds have been increasing due to a number of factors including the changes in modes as portrayed in Figures 13 and 14 where individuals move to faster modes, shifts of a larger share of the travel to off-peak time periods when congestion is less, and shifts of travel to higher classifications of facilities with generally higher speeds. Table 3 indicates the allocation of vehicle miles of travel for the US and Florida by roadway classification type for 1980 and 1998. By contrasting the columns one can see the changes in shares of travel on higher speed facilities. For example, in the US, the share of travel on freeway grade facilities grew from 24.6 percent in 1980 to 30.2 percent in 1998. In Florida the share of travel on freeway grade facilities grew from 15.8 percent in 1980 to 25.4 percent in 1998.



Source: CUTR Analysis of NPTS Data.

TABLE 2: Mode Share Analysis, 1995 NPTS						
	FL			US		
Mode Choice	Trips	Share	Summed Shares	Trips	Share	Summed Shares
Automobile	9,759,026,461	60.67%		220,479,388,713	58.18%	
Passenger Van	1,678,294,074	10.43%		37,418,277,506	9.87%	
Sport Utility	1,134,979,927	7.06%		22,289,394,942	5.88%	
Pickup truck	1,747,536,331	10.86%	89.93%	44,169,950,584	11.66%	86.40%
Other truck	106,388,010	0.66%		2,241,512,928	0.59%	
RV	5,258,757	0.03%		183,413,131	0.05%	
Motorcycle	20,810,072	0.13%		387,390,387	0.10%	
Other POV	12,532,344	0.08%		230,634,404	0.06%	
Bus	136,124,762			4,541,375,331		
Amtrak	1,743,157			22,122,872		
Commute train			0.89%	624,879,527		1.76%
Streetcar/trolley				41,660,919		
Subway/elevated rail	5,946,676			1,430,422,258		
Airplane	20,207,934	0.13%	0.13%	312,515,680	0.08%	0.08%
Taxicab	21,917,308	0.14%	0.14%	683,130,746	0.18%	0.18%
Bicycle	165,173,941	1.03%	1.03%	3,341,765,673	0.88%	0.88%
Walk	542,900,079	3.38%	3.38%	20,325,155,763	5.36%	5.36%
School bus	261,825,097	1.63%	1.63%	6,599,266,574	1.74%	1.74%
Other non-POV	55,614,192	0.35%	0.35%	1,140,191,381	0.30%	0.30%
Not ascertained	405,723,547	2.52%	2.52%	12,328,410,599	3.25%	3.25%
Refused	2,933,887	0.02%	0.02%	139,503,430	0.04%	0.04%
Total	16,084,936,556	100.00%	100.00%	378,930,363,348	100.00%	100.00%

Notes:

1. Data are shown in person trips.
2. Data are computed directly from raw 1995 NPTS data.
3. Excluding non-responses would increase mode shares slightly.
4. Sample size limits accuracy for small share estimates at the State of Florida level.

Exploring Future Travel Demand Growth

Given the portrait of the past few decades as characterized by the data presented in the proceeding pages, it in important to look to the future and explore what information might be available to make informed judgments as to the data that might be available to support forecasts of per person trip making and vehicle trip making. Demographic and land use factors are briefly discussed below.

Demographic Forecasts are readily available and are being reviewed and detailed by BEBR as another part of this overall research effort. Several characteristics of the population are closely related to trip making and thus may be important traits to use in future forecasts. Given what we know about travel behavior, the following traits may be useful in forecasting.

TABLE 3: VMT by Functional Class Changes

	Roadway Classification	FL				US			
		1980	% of Grand Total	1998	% of Grand Total	1980	% of Grand Total	1998	% of Grand Total
RURAL	Interstate	4,581	5.8%	11,159	8.1%	135,084	8.8%	251,062	9.6%
	Other Principal Arterial	8,070	10.2%	12,581	9.2%	132,958	8.7%	237,764	9.1%
	Minor arterial	4,917	6.2%	4,163	3.0%	129,816	8.5%	165,819	6.3%
	Major collector	3,074	3.9%	2,792	2.0%	150,186	9.8%	203,791	7.8%
	Minor collector	1,937	2.5%	1,207	0.9%	39,282	2.6%	54,278	2.1%
	Local	4,737	6.0%	3,742	2.7%	84,704	5.5%	120,596	4.6%
	Total	27,316	34.6%	35,644	25.9%	672,030	44.0%	1,033,310	39.4%
URBAN	Interstate	5,721	7.2%	16,528	12.0%	161,242	10.6%	374,407	14.3%
	Other freeways and expressways	2,174	2.8%	7,305	5.3%	79,690	5.2%	166,470	6.3%
	Other Principal Arterial	11,468	14.5%	29,366	21.4%	229,469	15.0%	388,193	14.8%
	Minor arterial	10,560	13.4%	17,002	12.4%	175,030	11.5%	307,783	11.7%
	Collector	8,102	10.3%	12,282	8.9%	83,043	5.4%	130,861	5.0%
	Local	13,661	17.3%	19,368	14.1%	126,791	8.3%	224,343	8.5%
	Total	51,686	65.4%	101,851	74.1%	855,265	56.0%	1,592,057	60.6%
TOTAL		79,002		137,495		1,527,295		2,625,367	

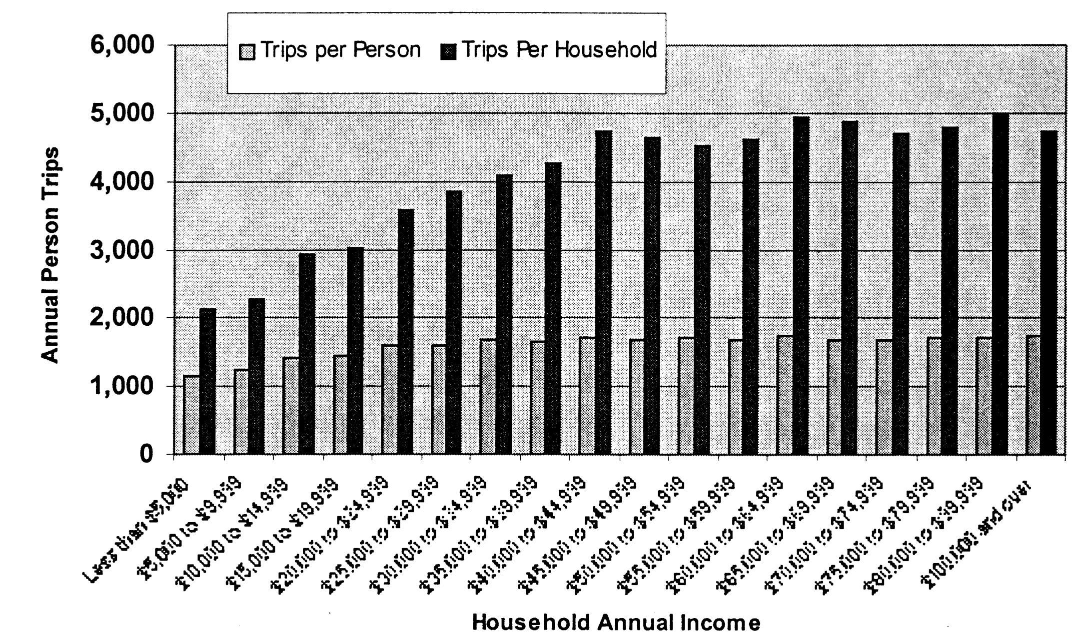
Age distribution - Figure 11 displayed the age related trip making rates. Mobility declines with age beyond middle age but changes in health and income as well as life style (i.e. more singe person households) also influence age related trip making. As evident by the different rates for different years, there are changes over time taking place that are significant in the context of age related changes. In general, one might expect continued increases in mobility for the young age groups if the economy stays strong, however, these increases are, in the opinion of this author, likely to be smaller than historic changes. As the highly mobile and economically active baby boomers move toward and beyond retirement, the trip rates for the older age cohorts are likely to continue to show some upward gains. Medical advances and technology advances as well as economic conditions may facilitate greater mobility for elderly populations in the future. The complex interrelationships between causal factors combined with uncertainty result in difficulty in developing an analytically defensible basis for extrapolating trip rates as a function of age. However, one could develop scenarios with a higher and flatter trip rate curve to test the implications on future travel demand.

Income distribution - Historically trip making has been tied to income as has mode choice. Future estimates of real incomes could be used to develop income-based trip making forecasts. Travel costs would also influence future trip making. The prospect of sustained higher energy costs as well as the move to toll facilities and higher parking costs as land develops, suggests that auto travel costs may not be declining in real terms. As in the case of age, the ability to discern income related trip-making rates is at best difficult and highly uncertain, however, scenarios could be explored to understand the ramifications on travel demand with higher incomes. As Figure 15 reveals, trip making increases with household income, however, it stabilizes when trip making reaches a given level. The trips per person rate appear to stabilize at about the $30,000 annually per person income level, whereas household trip making stabilizes at about the $50,000 income level.

Thus, one could develop scenarios where real income growth levels, or shares of the population that appear to be in income categories where income constrains their ability to participate in activities or to travel to them are adjusted to reflect anticipated changes in real income (or perhaps in some composite measure of income and transportation cost ratio).

Household Size and Composition - Household composition influences trip making as a result of the relationships of the people (propensity to share rides) and the opportunity to economize on some household service trips such as shopping. Over the past few decades the decline in household size has been attributed to lower fertility rates, lower marriage rates, and higher divorce rates as well as to the economic health that has enabled household formation by young people at a younger age than might be the case in times of high unemployment. Detailed analysis of household formation may provide some insight that could enable future forecasts of household composition and the subsequent impacts on person and vehicle trip making.

FIGURE 15: Trip Making by Income, 1995 NPTS



Source: CUTR analysis of NPTS data.

Land Use - Much of current thinking regarding transportation and land use planning is premised on the expectation that the design, density and land use mix of urban development is a critical driver of travel demand, especially vehicle trip demand. Aggregate empirical data confirms the relationship between density and transportation demand. Whether future growth in population is urban, suburban or exurban/rural, and whether or not existing urban or perhaps suburban residents will be moving to outlying areas is a key consideration in understanding future travel demand. Land use patterns are known to influence overall trip making and trip length as well as mode. Denser areas are more likely to have transit and walk/bike opportunities and mixed-use patterns can shorten trip lengths and facilitate chaining trip activities.

While trip rates and mode share can be derived as a function of density and urban area type, these traits are highly correlated with other traits and most importantly, very difficult to predict. Some, such as author Joel Garreau, have indicated that they envision continued and even accelerated suburban/exurban development.[1] Others envision an

[1]Comments by Joel Garreau at the American Public Transit Association Annual Meeting where he presented in a session

urban renaissance with aging baby boomers settling into urban condos in regentrified inner city neighborhoods.[1] Future research could establish trip making and mode share rates for three different urban environment categories reflecting three different urban location options. The implications of this can be tested against scenarios where the change in share of population in each urban environment is altered in a manner that is possible in the context of forecast demographic growth trends.

Summary Implications

As portrayed in this section, travel demand growth is driven by far more than population growth. Over the recent past, the time period that has influenced public and decision maker perceptions, the changes in travel demand have been remarkable as a result of some very pronounced changes in socioeconomic conditions. Several travel analysts have been repeatedly surprised, as demand levels for travel seem to continue to escalate beyond what some believed were saturation levels. However, some of the recent trends cannot be sustained or repeated as conditions such as labor force participation increases, auto occupancies and mode share declines and urban core exodus cannot continue at the same pace in relative or in some cases even absolute terms as has been the case in the past. Few envision lower real costs for transportation or as dramatic of increases in overall economic health as have occurred in the past two decades. Furthermore, other conditions such as growing congestion, a renewed interest in and investment in transit, an enhanced effort to improve urban design and other factors may influence the pace at which SOV travel demand will grow. Thus, we strongly recommend against straight-line extrapolation of most person travel demand related trends. Scenario testing would appear to be the most promising strategy to understand possible or probably future scenarios of travel demand growth. Expert consensus or other strategies may be useful to provide a stronger sense of confidence in the results. However, historically travel demand growth at the state level is the summation of various urban area forecasts, each developed with a variety of local assumptions. Thus, the trends and conditions research initiative may choose instead to acknowledge the factors and historical trends that shaped past growth and shed light of possible future trends as has been attempted in this section.

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titled Anticipating the Future – Where are We Going in Transit Oriented Development, Monday, September 25, 2000.
[1]For example, see Mobility for the 21st Century: A Blueprint for the Future, prepared for APTA by APTA's Mobility for the 21st Century Task Force and Robert L. Olson, Institute for Alternative Futures, October 1996.

SECTION III
TRENDS IN VEHICLE MILES OF TRAVEL BY FLORIDA'S VISITORS ON ITS HIGHWAYS

Introduction

This paper estimates the annual amount of vehicle miles of travel by Florida's visitors on its highways and compares it to the total amount of vehicle miles of travel in the state from 1984 through 1998. During this period, the estimated annual vehicle miles of travel by visitors on Florida highways increased by 87 percent from 8.0 billion in 1984 to 15.0 billion in 1998. Relative to all vehicle miles of travel in the state, these vehicle miles accounted for about 9.4 percent at the beginning of this period and increased to about 12.7 percent in the early 1990's. Since then, the share has declined to about 10.9 percent of the state total.

Understanding visitor travel trends is important in being able to predict future travel demands for transportation in Florida. Visitor travel has different temporal and geographic distributions. It is a relevant discussion when considering how to fund transportation infrastructure and service investments and has implications on safety, traveler security, signage, and other aspects of how transportation facilities are designed and operated. Understanding visitor travel trends is also important in considering the potential tradeoff between the benefits of tourism in terms of economic development and the costs of driving by visitors in terms of congestion, emissions, and traffic crashes. These costs are highly correlated with how much the visitors drive on Florida highways.

The paper is also motivated by a desire to put seemingly large numbers of visitors in perspective. The estimated annual number of visits by non-state residents increased from 29.9 million in 1984 to 52.7 million in 1998. This is an increase of about 76 percent during this 15-year period. Such high volume and high growth of visitors are often cited when transportation problems in Florida are the topic. Based on the face value of such statistics, one may quickly conclude that visitors must play a large role in the state's transportation problems. After all, the state's population was no more than 15 million in 1998 and its increase since 1984 is about half as fast as its visitors (from 10.9 million to 14.9 million).

A literature search does not uncover any previous work on the issue addressed in this paper. Much of the literature focuses on the coordination of transportation planning and tourism development. A recent example of this body of literature is the National Cooperative Highway Research Program Report 419: *Tourism Travel and Transportation System Development*.

The rest of this paper is divided into four sections. The next two sections detail the methodology and data sources for the estimations. The section after them shows the estimated annual amount of vehicle miles of travel by Florida's visitors and discusses the trend. The last section discusses future research. The appendix shows the input data used in the estimations.

Methodology

The estimations are done separately for three types of visitors: visitors who come by air from Canada or other US states (domestic air visitors), those who come by car from Canada or other US states (domestic auto visitors), and other visitors (foreign visitors).

Domestic Air Visitors

For domestic air visitors, their driving is largely done at their destinations in Florida. To estimate their destination driving, we use data on four of their characteristics and on an estimate of their total numbers. The characteristics include the length of stay at major destinations, party size, the share traveling around destinations by car, and the average amount of daily driving per party. For ease of reference, we use N to represent the estimated number of domestic air visitors and use L, S, C, and D to represent the four characteristics. For ease of reference, these five parameters are defined in Table 1.

TABLE 1: Parameter Definitions

Parameter	Definition
C	Share of visitors who travel by car at destinations
D	Destination driving per party per day in miles
L	Length of stay in nights
N	Total number of visitors
S	Number of visitors per party

The estimation for any given year is done in five steps:

To start, we estimate the number of these visitors who travel by car at their destinations, which is given by $C \cdot N$. Next we estimate the number of traveling parties among these visitors who travel by car around their destinations, given by $(C \cdot N) / S$. This number also represents the number of cars these air visitors drive while they are in Florida. We then estimate the average amount of driving each of the cars does while it is in Florida. This is given by $L \cdot D$. Putting these different pieces together gives us the annual amount of driving by air visitors at their Florida destinations: $(L \cdot D) \cdot [(C \cdot N) / S]$.

Domestic Auto Visitors

For domestic auto visitors, their driving on Florida highways consists of two components. One component is also driving to places near their final destinations. The same procedure as that for those who come by air is used for this component. The two procedures differ in the share of visitors who travel by car at their destinations. For domestic auto visitors, all visitors are assumed to travel by car at their destinations, i.e., $C = 1$.

The other component of driving by those who come by car is driving done on their way from the north Florida border to their destinations and back. This component is the product of the total number of these visitors by the average distance between their destinations and the north Florida border. This average distance may change from year to year because of changes in destinations chosen by these visitors.

Foreign Visitors

The same methodology for domestic air visitors is applied to foreign visitors. The underlying assumption is that foreign visitors to Florida typically both arrive and leave the state by air. Just as in the case for domestic air visitors, some of them may drive to their destinations in other states. As a result, the methodology may slightly underestimate the amount of driving by foreign visitors.

Comparison to State Total Travel

Once annual driving by each of these three groups is estimated, the total is then compared with the total amount of driving in the state. The total amount of driving in the state reflects all vehicle travel in the states on public roads, including those by visitors, residents, and freight travel. While it may be a better comparison to the total amount of passenger driving in the state, data are unavailable for separating passenger and freight travel over the period from 1984 to 1998.

Data Sources

Data for L, S, C, and N

For domestic visitors, data on *L*, *S*, *C*, and *N* are from the annual *Florida Visitor Study*. This document compiles data on the characteristics of Florida's domestic visitors and estimates aggregate visitor statistics in Florida. Before 1997, it is based on an annual survey of these visitors that involves person-to-person interviews of these visitors as they are completing their stay and leaving the state. The Tourism Division of the Florida Department of Commerce published it before 1996 and by the Florida Tourism Industry Marketing Corporation (FTIMC) since then. The same survey methodology has been consistently used throughout. The same methodology has also been in use since 1984 for estimating aggregate statistics on Florida's tourism industry.

For foreign visitors, data on *L* and *S* are available from annual *Profile of Overseas Travelers to the US* by the tourism division of the US International Trade Administration. This document is based on the monthly *Survey of International Travelers* to the United States. Unfortunately, data from earlier years are not immediately available for this document. As a result, data from 1998 will be used for the entire estimation period. While the same survey asks questions on what modes are used while visiting the US, multiple modes may be chosen in answering these questions. As a result, the resulting data are unusable for this purpose. Instead, we assume that the same portion of foreign visitors travel at their destinations in Florida by car as domestic air visitors.

For foreign visitors, data on *N* are available from the annual *Overseas Visitors to Select US States and Territories*. This document is based on a joint program between the tourism division of the US International Trade Administration and the US Immigration and Naturalization Service. The data are derived from the INS I-94 form that all U.S. non-citizens must complete to enter the United States. The basis of the derivation is the first intended address by these visitors. Because these visitors may visit more than one state, a direct estimate from the INS I-94 form will understate the total number of international travelers that visited any given state. The numbers in the above mentioned document account for this, using the monthly survey of international travelers. More details about these are available at the following Internet address: http://tinet.ita.doc.gov.

For the years after 1994, the data on the number of foreign visitors to Florida come from the above-mentioned document. For the period before 1995, data on the annual number of foreign visitors from the *Florida Visitor Study* are adjusted to reflect differences between these series. The series in the *Florida Visitor Study* shows the direct count from the INS I-94 form and underestimates the total number of foreign visitors to Florida. The numbers before 1995 are adjusted up by a factor that is the ratio of the 1995 number from *Overseas Visitors to Select US States and Territories* to the 1995 number from the *Florida Visitor Study*.

Because of the different sources of data for the total number of domestic visitors and foreign visitors, the definition of a visitor differs slightly between domestic and foreign visitors. Domestic visitors are persons who have been in the state for at least one night and no more than 180 nights, while foreign visitors are residents of countries other than US or Canada who have been in the state for at least one night and no more than one year. The estimations for domestic visitors take advantage of an annual survey of domestic visitors, while the estimations for foreign visitors rely on federal data on the number of international travelers to individual states. The percent of foreign visitors who stayed more than 180 nights is likely to be small, however. According to the 1998 *Profile of Overseas Travelers to the US*, the median for the number of nights stayed is 8.0, i.e., 50 percent of foreign visitors to this country stayed less than 8.0 nights. In addition, according to a telephone communication with staff of the Tourism Industries Division of the US International Trade Administration, about 94 percent of foreign visitors stayed less than 36 nights.

Data on D

We do not have data to get a direct estimate of *D* for any of the three visitor types. The annual surveys do not contain any information on how much a party of visitors drove at their destinations. As a result, the estimation relies on assumed values for *D*, the average amount of daily driving by each party. It seems that the average daily driving by Florida resident households provides a good point estimate for *D*. For most domestic visitors, they come to Florida either for social (visiting relatives or friends) or for recreational purposes. While both a typical household and a visitor party would need travel for basic life maintenance activities (shopping, eating), work related driving by a typical household is replaced by extra driving for social and recreational activities.

We estimate average daily driving by Florida resident households with data from the Nationwide Personal Transportation Survey (NPTS) series. The NPTS is a national survey of daily travel of Americans in this country. It has been conducted five times: 1969, 1977, 1983, 1990, and 1995. Using the Table Wizard at http://www-cta.ornl.gov/cgi/npts, the official website for the 1995 NPTS, we get an estimate of about 52.65 daily vehicle miles per Florida household for 1995.

In addition to an estimate of the amount of daily driving by Florida households for a single year, we also need to know how the amount of daily driving by each domestic party may have changed over time. For this, we examine the growth in the daily amount of driving for social and recreational purposes between 1983 and 1995 at the national level. National statistics are used here because data that are specific to Florida are unavailable for 1983. It turns out that the daily amount of per capita driving for social and recreational purposes grew at about 2.52 percent annually from 1983 to 1995 at the national level. Applying this growth rate to our 1995 estimate of *D*, we get a growth pattern for *D* from 1984 through 1998.

We apply the estimate of *D* for domestic visitors to foreign visitors simply because we do not have any other better information.

Data on Average Distance to Destinations

We use two sets of numbers to estimate the average distance between the north Florida border and the chosen destinations of auto visitors. One set of numbers is the distances between the north Florida border and each of the chosen destinations. These distances between city pairs are obtained using the Florida Department of Transportation's online tool at http://www3.dot.state.fl.us/mileage. The city of Jasper is used to represent the Florida border. The largest city in each of the top ten areas is used to represent the area in using the FDOT tool.

The other set of numbers is the distribution of these visitors by their chosen destinations from the annual *Florida Visitor Study*. The top ten destinations for the years from 1984 through 1996 typically accounted for over 90 percent of all visitors who come by car. For the last two years, they accounted for about 67 percent. Much of this drop may be explained by a change in how visitors were asked about their destination choices. For the years from 1984 to 1996, the question on destination choice solicited all destinations a respondent visited in Florida. For 1997 and 1998, however, that question was limited to the main destination of a respondent. As a result, a visitor could list multiple destinations for the years from 1984 to 1996 but only one destination for the last two years. The questions differ between these two periods because the *Florida Visitor Study* relied on an internal annual survey from 1984 to 1996 but used a national survey by D. K. Shifflet and Associates since then.

Using these two sets of numbers, the average distance between the north Florida border and the chosen destinations is estimated for each year. For the period from 1984 to 1996, this estimate of the average distance overstates the true value because some visitors visited more than one destination. To account for this overstatement in the estimated average distances from 1984 to 1996, they are adjusted down by a factor. To calculate this factor, we calculated what percent of all auto visitors chose the top ten destinations for each year. For any given year from 1984 to 1996, this factor is calculated as the ratio of the total percentage in that year to the total percentage in 1998.

Data on State Total VMT

For the annual amount of vehicle miles of travel in the state, the Federal Highway

Administration's *Highway Statistics Summary to 1995* is used from 1984 through 1995 and its annual *Highway Statistics* is used for the other years. This annual amount is estimated through the Highway Performance Monitoring System and includes all vehicle travel on public roads.

Trends

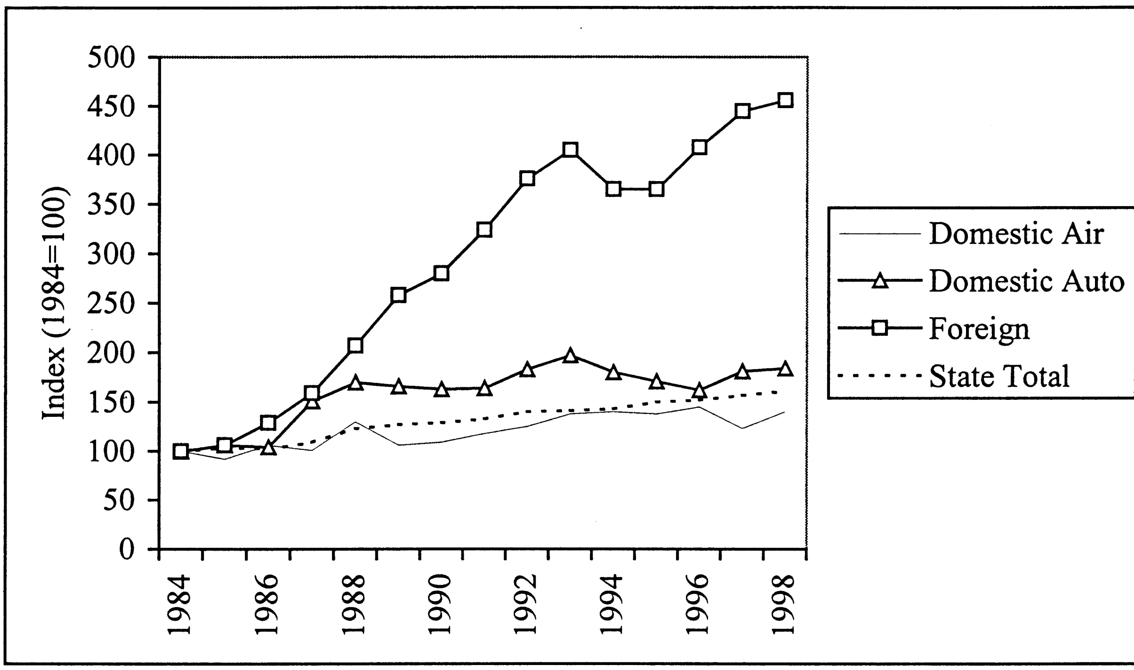
Table 2 summarizes our results on the estimated amount of vehicle miles of travel by Florida's visitors on its highways and how this amount compares to the state's total amount of vehicle driving from 1984 through 1998. The annual vehicle miles of travel by Florida's visitors on its highways increased from 8.0 billion in 1984 to 15.0 billion in 1998. Relative to all vehicle miles of travel in the state, these vehicle miles accounted for about 9.4 percent at the beginning of this period and increased to as much as over 12.7 percent in the early 1990's. Their share has since declined to about 10.9 percent of the state total.

TABLE 2: Estimated Vehicle Miles of Travel by Florida's Visitors and Share of State Total

Year	Vehicle Miles of Travel (millions)				As a Percent of State Total			
	Domestic Air Visitor	Domestic Auto Visitor	Foreign Visitor	All Visitors	Domestic Air Visitor	Domestic Auto Visitor	Foreign Visitor	All Visitors
1984	2,699	4,793	524	8,016	3.2%	5.6%	0.6%	9.4%
1985	2,487	5,068	557	8,112	2.8%	5.8%	0.6%	9.2%
1986	2,853	4,992	675	8,519	3.3%	5.7%	0.8%	9.7%
1987	2,738	7,256	831	10,825	2.9%	7.8%	0.9%	11.7%
1988	3,514	8,134	1,084	12,732	3.3%	7.7%	1.0%	12.1%
1989	2,859	7,938	1,354	12,151	2.6%	7.3%	1.2%	11.2%
1990	2,929	7,830	1,469	12,228	2.7%	7.1%	1.3%	11.1%
1991	3,173	7,851	1,698	12,722	2.8%	6.9%	1.5%	11.2%
1992	3,370	8,761	1,968	14,098	2.8%	7.3%	1.6%	11.8%
1993	3,717	9,421	2,123	15,262	3.1%	7.8%	1.8%	12.7%
1994	3,775	8,635	1,913	14,323	3.1%	7.1%	1.6%	11.7%
1995	3,736	8,206	1,912	13,854	2.9%	6.4%	1.5%	10.8%
1996	3,912	7,753	2,138	13,802	3.0%	6.0%	1.6%	10.6%
1997	3,329	8,669	2,331	14,329	2.5%	6.5%	1.7%	10.7%
1998	3,775	8,841	2,387	15,004	2.7%	6.4%	1.7%	10.9%

Among the three visitor types, the annual amount of driving by foreign visitors has grown the most (Figure 1). For the period from 1984 to 1998, the total amount of driving in the state grew by 61 percent. For the same period, driving by domestic air visitors grew by 40 percent and driving by domestic auto visitors grew by 84 percent. However, driving by foreign visitors grew 356 percent. These differences in relative growth are also reflected in the differences in the share of state total vehicle miles of travel contributed by visitor type shown in Table 2.

FIGURE 1: Growth in VMT: State Total and Visitor Types

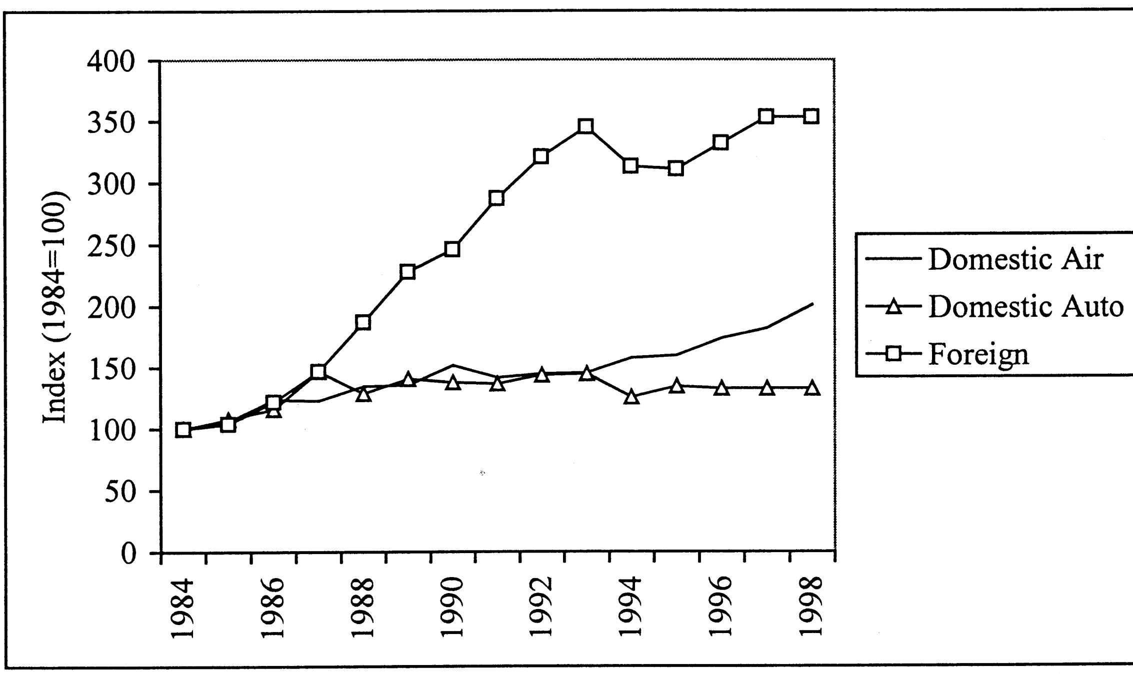


Much of the differential growth trend in vehicle miles of travel between domestic visitors and foreign visitors results from differential growth trends in their numbers. From 1984 to 1998, the number of foreign visitors grew by 253 percent, compared to 33 percent for domestic auto and 101 percent for domestic air visitors (Figure 2).

However, differences in the number of visitors by visitor type do not fully account for the differences in the amount of driving by visitor type. For example, the number of air visitors grew by 101 percent, compared to a growth of only 40 percent in their driving. On the other hand, the number of domestic auto visitors grew by only 33 percent, compared to a growth of 84 percent in their driving. In addition, the number of foreign visitors grew by 253 percent, compared to a growth of 356 percent in their driving.

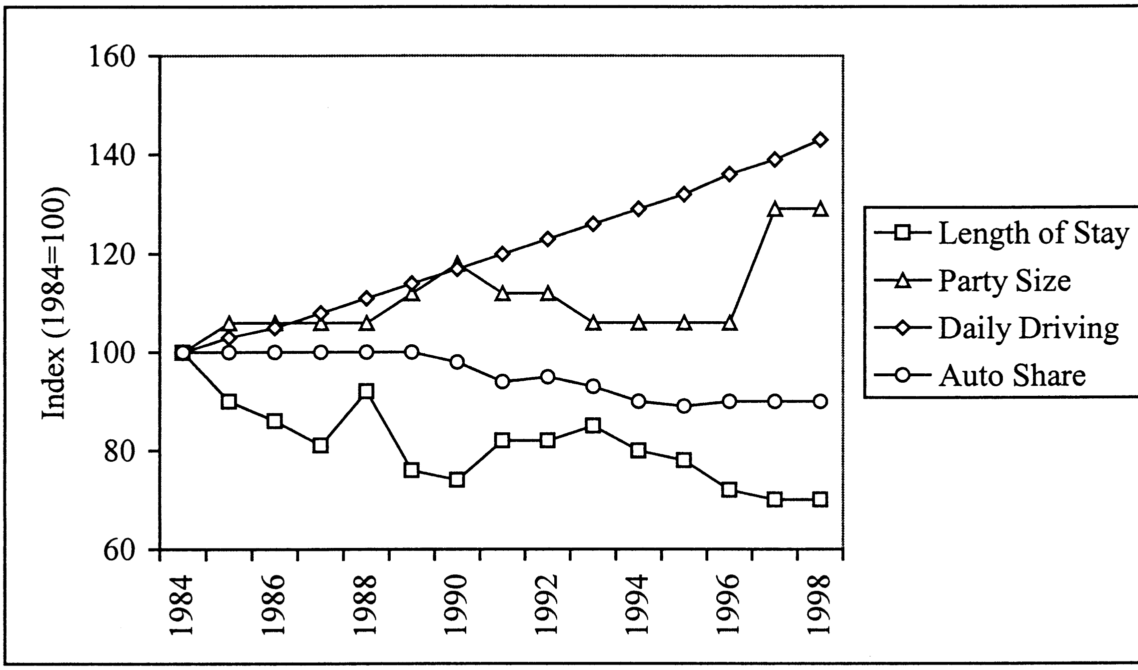
The additional differences in driving by the different visitor types reflect their differences in the other factors that determine how much they drive. These include the length of stay, party size, share traveling by car at their destinations, and the average amount of daily driving per party of visitors. Figures 3 through 5 show the changes in these parameters for domestic air visitors, domestic auto visitors, and foreign visitors, respectively.

FIGURE 2: Growth in Number of Visitors by Visitor Type



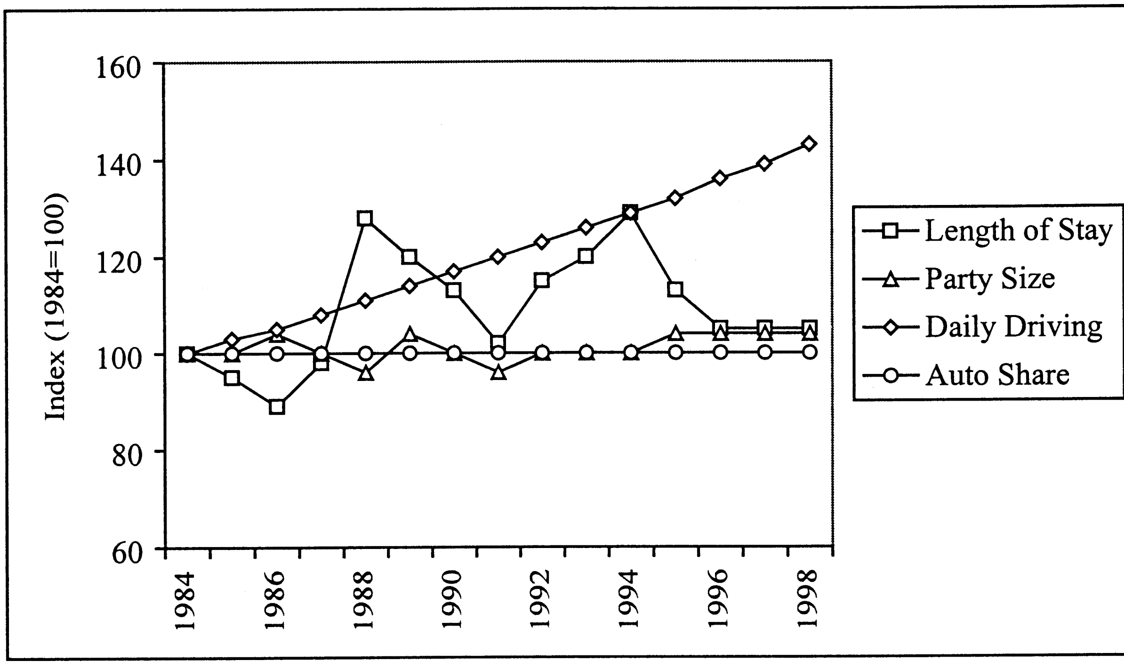
For domestic air visitors, the growth in their driving is slower than that in the number of visitors. The assumed growth in their daily driving reinforces the growth in the number of visitors. However, changes in all other factors contributed to the lower growth in their driving. The length of stays decreased by 30 percent from 1984 to 1998 and the share of domestic air visitors traveling by car at their destinations decreased by about 10 percent. And the number of people per party increased during this period by about 30 percent. If the trends in these parameters continue, we will continue to see slower growth in driving by domestic air visitors than in the number of these visitors.

FIGURE 3: Changes in Determinants of Annual Driving by Domestic Air Visitors



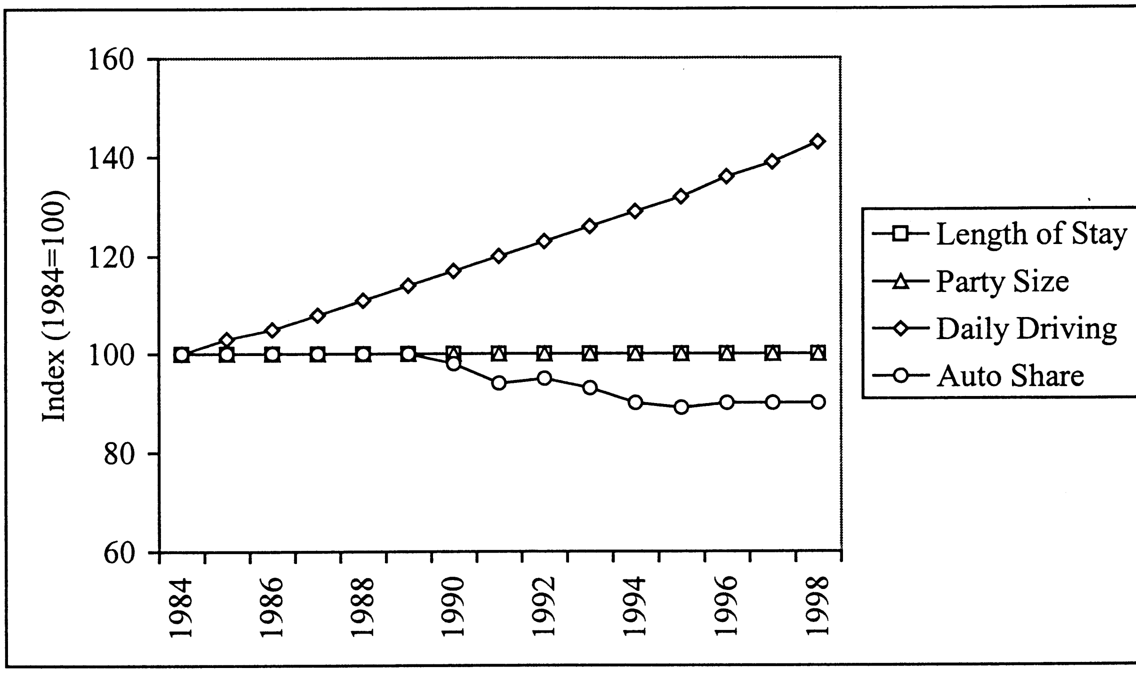
For domestic auto visitors, in contrast to domestic air visitors, the growth in their driving is greater than the number of visitors and the number of people per party slightly increased by about 4 percent. On the positive side, however, not only the assumed growth in daily driving reinforced the growth in the number of visitors, but also the length of stays increased slightly by 5 percent. In addition, all domestic auto visitors are assumed to travel by car at their destinations. If the trends in these parameters continue, we will continue to see higher growth of driving by domestic auto visitors than the number of these visitors.

FIGURE 4: Changes in Determinants of Annual Driving by Domestic Auto Visitors



Driving by foreign visitors has also grown faster than the group itself. Even though their share of traveling by car at their destinations decreased, the assumed growth in daily driving over-compensated for that decrease. In addition, both the length of stays and the number of people per party of visitors remained the same by assumption due to lack of data.

FIGURE 5: Changes in Determinants of Annual Driving by Foreign Visitors



Future Research

The above analysis has focused on trends in driving by visitors who come to Florida by either air or car and on trends in the characteristics of these visitors. As the results suggest, visitors represent a significant share of the demand placed on the current capacity of Florida's transportation system. If the underlying trends continue, travel by visitors will remain a relatively constant share of total statewide vehicle travel.

This analysis does not include travel by visitors who come by modes other than air or car. Visitors are also users of other transportation modes when traveling in Florida and to and from Florida. Visitors comprise a significant share of the cruise ship traffic, meaningful shares of the airline, intercity bus and rail traffic, some share of the pedestrian traffic, and a modest share of the transit, and bike traffic. These travel modes are not reviewed in this discussion.

This analysis does not look at trends in the underlying determinants of the number of visitors to Florida. A number of factors influence the number of visitors to Florida.

These include the strength of the economy, the relative affordability of both auto and air travel, the age profile of the population in the context of the attractions that Florida offers, the range of competing vacation destinations, and other factors.

Subsequent research will explore these trends, where data permit. In addition, subsequent research could compare the potential benefits of tourism in terms of economic development to the state with the potential costs of driving by visitors in terms of added congestion, emissions, and crashes.

APPENDIX

This appendix provides the input data used in the calculations. They are shown separately for domestic air visitors, domestic auto visitors, and foreign visitors.

Domestic Air Visitors

Tables A1 show data on length of stay, party size, auto share at destination, total number of visitors, and assumed daily driving per party for domestic air visitors.

TABLE A1: Inputs for Domestic Air Visitors

Year	Length of Stay (L) (nights)	Party Size (S) (persons)	Travel by car (C) (percent)	Visitors (N) (millions)	Daily driving (D) (miles)
1984	10.6	1.7	80.7	13.49	39.8
1985	9.5	1.8	80.7	14.32	40.8
1986	9.1	1.8	80.7	16.71	41.8
1987	8.6	1.8	80.7	16.54	42.9
1988	9.8	1.8	80.7	18.16	44.0
1989	8.1	1.9	80.7	18.40	45.2
1990	7.8	2.0	79.0	20.51	46.3
1991	8.7	1.9	76.2	19.13	47.5
1992	8.7	1.9	76.9	19.62	48.8
1993	9.0	1.8	75.3	19.73	50.0
1994	8.5	1.8	72.9	21.36	51.3
1995	8.3	1.8	71.5	21.52	52.7
1996	7.6	1.8	73.0	23.51	54.0
1997	7.4	2.2	73.0	24.50	55.3
1998	7.4	2.2	73.0	27.10	56.7

Domestic Auto Visitors

Tables A1 show data on length of stay, party size, auto share at destination, total number of visitors, and assumed daily driving per party for domestic auto visitors. In addition, Table A3 shows the distance between each destination and the north Florida border and Table A4 shows the percent of auto visitors in top ten destinations. More than ten destinations appear in Table A3 because top ten destinations vary across years.

TABLE A2: Inputs for Domestic Auto Visitors

Year	Length of Stay (L) (nights)	Party Size (S) (persons)	Travel by car (C) (percent)	Visitors (N) (millions)	Daily driving (D) (miles)
1984	13.1	2.5	100.0	14.66	39.8
1985	12.5	2.5	100.0	15.80	40.8
1986	11.6	2.6	100.0	17.03	41.8
1987	12.8	2.5	100.0	21.56	42.9
1988	16.8	2.4	100.0	18.99	44.0
1989	15.7	2.6	100.0	20.70	45.2
1990	14.8	2.5	100.0	20.27	46.3
1991	13.4	2.4	100.0	20.15	47.5
1992	15.1	2.5	100.0	21.13	48.8
1993	15.7	2.5	100.0	21.29	50.0
1994	16.9	2.5	100.0	18.52	51.3
1995	14.8	2.6	100.0	19.76	52.7
1996	13.8	2.6	100.0	19.49	54.0
1997	13.8	2.6	100.0	19.49	55.3
1998	13.8	2.6	100.0	19.49	56.7

TABLE A3: Distance between Destinations and North Florida Border

Destination	Miles from Jasper to the Following Cities	
Okaloosa	Ft. Walton Beach	234
Escambia	Pensacola	275
Orange and Oceola	Orlando	180
Broward	Ft. Lauderdale	380
Palm Beach	West Palm Beach	300
Hillsborough	Tampa	195
Pinellas	St. Petersburg	200
Brevard	Melbourne	244
Bay	Panama City	182
Duval	Jacksonville	89
Volusia	Daytona Beach	160
Dade	Miami	402

TABLE A4: Percent of Domestic Auto Visitors in Top Destinations

Destination	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Okaloosa	5.9	6.1	5.2	0.0	0.0	0.0	0.0	0.0	6.1	6.3	6.7	7.1	6.2	5.1	6.4
Escambia	6.1	6.1	5.6	5.8	7.6	7.3	7.1	7.2	0.0	0.0	0.0	0.0	0.0	0.0	5.2
Orange/Oceola	20.6	22.8	26.8	26.8	24.6	21.8	25.6	21.7	21.2	20.8	21.4	22.5	24.3	18.6	20.2
Broward	4.7	5.3	5.0	5.3	5.7	5.5	5.6	5.1	5.6	5.8	5.6	5.3	4.1	3.5	3.0
Palm Beach	0.0	0.0	0.0	0.0	0.0	5.2	4.8	4.8	5.4	5.5	5.1	3.9	4.0	3.3	2.5
Hillsborough	5.3	5.7	5.5	6.4	5.9	6.2	5.9	5.2	5.8	4.7	6.2	4.8	4.5	3.6	5.2
Pinellas	7.6	7.0	12.1	7.4	7.2	7.6	6.4	6.4	7.2	6.7	6.3	4.9	5.1	4.0	3.8
Brevard	6.3	6.2	5.9	6.4	6.5	6.5	5.2	6.0	6.1	6.0	7.1	6.4	6.7	4.3	2.8
Bay	12.0	11.3	11.5	12.2	12.7	12.2	13.1	13.2	13.6	12.8	13.8	14.0	14.1	11.4	6.8
Duval	6.0	6.0	4.7	6.2	6.8	8.1	7.1	6.8	6.0	5.5	6.8	6.9	7.5	5.1	5.9
Volusia	14.6	14.4	13.6	13.0	14.0	13.0	14.6	13.6	13.4	11.6	12.0	13.2	14.1	8.8	5.6
Dade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Total	89.1	90.9	95.9	89.5	91.0	93.4	95.4	90.0	90.4	85.7	91.0	89.0	90.6	67.7	67.4

Foreign Visitors

Table A5 shows the input data for foreign visitors. The length of stays and party size are assumed to be the same from 1984 to 1997 as in 1998. The share of them traveling by car at their destinations is assumed to be the same as domestic air visitors.

TABLE A5: Inputs for Foreign Visitors

Year	Length of Stay (L) (nights)	Party Size (S) (persons)	Travel by car (C) (percent)	Visitors (N) (millions)	Daily driving (D) (miles)
1984	15.4	1.6	80.7	1.72	39.8
1985	15.4	1.6	80.7	1.78	40.8
1986	15.4	1.6	80.7	2.10	41.8
1987	15.4	1.6	80.7	2.53	42.9
1988	15.4	1.6	80.7	3.21	44.0
1989	15.4	1.6	80.7	3.91	45.2
1990	15.4	1.6	79.0	4.22	46.3
1991	15.4	1.6	76.2	4.93	47.5
1992	15.4	1.6	76.9	5.52	48.8
1993	15.4	1.6	75.3	5.93	50.0
1994	15.4	1.6	72.9	5.38	51.3
1995	15.4	1.6	71.5	5.35	52.7
1996	15.4	1.6	73.0	5.71	54.0
1997	15.4	1.6	73.0	6.07	55.3
1998	15.4	1.6	73.0	6.07	56.7

REFERENCES

1. Florida Department of Commerce (various years), *Florida Visitor Study.*

2. Florida Department of Transportation, *Official Highway Mileage*, http://www3.dot.state.fl.us/mileage.

3. Florida Tourism Industry Marketing Corporation (various years), *Florida Visitor Study.*

4. D. K. Shifflet and Associates, *DK&A Directions Travel Intelligence System*, http://www.dksa.com.

5. National Cooperative Highway Research Program (1998), *Tourism Travel and Transportation System Development*, Report 419, Transportation Research Board, Washington, D.C.

6. U.S. Federal Highway Administration, *1995 Nationwide Personal Transportation Survey*, http://www-cta.ornl.gov/cgi/npts.

7. U.S. Federal Highway Administration, *Highway Statistics Summary to 1995*, http://www.fhwa.dot.gov/ohim/summary95/index.html.

8. U.S. Federal Highway Administration (various years), *Highway Statistics*, http://www.fhwa.dot.gov/ohim/ohimstat.htm.

9. US International Trade Administration, 1998 *Profile of Overseas Travelers to the US*, http://tinet.ita.doc.gov.

10. US International Trade Administration, *Survey of International Travelers*, http://tinet.ita.doc.gov.

11. US International Trade Administration (various years), *Overseas Visitors to Select US States and Territories*, http://tinet.ita.doc.gov.

SECTION IV
TRENDS IN VEHICLE MILES OF TRAVEL BY TRUCKS

Introduction

Understanding truck travel trends is important in being able to predict future travel demands for transportation in Florida. Truck travel has different temporal and geographic distributions and some different causal factors driving demand. It is relevant to understanding overall travel demand and when considering how to fund transportation infrastructure. It also has implications on safety and other aspects of how transportation facilities are designed and operated. This paper compares vehicle miles of travel by trucks with vehicle miles of travel (VMT) by all vehicles.

Data on vehicle miles of travel are from Federal Highway Administration's *Highway Statistics* series. Data on US Gross Domestic Product (GDP) and Florida Gross State Product (GSP) are from US Department of Commerce's Bureau of Economic Analysis. Due to the lack of data related to separate estimates for passenger and freight VMT, this comparison is not comprehensive; rather, it focuses on the relative amount of VMT and the share by trucks.

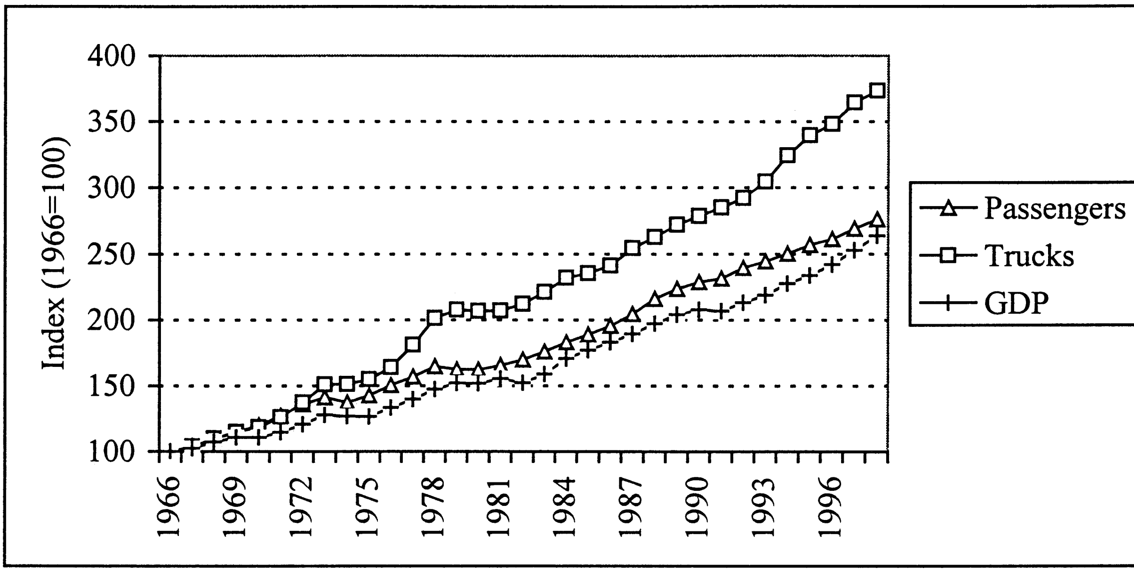
Long-Term Trends

This review looks at the long-term trends in both the amount of truck VMT and its share of total VMT. Florida data on long-term trends are unavailable. National data were used to illustrate these long-term trends from 1966 through 1998.

Amount of Truck VMT

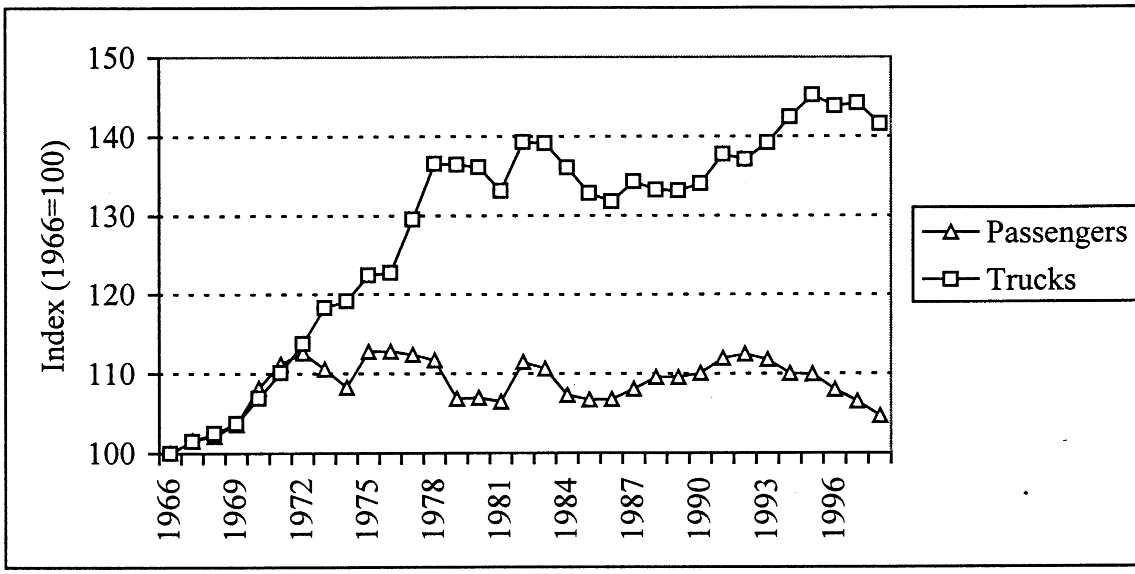
The amount of travel by trucks has been growing at a much higher rate than by passenger motor vehicles. Trucks are defined as combination trucks and single-unit trucks with 2 axles and at least 6 tires that are not pickup trucks. Figure 1 shows the indexed amount of truck VMT nationwide from 1966 to 1998, with 1966 indexed at 100. From 1966 to 1972, the amount of truck VMT grew at a similar rate with the amount of passenger VMT. After 1972, however, truck VMT grew much faster than passenger VMT. By 1998, truck VMT had grown by about 275 percent since 1966, compared to a growth of 175 percent for passenger VMT. Note that both passenger VMT and truck VMT have grown faster than the overall economy as measured by GDP in constant dollars.

FIGURE 1: Amount of VMT by Trucks and Passenger Vehicles in US, 1966-1998



The relative growth patterns of vehicle miles of travel between passenger vehicles and trucks can be seen from another angle. Figure 2 shows growth patterns in the amount of vehicle miles of travel by passenger vehicles and trucks, respectively, per constant dollar of GDP. For the first several years, the amount of vehicle miles of travel per constant dollar of GDP grew at a similar rate between passenger vehicles and trucks. Since early 1970s and until 1995, however, it had grown over 30 percent for trucks but has declined somewhat for passenger vehicles. Since then, it has declined for both passenger vehicles and trucks. Overall during this period from 1966 to 1998, however, the amount of vehicle miles of travel per constant dollar of GDP for trucks increased over 40 percent, compared to no more than 5 percent for passenger vehicles.

FIGURE 2: Amount of VMT per Constant Dollar of GDP in US, 1966-1998

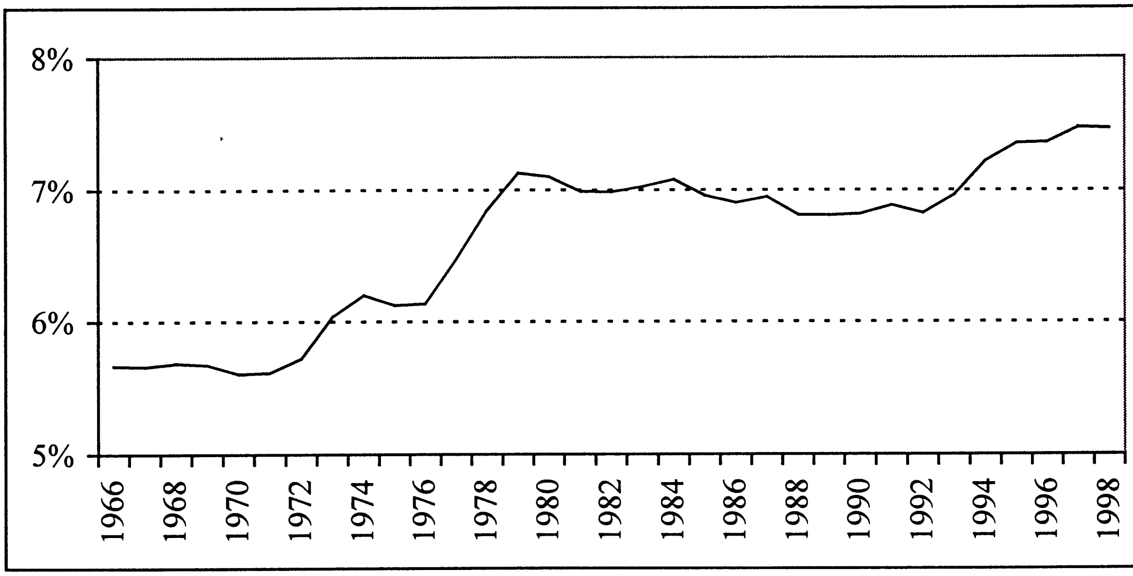


Three factors have likely played a significant role in this relatively larger growth in the amount of vehicle miles of travel per constant dollar of GDP for trucks. First, truck's share of the freight market has increased during this period. Second, trucks have been doing smaller sized shipments at greater frequency. Third, the amount of demand for freight movement per constant dollar of GDP has declined, reflecting the shift from a goods-producing economy to a service-information oriented economy. Overall, the positive effects of the first two effects have overwhelmed the negative effect of the third factor on the growth in the amount of truck miles of travel per constant dollar of GDP.

Share of Truck VMT

This faster growth in truck VMT than passenger VMT is also reflected in an increasingly larger share of total VMT by trucks (Figure 3). The amount of truck VMT represented about 5.66 percent of total VMT in 1966. From 1966 to 1979, truck VMT was growing much faster than passenger VMT. It grew to about 7.1 percent of total VMT by 1979. The amount of truck VMT as a share of total VMT then dropped slightly until 1992 when it represented about 6.8 percent of total VMT. Since 1992, however, the amount of truck VMT has been growing much faster than passenger VMT. By 1998, truck VMT represented about 7.5 percent of total VMT.

FIGURE 3: Truck VMT as a Percent Share of Total VMT in US, 1966-1998



Short-Term Trends

We compare the short-term trends in both the amount of truck VMT and its share of VMT by all vehicles between Florida and the nation. We focus this comparison on functional classifications. For Florida, we have the following categories: interstates, arterials, urban interstates and arterials, rural interstates and arterials, and all interstates and arterials. For the nation, we have: interstates, non-interstates, urban, rural, and all roads. Data are only available for 1994 through 1998.

Amount of Truck VMT

The most significant trend for Florida is how the amount of truck VMT on interstates and arterials has grown differently between urban and rural areas (Figure 4). While, the amount of truck VMT on interstates and arterials has grown about 50 percent in urban areas since 1994, it has grown less than 10 percent in rural areas. In comparison, the national growth in truck VMT on all roads has been similar between urban and rural areas (Figure 5).

FIGURE 4: Amount of Truck VMT by Functional Class, Florida (1994=100)

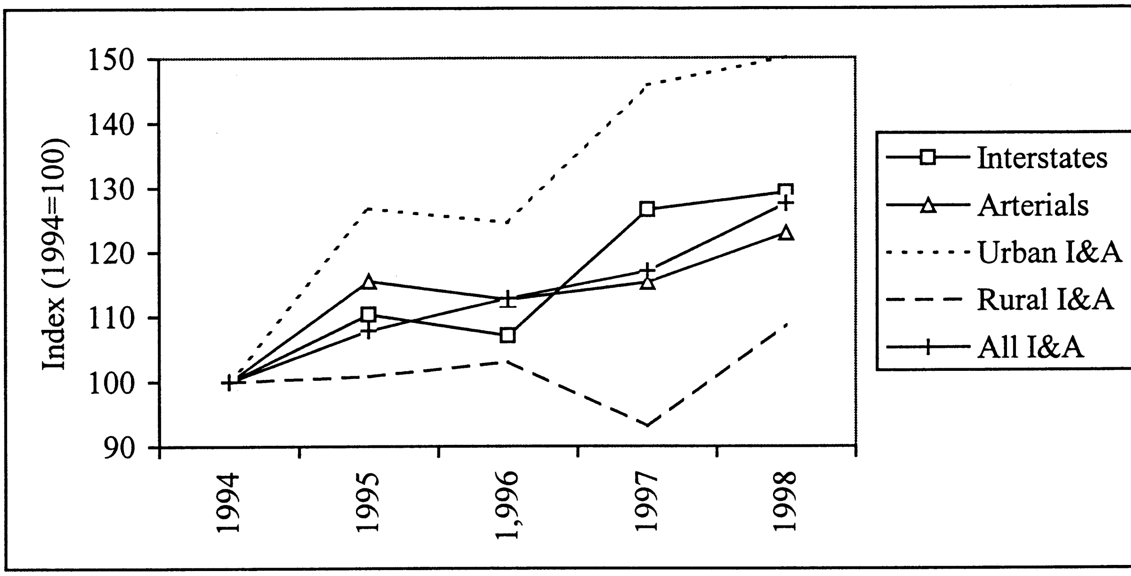
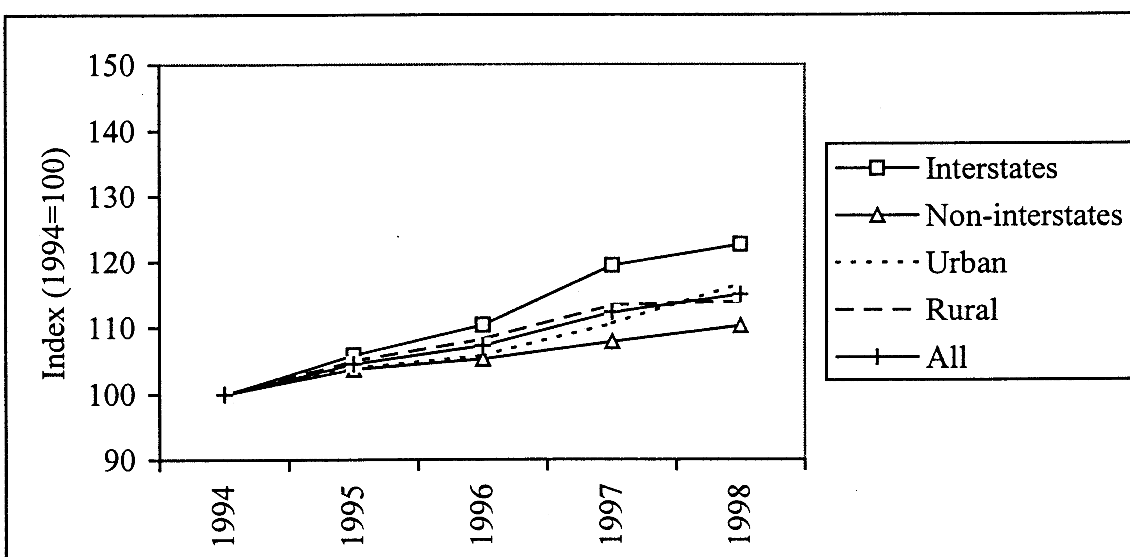


FIGURE 5: Amount of Truck VMT by Functional Class, US (1994=100)



Share of Truck VMT

As expected, trucks account for a much large share of vehicle travel on the interstates and in rural areas than on arterials or in urban areas (Figures 6 and 7). In 1998, for example, truck VMT accounted for 13.20 percent of all vehicle travel on Florida interstates, compared to 6.31 percent on arterials. Similarly, truck VMT accounted for

13.33 percent of all vehicle travel in Florida rural areas, compared to 6.11 percent in Florida urban areas.

The difference in the share of truck VMT between interstates and arterials has changed in a different direction than the difference in the share of truck VMT between rural and urban areas. On one hand, the difference between interstates and arterials appears to be expanding. In fact, the difference increased from 5.97 percentage points in 1994 to 6.89 percentage points in 1998. On the other hand, the difference between rural and urban areas appears to be narrowing, from 9.41 percentage points in 1994 to 7.23 percentage points in 1998. The same pattern holds for the nation as a whole.

The share of truck VMT has increased more on interstates than on arterials and more in urban areas than in rural areas. In fact, the share of truck VMT in Florida on interstates increased by 1.42 percentage points (from 11.78 percent in 1994 to 13.20 percent in 1998) compared to an increase of 0.50 percentage points on arterials. Similarly, the share of truck VMT in Florida in urban areas increased by 1.45 percentage points (from 4.65 percent in 1994 to 6.11 percent in 1998) compared to a decline of 0.73 percentage points in rural areas.

FIGURE 6: Share of Truck VMT by Functional Class, Florida

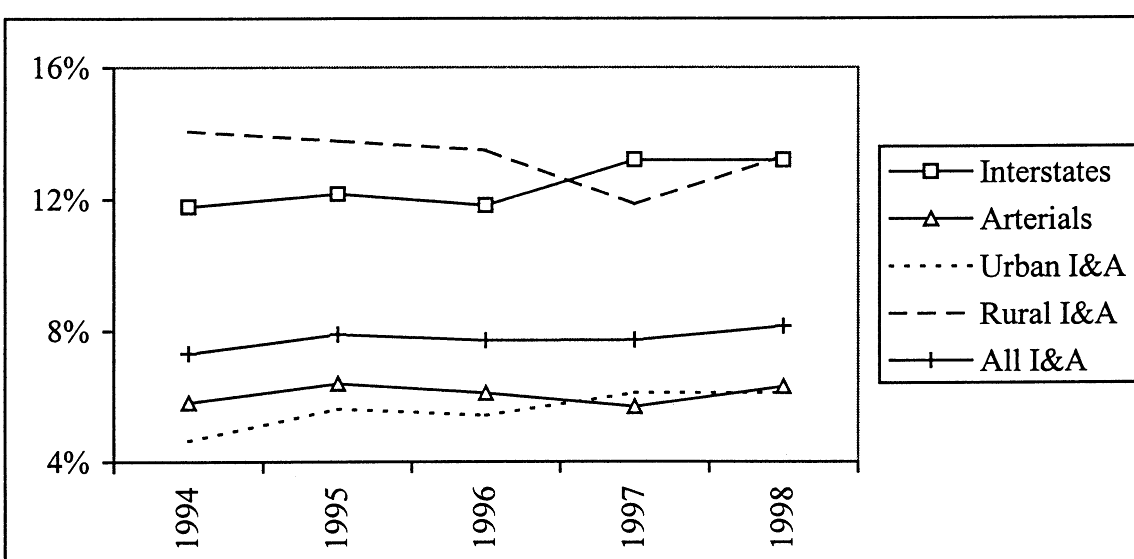
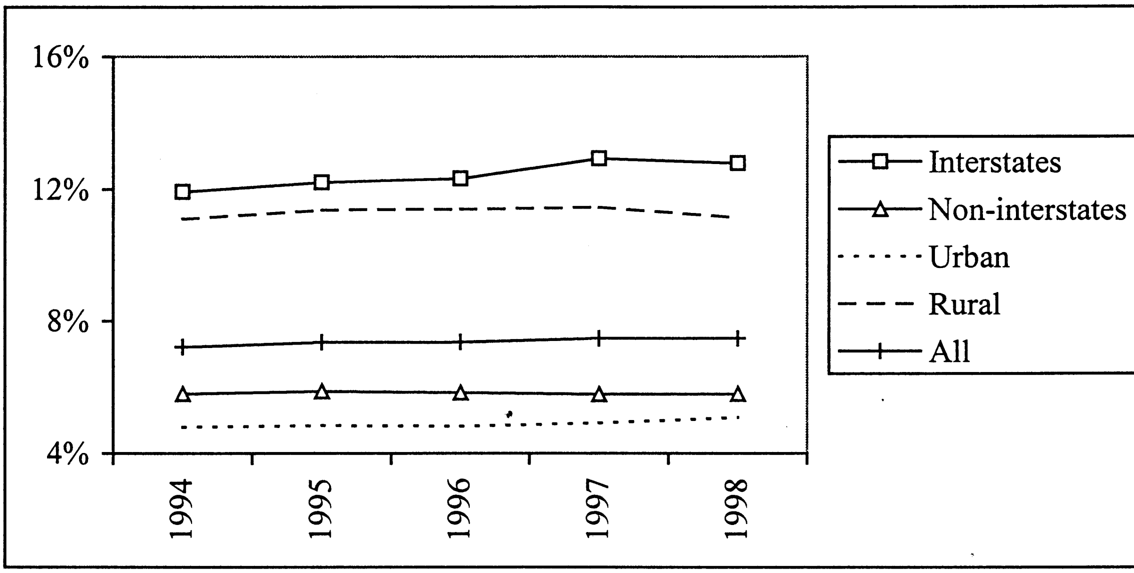


FIGURE 7: Share of Truck VMT by Functional Class, US



While Florida has traditionally had a smaller goods-producing sector of the economy than the country as a whole, this difference does not necessarily explain the differences and similarities between Figures 5 and 6. According to the October-2000 issue of *Survey of Current Business*, the private goods-producing industries (agriculture, forestry, fishing, mining, construction, and manufacturing) accounted for 14.0 percent of Florida's gross state product in 1998, compared to 23.3 percent for all states combined. However, the share of truck VMT on interstates was around 12 percent from 1994 through 1998 for both Florida and the country as a whole.

Implications and Future Analysis

In an era when the contemporary media appears to be focused on the "new economy" and the conventional wisdom is that the economy has shifted from an agricultural and industrial focus to a services and technology economy, one might expect that the significance of freight traffic and truck volumes on our transportation system would be in decline. However, as the data is this section indicate, the prevalence of trucks on the roadway system has increased and comprises a significant share of total roadway volume, particularly in urban areas and on freeway links (some of the most congested and most expensive to improve of our transportation links).

It should also be recognized that truck traffic has significant implications on our transportation network in exaggerated proportion to their share of vehicles. Trucks consume significantly more roadway capacity per vehicle than autos as a result of their physical size and performance characteristics, thus truck's share of the roadway capacity is significantly greater that is represented by the vehicle share numbers. Depending on the physical and operational environment, trucks can consume the equivalent of several normal vehicles worth of roadway capacity. Increased stopping, grades and turns, and the vehicle size and traits influence the impact it has on capacity.

Trucks also influence the rate of deterioration of the roadways. The heavier weight of trucks has dramatically greater impacts on the deterioration of infrastructure under traffic. Truck volumes are also of interest to those involved in safety analysis. Trucks have different performance traits that impact their safety and their physical size influences the consequences when there are accidents.

While not explored in this analysis, clearly part of the growth in truck VMT is attributable to shifts in mode, principally from rail to truck travel. However, the dramatic growth and large share of urban travel comprised of truck traffic is not a market necessarily appropriately served by, or shifted from, rail. The dispersion of activities in our growing urban areas in addition to the change in economic focus has also contributed to the urban truck travel volumes. Contemporary management tactics such as just-in-time-inventory also favor the fast response times typically enabled by more flexible truck traffic for shorter distance hauls.

Looking ahead, understanding the anticipated trends in freight traffic will be important to fully understanding travel demand growth. Additional analysis of longer-range freight volume and delivery forecasts can be investigated if it is deemed appropriate to further explore the changing role of freight traffic in future travel demand analysis. Florida is relatively unique in that it is isolated by geography from being a pass through location for domestic surface truck and rail freight traffic. The vast majority of freight traffic will have origins or destinations within the state, thus, is tied directly to economic activity in the state. However, Florida is increasingly recognized as a major location for international air and shipping commerce. Thus, particularly Caribbean and South American economic and trade activity levels will influence the truck and rail volumes in Florida.

REFERENCES

1. Federal Highway Administration (various years), *Highway Statistics*, http://www.fhwa.dot.gov/ohim/ohimstat.htm, U.S. Department of Transportation, Washington, D.C.

2. Bureau of Economic Analysis (various years), *Survey of Current Business*, http://www.bea.doc.gov, U.S. Department of Commerce.

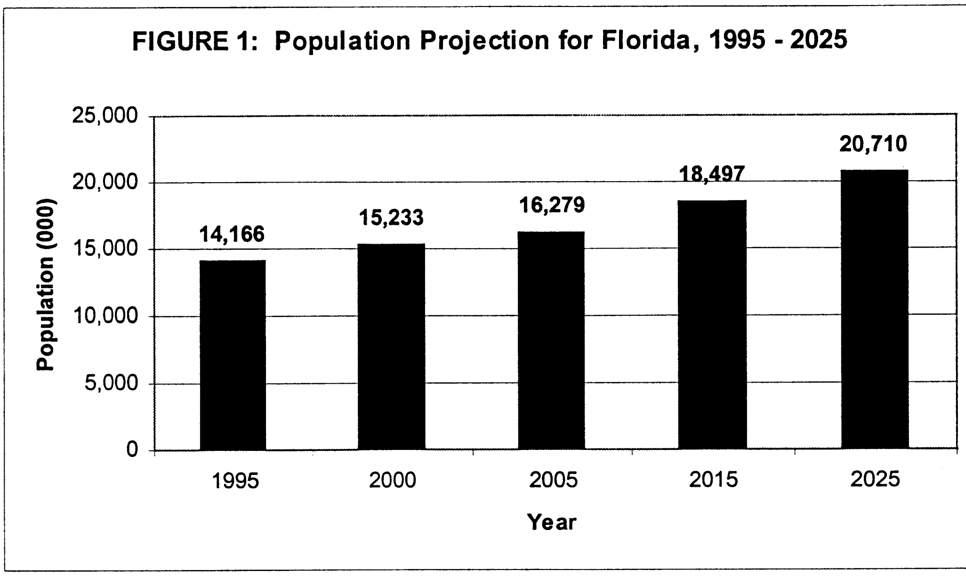
SECTION V
FLORIDA'S TRANSPORTATION SYSTEM

Introduction

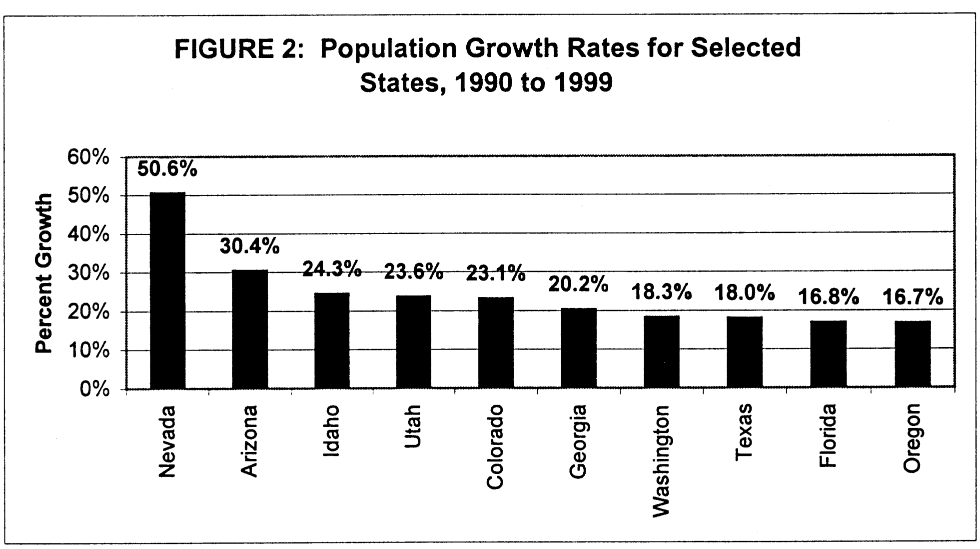
Unparalleled population and economic growth, increased numbers of vehicles and drivers as well as a host of social trends such as increased participation of women in the workforce, rising household income (and the implications this has for increased availability of multiple personal vehicles per household), increased tourism, and growing auto ownership and licensure rates have created burgeoning levels of transportation demand. This growth has precluded reliance solely on traditional transportation system capacity increases and necessitated a shift to efficiency enhancements and demand management. As a result of this shift, more emphasis is now being placed on maintaining, improving, and modernizing the existing transportation system in Florida.

Among the factors responsible for this growth in demand has been the substantial growth in Florida's overall population. According to population projections by the US Census Bureau (USCB), Florida's population is expected to increase to about 21 million persons by the year 2025[1], as shown in Figure 1. According to data from the same source, Florida's population swelled from about 12.9 million to 15.1 million persons between 1990 and 1999; a growth rate of 16.8 percent, as shown in Figure 2. According to the USCB only eight other states exceeded Florida's rate of population growth during this same time period. The USCB also points out that Florida's rate of net domestic migration led the nation with slightly over 1.1 million persons migrating to Florida from other US states, as shown in Figure 3. In addition, Figure 4 shows that Florida ranked fourth in total net international migration behind only the states of California, Texas, and New York in the 1990's, according to the USCB. As these trends indicate, Florida's population growth is likely to continue well into the future thus placing an even greater strain on Florida's transportation system.

[1] U.S. Census Bureau, Population Division, Population Projections Branch.

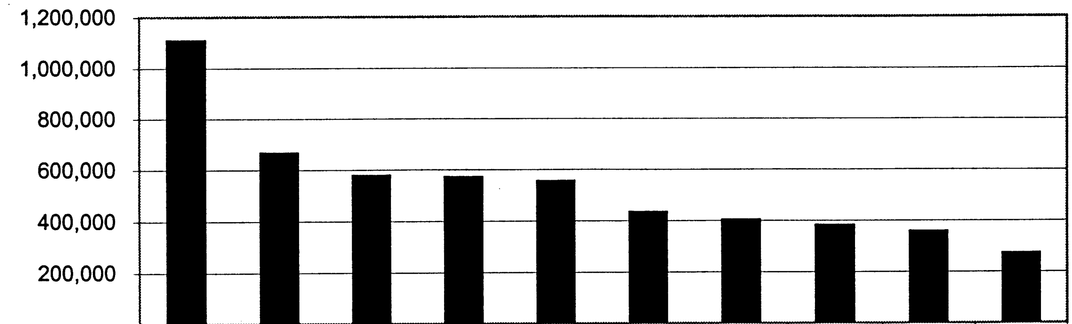


Source: U.S. Census Bureau, Population Division, Population Projections Branch.



Source: U.S. Census Bureau, Population Division, Population Projections Branch.

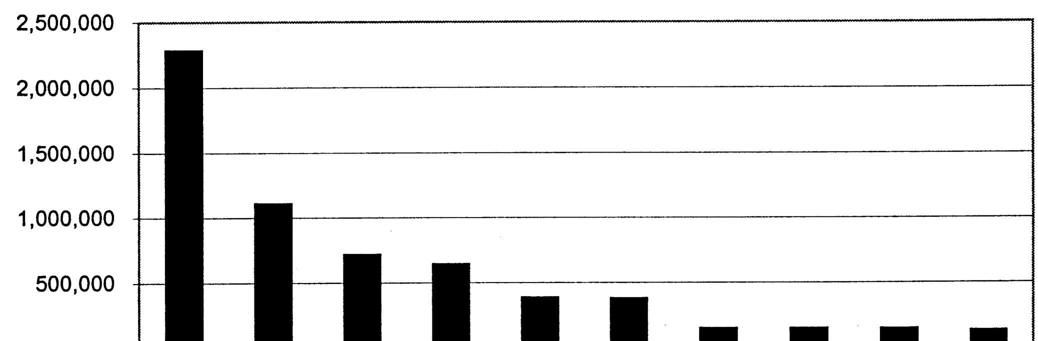
FIGURE 3: Top Ten Net Domestic Migration States, 1990 to 1999



	Florida	Georgia	Arizona	Texas	North Carolina	Nevada	Colorado	Washington	Tennessee	Oregon
Net Domestic Migration	1,108,514	665,418	577,038	569,957	554,268	433,219	402,832	381,552	356,907	270,903

Source: U.S. Census Bureau, Population Division, Population Projections Branch.

FIGURE 4: Top Ten Net International Migration States, 1990 to 1999



	California	New York	Texas	Florida	Illinois	New Jersey	Massachusetts	Washington	Virginia	Maryland
Net International Migration	2,280,354	1,107,814	715,420	640,109	384,026	377,830	147,834	146,830	145,733	131,871

Source: U.S. Census Bureau, Population Division, Population Projections Branch.

This section of the Trends and Conditions Research Support Services Year-One Working Paper contains a host of descriptive information relating various components of Florida's transportation system accompanied by text that points out the important implications for Florida's transportation system. This section is intended to assist in building the transportation knowledge base that can be used to understand current conditions, explore how those conditions might change over the next several years or decades, and examine what the implications might be. The data presented in this section will support a number of tasks in this and subsequent analyses. In addition to supporting subsequent analyses, a modest share of these data will be appropriate for inclusion in the trends and conditions report that will be produced in 2001.

The information contained within is presented in five sections:

- Highways and Usage
- Public Transit
- Airports and Aviation
- Rail and Freight
- Deepwater Seaport

The information in each section ranges from illustrating the trend in lane miles compared to total vehicle miles traveled for urban roadways by federal functional classification to various per capita measures.

The sources of the information used to illustrate the trends and conditions are provided either at the bottom of each graphic and table or sourced as a footnote. Information was obtained from such sources as the *Florida Highway Data Source Book* provided by the Department to multiple years of the Federal Highway Administration's (FHWA) *Highway Statistics* series. Other data sources include *State Highway System Reports* provided by the Department, BEBR from several editions of its *Florida Statistical Abstract*, and the Department's Microsoft Access database that includes information pertaining to the inter- and intra-movement of freight by various modes (rail, for-hire truck, etc.) in Florida. Several parts of this section provide only limited information due to a lack of comprehensive information about particular transportation modes. Every effort is being made to obtain more recent data so that these sections can be improved. For example, the Florida Seaport Transportation and Economic Development Council are in the process of issuing a current report on the status of Florida's deepwater seaports. Once available, relevant data from this report will be included.

Highways And Usage

The general use public highway system in Florida consists of 115,416 centerline miles of roads, streets, and various other types of roads, as shown in Table 1. Of these centerline miles, 11,942 are under the direct responsibility of the Department as part of the State Highway System (SHS). These 11,942 centerline miles of SHS account for slightly over 10 percent of all general use public roads in Florida. Since June 30 1999, a total of only 38 centerline miles have been added to the SHS.[1] The general public roadway system under county and city control accounts for the bulk of all general use public roadways with slightly over 88 percent of all roads in Florida. At present, about 58.5 percent of the SHS lies in areas defined as rural and 41.5 percent lie in areas defined as urban (urban means having a population of at least 5,000 persons).

TABLE 1: Florida Public Road Mileage Summary as of June 30, 1999

Road System	Centerline Miles	Percent Share
State Highway System	11,942	10.3%
County Road System	69,106	59.9%
City Street System	32,721	28.4%
US Fish and Wildlife Service Roads	107	0.1%
National Aeronautical and Space Administration Roads	60	0.1%
USDA Forest Service Trails and Roads	1,206	1.0%
Bureau of Indian Affairs Roads	106	0.1%
National Park Service System Roads	149	0.1%
US Army Corps of Engineers Roads	19	< 0.1%
Total	**115,416**	**100%**

Source: Florida DOT Certification of Public Road Mileage provided to the Federal Highway Administration, June 30, 1999.

The enormous growth in the demand placed on Florida's highway system can be seen by the constant increases in the amount of vehicle travel. Only a modest 6.4 percent of additional centerline miles and 7.9 percent of lane miles have been added to Florida's public use highway system since 1990.[2] During the period of 1990 to 1998, total vehicle

[1] Florida Department of Transportation, State Highway System Mileage Report Summary, June 30, 2000.
[2] Federal Highway Administration. Highway Statistics Series. Centerline miles obtained from Table HM-10 and Lane Miles obtained from Table HM-60.

miles traveled (VMT) increased by 19.5 percent on Florida's general use public highway system; significantly more than either centerline or lane miles.[1] Compared to Florida's population growth between 1990 and 1998, total VMT has steadily increased at a greater rate as people are traveling more often for personal and business-related trips as well as other trip purposes. According to data compiled by the Federal Highway Administration (FHWA) between 1972 and 1995, VMT in Florida has increased by slightly over 300 percent while, by comparison, total annual VMT in the US has increased by about 151 percent.[1]

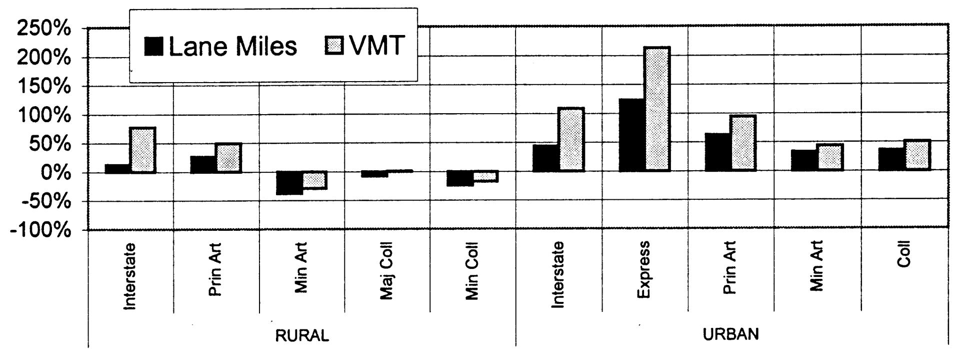
The numbers also point out that the growth in the use of Florida's highway system is not evenly spread across functional roadway classification or mode of travel. Figure 5 shows a comparison of the growth in VMT and lane miles by rural and urban highway functional classification for the years 1984 to 1998. The information in Figure 5 clearly demonstrates that VMT (usage) has outpaced lane miles (capacity) across the entire system for these years. The figure also shows that the most significant growth has occurred on the urban part of the system, where VMT has increased for each classification of roadway during the 15-year period. Additionally, the greatest increases in VMT and lane miles have occurred on both rural and urban higher classification roadways; namely Interstates, Other Freeways and Expressways, and Other Principal Arterials. This finding is of significance since most of these higher functional classification roadways comprise the Florida Intrastate Highway System (FIHS) that are under direct control of the Department (the FIHS is a 4,171 mile system that includes the Interstates, Florida's Turnpike, and other limited and controlled access highways that serve high speed and long distance travel within Florida).

The information in Figure 5 also shows that the rural highway system has been able to better keep pace with the demand being placed on it than its urban counterpart. Specifically, only Interstates and Principal Arterials in rural areas show increases in VMT (77.4 percent and 49.8 percent, respectively) and lane miles (12.6 percent and 27 percent, respectively), while the other three classes of rural highways show decreases for both measures (see Figure 5). By comparison, all of the urban highway classifications show increases in both VMT and lanes miles. However, as pointed out previously, the additional capacity (lane miles) that has been built into Florida's urban

[1] Ibid. Table VM-2.

highway system between the years 1984 to 1998 has not been able to keep up with the demand (VMT) being placed on it, especially the FIHS highways.

FIGURE 5: Comparison of Lane Miles and VMT by Roadway Functional Classification for Florida, 1984 to 1998

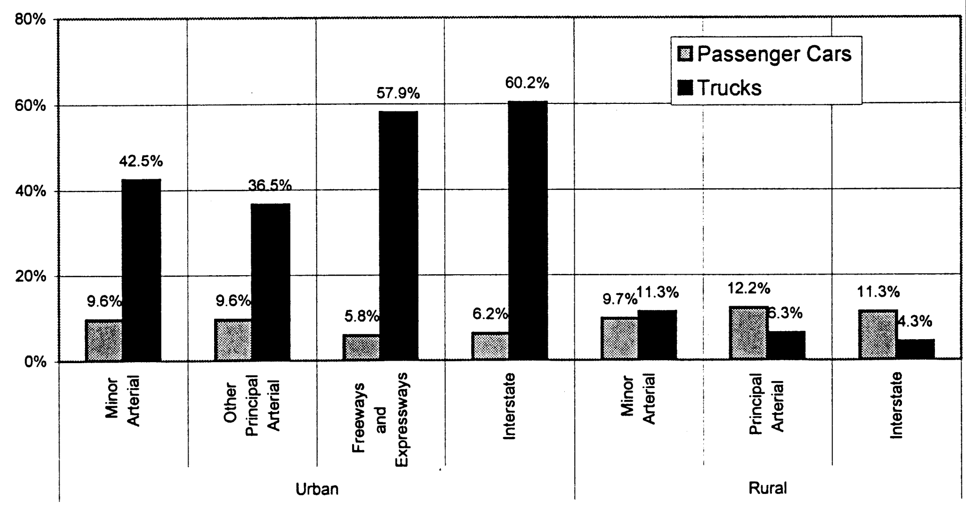


Source: Federal Highway Administration. Highway Statistics Series. VMT obtained from Table VM-2 andLane Miles obtained from Table HM-60.

Figure 6 shows the demand being placed on Florida's highway system by passenger cars and trucks by highway functional classification for the five-year period between 1994 and 1998. The data point out that truck travel has increased more in urban areas while passenger car travel has increased more in rural areas. With respect to highway functional classification, urban Interstates and Other Freeways and Expressways showed the greatest increases in truck travel (truck includes single unit and two-axle six tire or more and combination trucks) suggesting that the movement of freight is increasing on the highest urban highway functional classifications. Additionally, rural Principal Arterials and Interstates showed larger increases in passenger car travel than truck travel.

[1] Ibid. Table VM2.

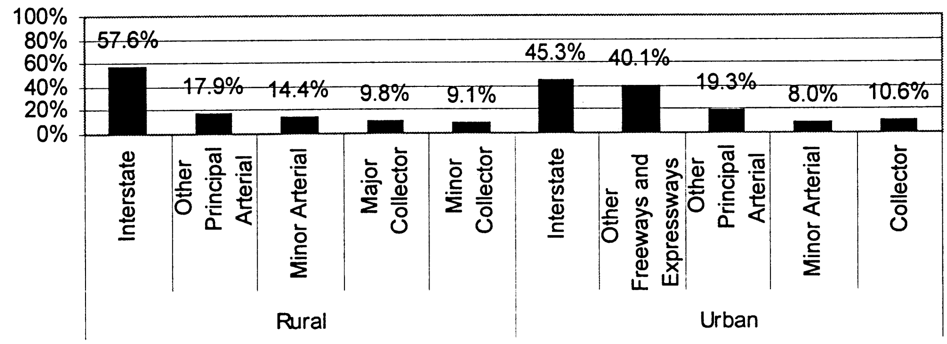
FIGURE 6: Percent Change in Annual Vehicle Miles of Travel by Passenger Cars and Trucks for Florida, 1994 to 1998



Source: Federal Highway Administration. Highway Statistics Series. Table VM-4.

The information presented in this section strongly suggests that capacity on Florida's urban and, to a lesser extent, its rural highway system (especially higher classification highways for both urban and rural) lags behind both current and anticipated future demand. Figure 7 shows the percent changes in VMT per lane mile in Florida for various functional classes of highway since 1984. As the figure shows, the higher classification highways have experienced the greatest increases in VMT per lane between 1984 and 1998.

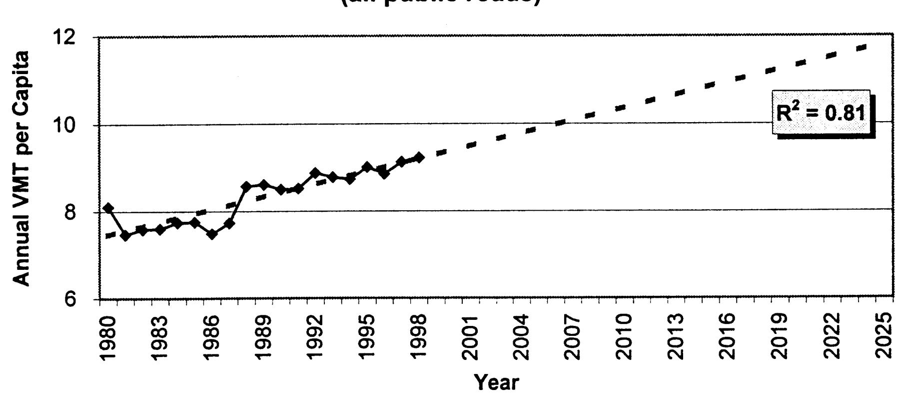
FIGURE 7: Percent Change in Vehicle Miles of Travel per Lane Mile for Florida, 1984 to 1998



Source: Federal Highway Administration. Highway Statistics Series. Table VM-2 and Table HM-60.

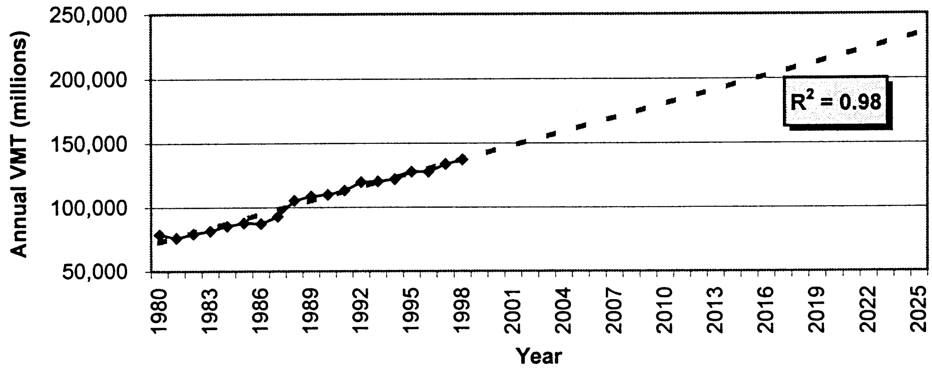
Factors such as increases in population, number of drivers and vehicles, number of trips per household, economic activity, and movement of freight have led to ever increasing demand being placed on Florida's highway system, especially in and around urban areas. The evidence suggests that this trend is likely to continue well into the future. If VMT and VMT per capita continue to increase in Florida at the rates suggested in Figures 8 and 9 and new facilities are not constructed or transportation alternatives provided as part of a linked highway system of multi-modal connections to keep up with the increasing demand, it will become harder and harder to alleviate the growing congestion on Florida's highway system, especially on higher classification highways in both urban and rural areas.

FIGURE 8: Trend in Vehicle Miles Traveled per Capita for Florida (all public roads)



Source: Federal Highway Administration. Highway Statistics Series. Table VM-2. and U.S. Census Bureau, Population Division, Population Projections Branch.

FIGURE 9: Trend in Vehicle Miles of Travel for Florida
(all public roads)



Source: Federal Highway Administration. Highway Statistics Series. Table VM-2.

Public Transit

Over the next 25 years, Florida is likely to grow by more than five million people, according to projections by the USCB[1]. Given the current and anticipated future levels of highway usage and highway availability as a result of Florida's population growth as shown in the prior section, it is highly unlikely that Florida will ever be able to build enough highways to accommodate the expected growth. Among the alternatives, Florida will need to focus on an expanded and more effective public transit network to make its overall transportation system work more efficiently. Accommodating an additional five million people by the year 2025 will take all of the resources that Florida can muster, particularly related to its overall transportation system.

All of the ridership data reported within relate to passenger trips taken and not to persons because that is how transit data are collected and reported. The heavy use of passes, transfers, and cash by riders transferring from one vehicle to another, one mode to another, and from one public transportation agency to another makes it impossible to accurately count persons. Only boardings (called unlinked passenger trips) can be counted with any accuracy. Even at the very largest public transportation agencies, the number of boardings may be estimated for at least a portion of the ridership.

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[1] U.S. Census Bureau, Population Division, Population Projections Branch.

The majority of people using public transportation take two trips per day; one to work in the morning and one home in late afternoon or evening. A small proportion typically make only one public transit trip per day. For example, they may ride public transit to the airport and then fly out of town, or they ride it in the morning to work, but ride home with a friend in an automobile at night. A somewhat larger proportion of persons characterized as being dependent on public transit may take 4, 6, 8, or even 10 or more trips per day.

The data indicate that more and more persons in Florida are choosing public transit as a viable mode of transportation. Since 1984, passenger trips have increased by 45 percent (1999), passenger miles by 54 percent (1998), and service miles by 67 percent (1999), and route miles by 66 percent (1998).[1] Despite the rise in public transit usage as measured by boardings since 1984 in Florida, data from the 1995 Nationwide Personal Transportation Survey (NPTS) shows that its market share or mode split continues to be very small in relation to other forms of transportation, particularly the private automobile. Using data from the 1995 NPTS, Table 2 shows the public transit mode split for the state as well as several of its large urbanized areas for work and non-work trips. The data in the table show that transit's market share in Florida is slightly less than one percent of all person trips in 1995. By comparison, transit's market share in the US was slightly less than two percent all person trips in 1995.[2] According to the most current data from the National Transit Database, public transit accounted only for slightly more than 184 million of all person trips taken in Florida in 1999.[3] The continuing trend toward lower densities and suburban sprawl presents difficulties for traditional fixed-route bus transit services in Florida, which primarily rely on ridership from densely populated areas to support the system.

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[1] Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.
[2] Center for Urban Transportation Research. Public Transit in America: Findings from the 1995 Nationwide Personal Transportation Survey. September 1998.
[3] Florida Department of Transportation, Public Transit Office, Performance Evaluation of Florida's Transit Systems, Various Years.

TABLE 2: Public Transit Mode Split in Florida (1995)

Urbanized Area	Sample Size		Transit Split			Work Trips			
	Households	Person Trips	Peak	Off-peak	All Hours	Peak	Off-peak	All Hours	
Ft Lauderdale	126	1,044	1.87%	2.58%	2.31%	33.06%	13.09%	20.76%	38.42%
Miami	165	1,439	3.62%	2.10%	2.60%	34.19%	12.16%	19.33%	32.57%
Orlando	105	1,000	0.98%	0.72%	0.83%	30.27%	12.39%	19.59%	40.24%
Tampa-St Pete	141	1,341	2.05%	0.47%	1.02%	22.65%	9.46%	14.07%	34.93%
Rest of Florida	592	5,575	0.32%	0.34%	0.33%	24.91%	10.94%	16.06%	36.63%
State	1,129	10,399	1.10%	0.76%	0.88%	26.80%	11.16%	16.86%	36.43%

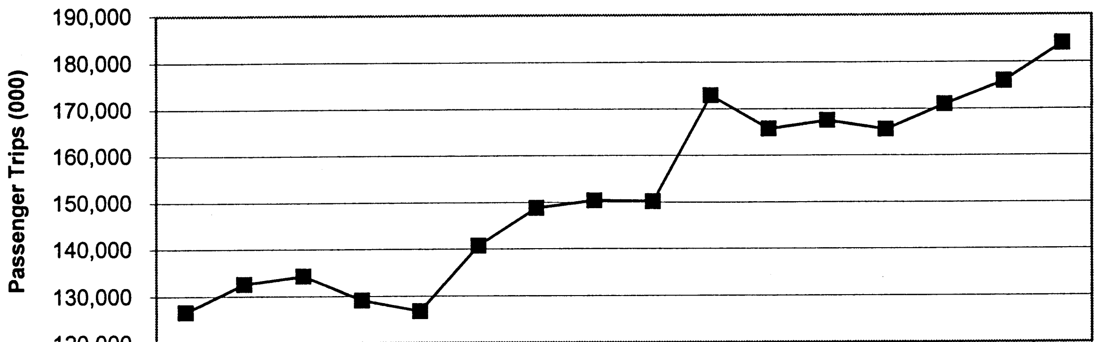
Source: Calculated by CUTR using information from the 1995 Nationwide Personal Transportation Survey (NPTS). Note: The number of person trips by mode (transit vs. non-transit) and by purpose (work and non-work) and by hour of day. Peak hours include: 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM.

Florida is currently served by 20 local and regional fixed-route bus transit systems operating approximately 2,300 vehicles available for maximum service over about 12,700 fixed-route miles, 51 specialized or demand-response systems serving the transportation disadvantaged, one commuter rail and one heavy rail system located in South Florida, and two automated guideway (people mover) systems.[1] In Florida, fixed-route public transit modes include bus, heavy rail, commuter rail, and automated guideway. This type of public transit involves vehicles in revenue service repeatedly following a consistent time schedule over a fixed route. The 51 specialized or demand-response transit systems are characterized by flexible routing and scheduling of vehicles for the provision of point-to-point service at the user's request with less than a 24-hour advanced notice.

Between 1984 and 1999, total fixed-route ridership increased by almost 45 percent from about 127 million to slightly over 184 million total passenger (person) trips; an increase of about 58 million total trips. Figure 10 illustrates the trend for fixed-route passenger trips in Florida starting in 1984. Between the same years, demand-response passenger trips increased by 504 percent from slightly less than 1 million to slightly over 5.1 million passenger trips, as shown in Figure 11.

[1] Ibid.

FIGURE 10: Trend in Public Transit Fixed-Route Ridership for Florida, 1984 to 1999



	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total (000)	126,657	132,592	134,314	129,120	126,755	140,798	148,769	150,395	150,168	172,904	165,684	167,472	165,578	170,968	175,958	184,001

Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.

Coupled with the increases in passenger trips, revenue miles and other measures, Florida's transit fleet has also grown in order to handle the increased demand placed on it by Florida's growth in population. Between 1984 and 1998, Florida's fixed-route transit vehicle fleet grew from 1,686 to slightly over 2,300 vehicles available for maximum service; an increase of 37 percent. As Florida's fixed-route transit fleet has increased in size, it has also aged. Since 1984, Florida's transit fleet has grown in average age from 6.00 years to 6.31 years; an increase of 5.15 percent. Figure 14 shows a comparison of fixed-route fleet size and average age since 1984.

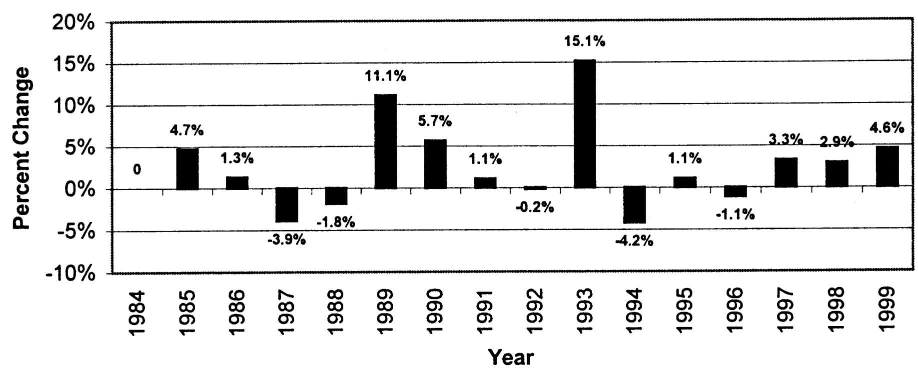
By comparison, Florida's demand-response fleet grew from 224 vehicles to 1,774 vehicles available for maximum service; an increase of 692 percent. Regarding the average age of Florida's demand-response fleet, since 1984 it has actually declined slightly in average age from 3.96 years to 3.92 years; an overall decrease of 1.1 percent. Figure 15 shows a comparison of demand-response fleet size and average age since 1984.

Between 1984 and 1998, VMT in Florida increased by 60[1] percent and the population increased by 35[1] percent. By comparison during this same time period, public transit use in Florida, as measured by total fixed-route passenger (person) trips, increased faster than the growth in population, 45 versus 35 percent, respectively. Despite

[1] Federal Highway Administration. Highway Statistics Series. Table VM-2.

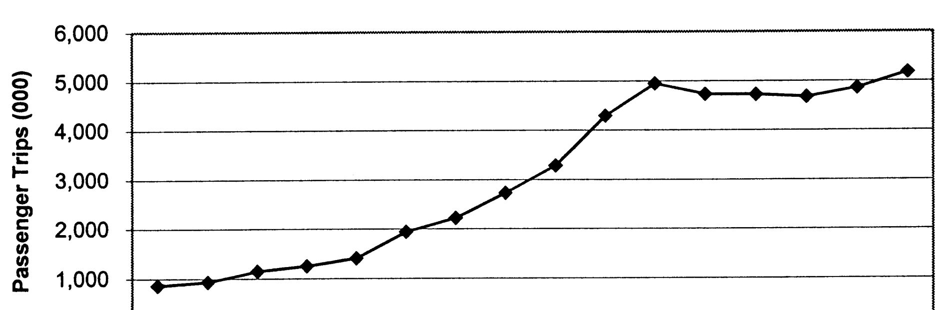
outpacing population since 1984, the share of all person trips on pubic transit in Florida is still in the neighborhood of a scant one percent. Increased use of public transit or use that at least keeps up with or outpaces the annual increases in population growth can help to relieve traffic congestion, particularly within Florida's densely populated urban areas. Investments in additional public transit to increase its overall market share, particularly the bus mode, should be part of effective regional solutions to relieve traffic congestion.

FIGURE 11: Annual Percent Change in Public Transit Fixed-Route Ridership for Florida, 1984 to 1999



Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.

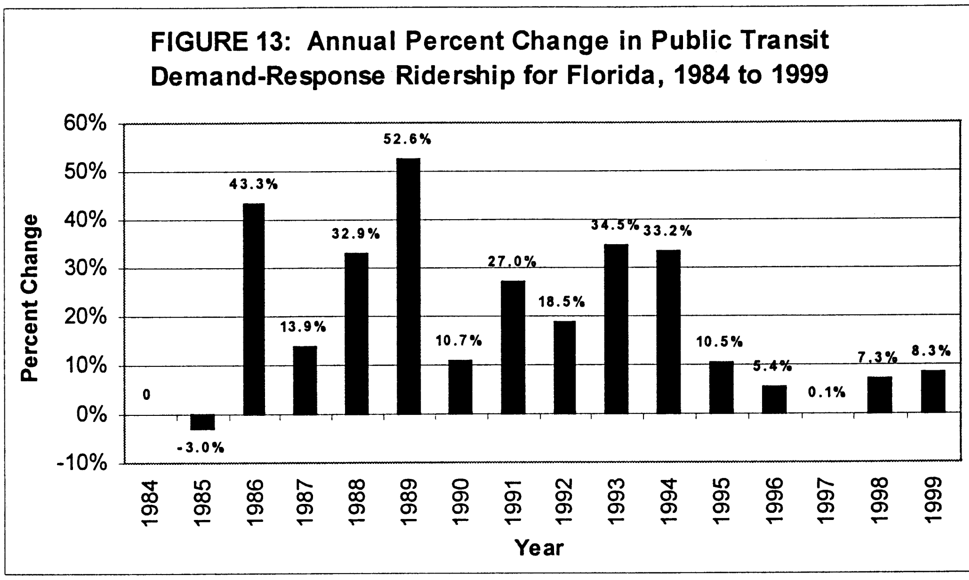
FIGURE 12: Trend in Public Transit Demand-Response Ridership for Florida, 1984 to 1999



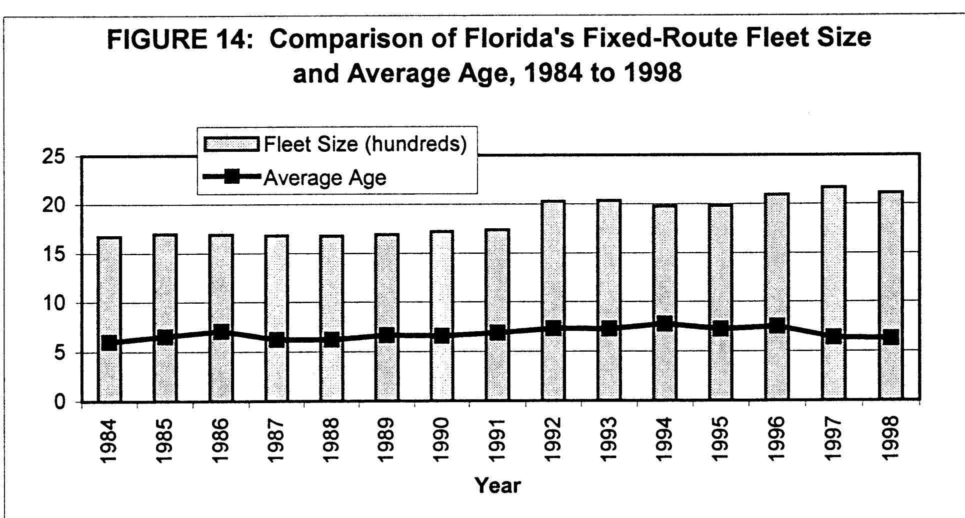
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total (000)	858	934	1,145	1,249	1,404	1,944	2,224	2,728	3,283	4,292	4,943	4,730	4,726	4,677	4,859	5,178

Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.

[1] U.S. Census Bureau, Population Division, Population Projections Branch.

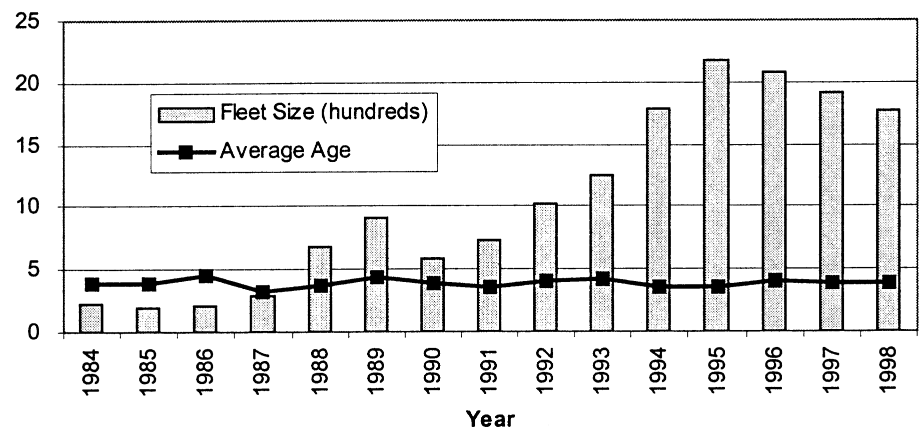


Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.



Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.

FIGURE 15: Comparison of Florida's Demand-Response Fleet Size and Average Age, 1984 to 1998



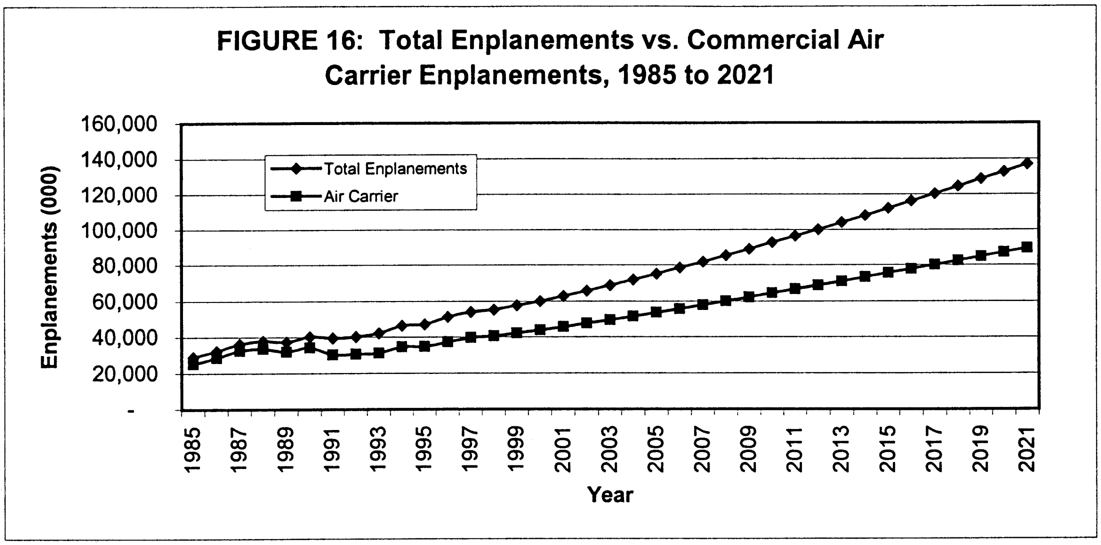
Source: Florida Department of Transportation, Public Transit Office, *Performance Evaluation of Florida's Transit Systems*, Various Years.

Aviation

Air travel is one of Florida's fastest growing modes of both commercial and general aviation (noncommercial). The increasing number of persons that have flown on commercial aircrafts as well as the increases in various air cargo since 1985 have contributed significantly to the growth of Florida's overall aviation system. To illustrate this trend, Figure 16 shows the total number of enplanements compared to commercial air carrier enplanements since 1985. The figure also shows forecasts for each measure out to the year 2021. Statewide, between 1985 and 1997 (last year of historical data), commercial air carrier enplanements have increased just slightly less than 87 percent.[1] Forecasts conducted by the Federal Aviation Administration (FAA) for Florida show that commercial air carrier enplanements are expected to increase by 374 percent between 1985 and 2021 and by 148 percent during the forecasted years of 1998 and 2021.[2] The growth in enplanements relative to operations during the period 1985 to 2021 reflects the baseline commercial air carrier assumptions of higher load factors, larger seating capacity for commercial air carrier aircraft, and longer passenger trip lengths.

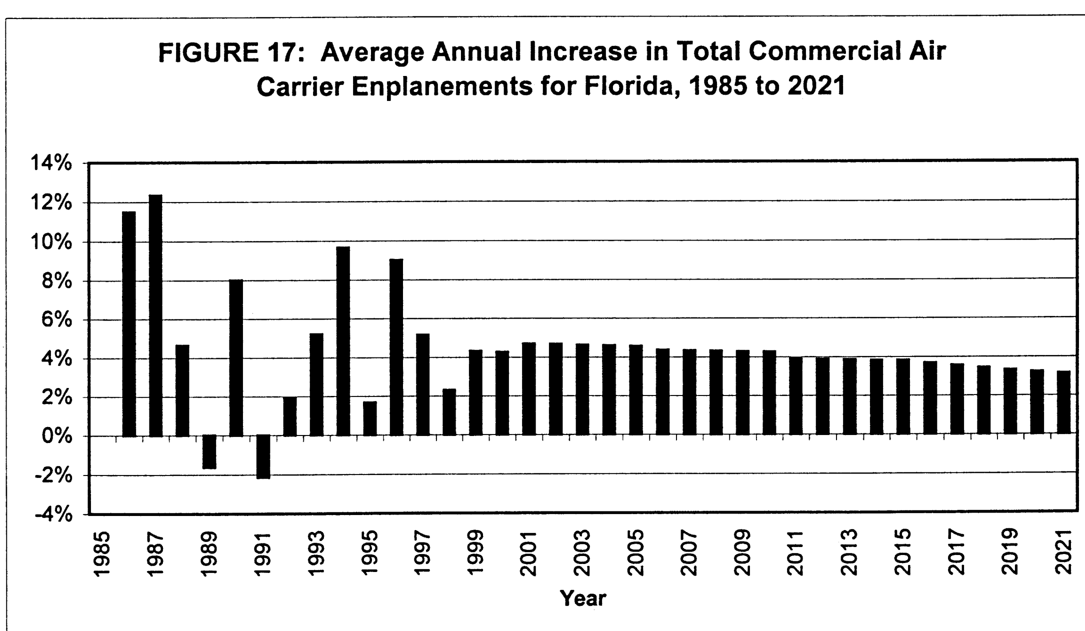
[1] Federal Aviation Administration (FAA) Terminal Area Forecasts (TAF).

[2] Ibid.



Source: Federal Aviation Administration (FAA) Terminal Area Forecasts (TAF).
Note: Forecasts reported as performed by the FAA. Enplanement is defined as the total number of revenue passengers boarding aircraft, including originating, stopover, and transfer passengers in scheduled and nonscheduled services.

Figure 17 shows the average annual increase in commercial air carrier enplanements between 1985 and 2021. Commercial air carrier enplanements are forecast to increase by an annual rate of 4.0 percent between 1998 and 2021.



Source: Federal Aviation Administration (FAA) Terminal Area Forecasts (TAF).
Note: Forecasts reported as performed by the FAA. Enplanement is defined as the total number of revenue passengers boarding aircraft, including originating, stopover, and transfer passengers in scheduled and nonscheduled services.

Statewide, there are a total of 769[1] air facilities, as shown in Table 3. In 1996, there were a total of 472 airports, 248 heliports, 35 seaplane bases, and 14 short takeoff and landing (STOL) facilities.[2] Table 3 also shows a breakdown of the 769 air facilities by public and private ownership as well as the number of lighted/unlighted and paved/unpaved air facilities and Figure 18 shows the trend in the total number air facilities in Florida between 1987 and 1996. As Figure 18 shows, the total number of air facilities in Florida has grown from 609 in 1987 to 769 in 1996; an increase of almost 27 percent.

TABLE 3: Breakdown of Florida Air Facilities by Type and Ownership

Airports	Heliports	STOLports	Seaplane Bases	Total	
472	248	14	35	769	
By Ownership		Paved		Unpaved	
Public	Private	Lighted	Not Lighted	Lighted	Unlighted
163	606	120	213	30	406

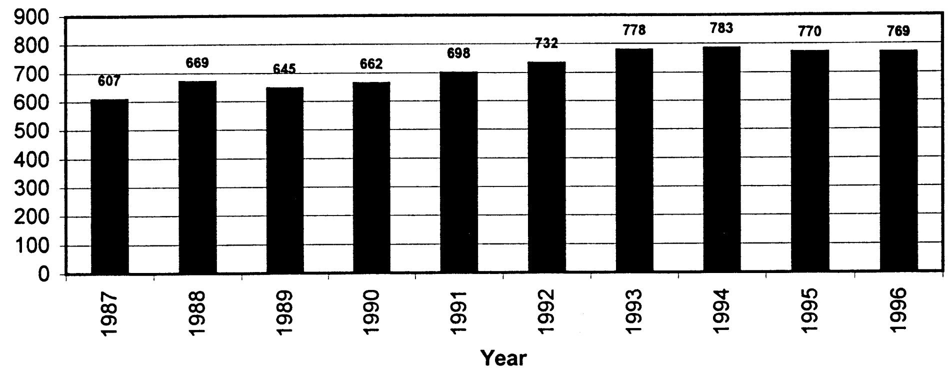
Source: Federal Aviation Administration: 1996. *FAA Statistical Handbook*. Aviation Office. Table 3.2 and 3.3.

According to *The Florida Aviation System Plan* Florida's commercial service and reliever airport system consists of 20 commercial passenger services airports and 23 reliever airports. Reliever airports provide alternatives to the busy commercial airports. An additional 60 public general aviation airports service Florida's business, air cargo, aircraft storage, maintenance, emergency, and other general aviation needs.

Figure 19 shows that just under 65 percent of Florida's total runways are under 3,000 feet in length and 80 percent are under 4,000 feet in length; far too short in length for major commercial and freight traffic. Given the limited capacity of Florida's existing runways and taxiways and the expected increases in overall aviation operational demands, The *Florida Aviation System Plan* calls for $1.3 billion of runway and taxiway improvements to Florida's airports over the next decade.[3] *The Florida Aviation Plan* also calls for four new general aviation airports to be built to relieve crowded commercial airline service airports.

[1] Federal Aviation Administration: 1996. *FAA Statistical Handbook*. Aviation Office. Table 3.2.
[2] Ibid. Table 3.3.
[3] The Florida Aviation System Plan: Statewide Summary 1992 – 2010.

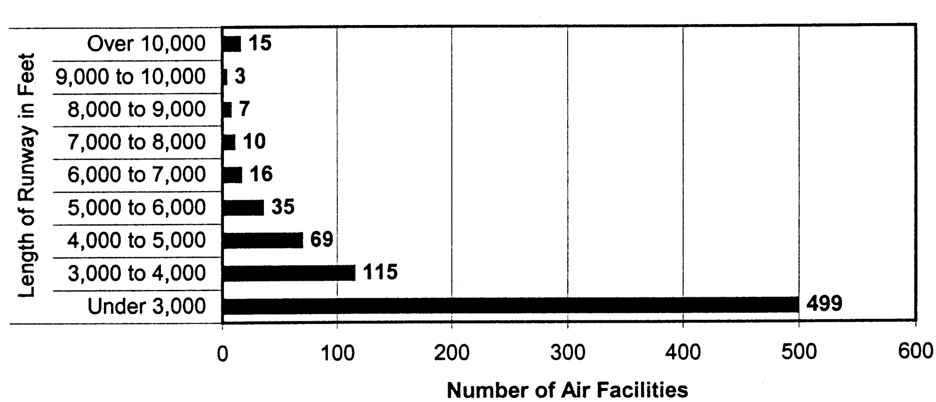
FIGURE 18: U. S. Civil and Joint-Use Florida Air Facilities, 1987 to 1996



Source: Federal Aviation Administration: 1996. *FAA Statistical Handbook.* Aviation Office. Table 3.5.

Figures 20 and 21 show the total number of enplanements and operations by Department district. As the figures show, District Five, which contains the Orlando International Airport (OIA), had the largest percent increases in both enplanements and total operations. For District Five, enplanements are forecasted to increase by 594 percent and operations are forecasted to increase by 119.4 percent by the year 2021.

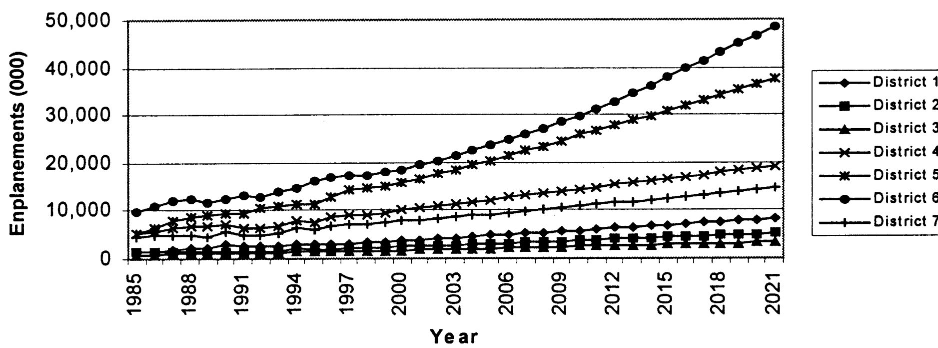
FIGURE 19: Number of Florida Air Facilities by Runway Length



Source: Federal Aviation Administration: 1996. *FAA Statistical Handbook.* Aviation Office. Table 3.4.

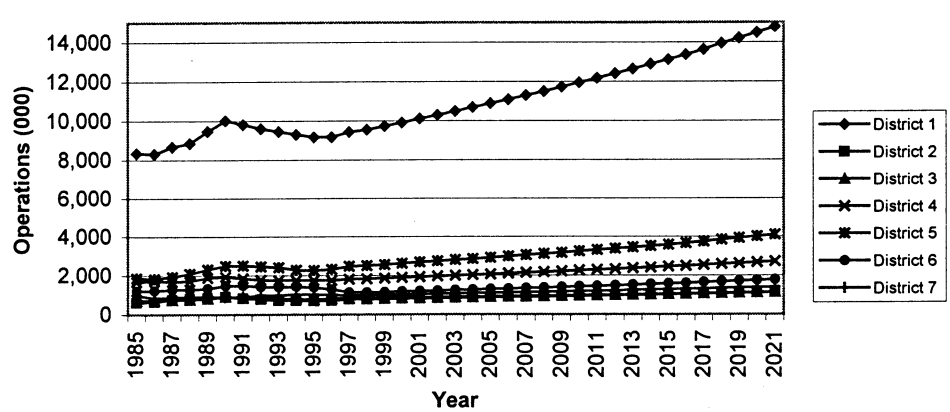
Florida has nine centers of aviation activity with five being designated as aviation "regions" and four as "metropolitan areas." A region is an area containing several communities with common aviation attributes due to either geographic or economic characteristics or both.[1] And, a metropolitan area is a portion of the state with interrelationships between airports and a common base due to contiguous urban development.[2] Figure 22 shows the total number of enplanements by region and contiguous metropolitan area from 1985 forecasted to the year 2021.

FIGURE 20: Total Enplanements by Department District for Florida, 1985 to 2021



Source: Florida Department of Transportation. Aviation Office Non-Official Forecast published November 11, 1999. Last historical year of data is 1997.

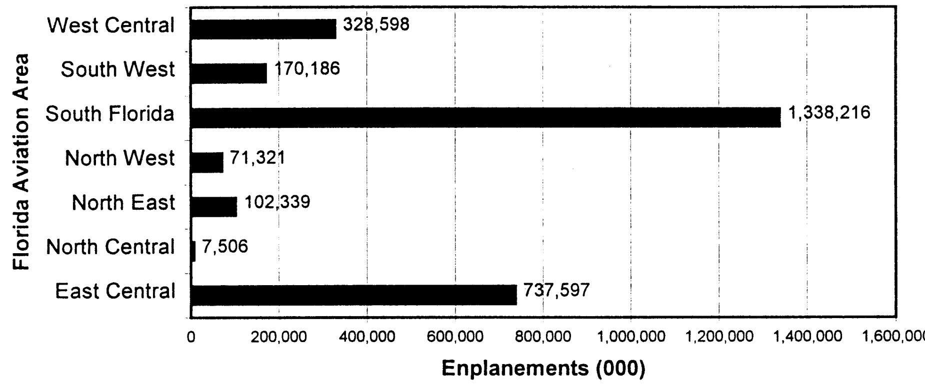
FIGURE 21: Total Operations by Department District for Florida, 1985 to 2021



Source: Florida Department of Transportation. Aviation Office Non-Official Forecast published November 11, 1999. Last historical year of data is 1997.

[1] The Florida Aviation System Plan: Statewide Summary 1992 – 2010.
[2] Ibid.

FIGURE 22: Total Enplanements by Aviation Area for Florida, 1985 to 2021

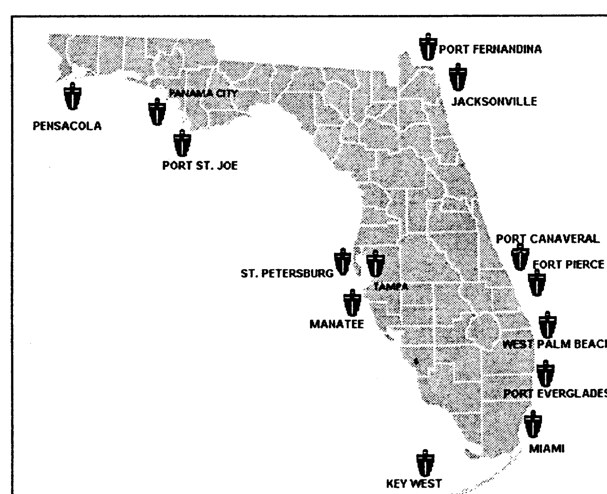


Source: Florida Department of Transportation. Aviation Office Non-Official Forecast published November 11, 1999. Last historical year of data is 1997.

Deepwater Seaports

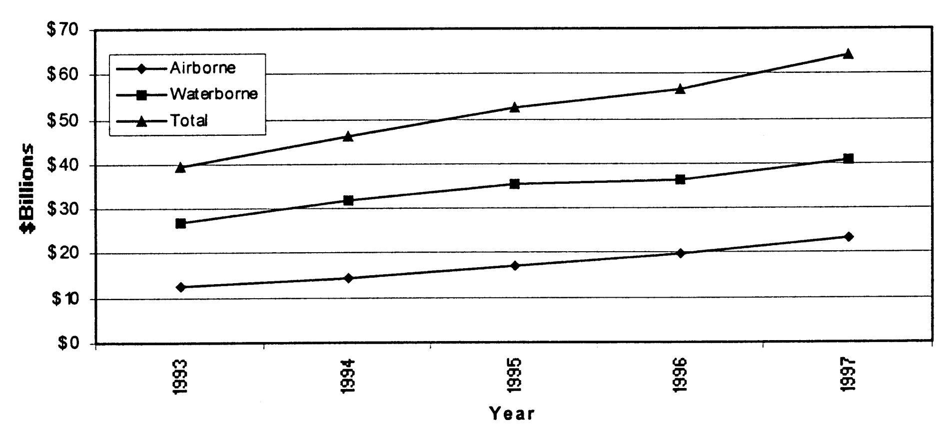
Florida's 14 deepwater seaports have become important transportation hubs for both domestic and international trade as cargo are distributed and received from all over the world to locations throughout Florida. The location of Florida's 14 deepwater seaports is shown in Figure 23. Florida's seaports also play a crucial role in developing and maintaining the shoreside facilities for the intermodal transfer of both domestic and international cargo between ships, barges, trucks, and railroads. Florida's seaports work hand-in-hand with trucking companies, railroads, and airports to offer the most efficient transportation system possible. Florida's seaports also build and maintain cruise terminals for the growing cruise tourism industry.

FIGURE 23: Florida's 14 Deepwater Seaports



As Florida's economy grows, it becomes more and more dependent not only on its extensive highways system but its seaports for the movement of goods. The transfer of goods between land and water carriers at ports is critical to the expansion of trade and, therefore, to Florida's overall economy. A healthy Florida economy demands trade, and growing trade demands the continued development of it seaports. Growth in international (and domestic) international trade will put ever-increasing demands on the Florida's overall transportation system. Between 1990 and 1997, Florida's international trade increased by 110 percent, expanding from $30.6 billion to $64.3 billion with Florida's 14 seaports being responsible for almost two-thirds of Florida's international trade.[1] Figure 24 illustrates the importance of Florida's international waterborne trade.

FIGURE 24: Trends in Florida's International Trade, 1993 to 1997



Source: *A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002.* Florida Seaport Transportation and Economic Development Council. Table C-1.

Seaports provide Florida's consumers access to the global marketplace. Electronics from Asia, coffee from Central and South America, and clothes from Europe all make their way to Florida consumers on cargo ships that arrive at one of Florida's 14 deepwater seaports. Many of the goods are shipped in large metal boxes called containers. These containers are then loaded onto freight trains or trucks for delivery to their final destinations throughout the state.

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[1] A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002. Florida Seaport

Not only are seaports and their cargo ships vital to Florida's economy, but they are also friendly to Florida's environment as well. According to The American Association of Port Authorities (AAPA), one cargo ship loaded with one metric ton of goods sails farther and causes less air pollution on one gallon of fuel than an airplane with the same tonnage, a truck, or train.[1] Moreover, ships and barges have the fewest accidental spills or collisions of all forms of transportation.[2]

Table 4 shows container movement expressed in 20-foot equivalent container units (TEUs) for selected Florida ports from 1995 to 1999. In addition, Figure 25 shows the trend in container movement for all of Florida ports from 1989/1990 to 1996/1997. As Figure 25 shows, the movement of containerized goods showed a dynamic increase of 148 percent from 1989/1990 to 1996/1997.

TABLE 4: Container Movement for Selected Florida Seaports (in TEUs)

Seaport	1995	1996	1997	1998	1999	Percent Change (1995 to 1999)
Jacksonville	529,547	613,448	675,196	753,823	771,882	45.76%
Manatee	16,730	16,088	16,532	16,257	13,368	-20.10%
Miami	656,175	656,798	761,183	813,761	777,821	18.54%
Palm Beach	162,045	174,870	174,080	189,804	192,784	18.97%
Port Everglades	632,789	701,281	719,685	704,390	715,585	13.08%
Tampa	6,020	4,616	2,673	8,013	6,905	14.70%
Fernandina	30,865	32,414	28,754	29,365	33,322	7.96%

Source: American Association of Port Authorities (AAPA) can be found on the Internet *at http://www.aapa-ports.org/portfacts.html*.

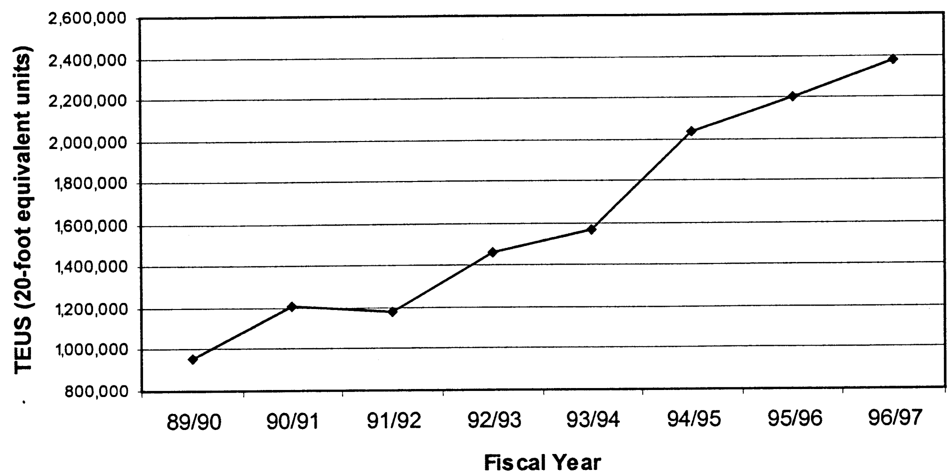
Note: TEUs are 20-foot equivalent container units.

Transportation and Economic Development Council.

[1] American Association of Port Authorities (AAPA) can be found on the Internet at http://www.aapa-ports.org/portfacts.html).

[2] Ibid.

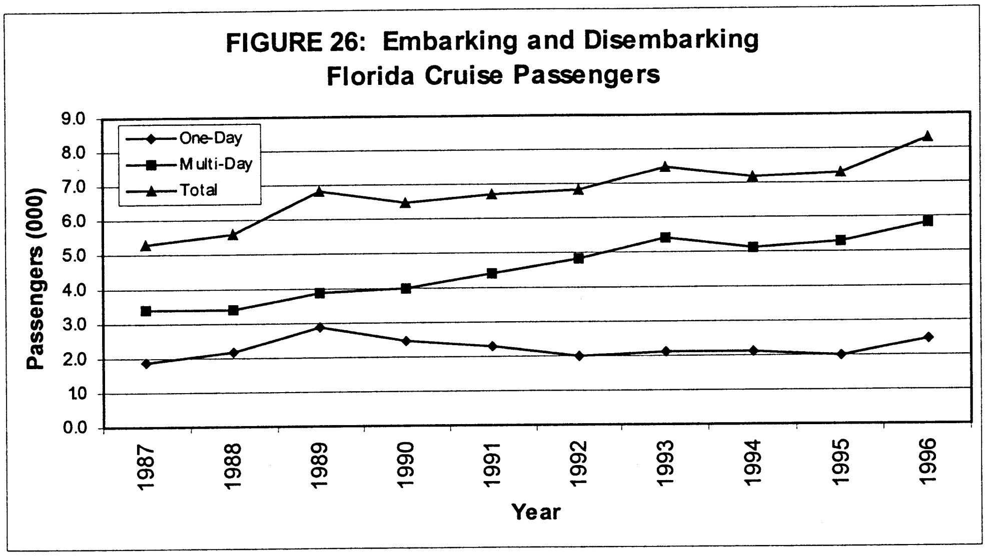
FIGURE 25: Container Movement at Florida's Ports



Source: *A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002.* Florida Seaport Transportation and Economic Development Council. Table C-3.

Florida's deepwater seaports also continue to play a vital role in the sustainability and expansion of Florida's cruise tourist industry via passenger embarkments and disembarkments. Figure 26 shows the trend in Florida cruise passenger embarkments and disembarkments. Between 1987 and 1996, one-day cruise tourism increased by 31.6 percent, multi-day cruise tourism increased by 70.6 percent, and all types of cruise tourism increased by 56.6 percent.[1]

[1] Source: A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002. Florida Seaport Transportation and Economic Development Council. Table C-4.



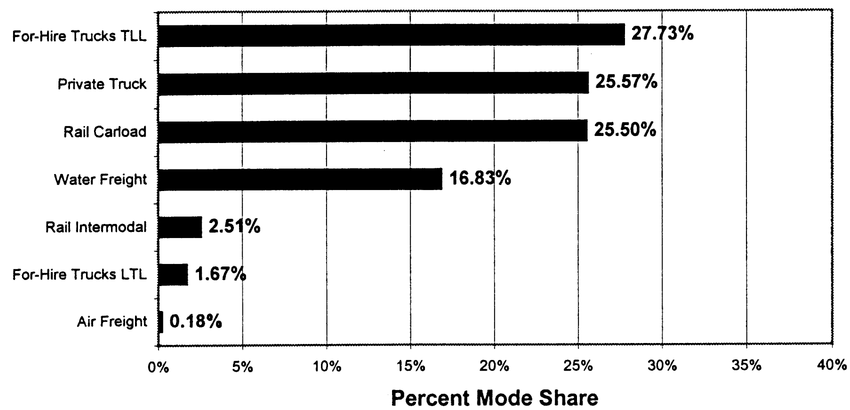
Source: *A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002.* Florida Seaport Transportation and Economic Development Council. Table C-4.

Freight and Passenger Railroads

Freight Railroads

Florida's freight railroads remain a driving force in the Florida economy and a crucial component of its overall transportation system. Like the US rail industry, Florida's rail industry is almost totally privately owned and maintained. In 1998, railroads handled about 28 percent of Florida's total freight movement (as measured in tons), as shown in Figure 27.

FIGURE 27: Mode Share for Total Tonnage of Freight Movement (1998)



Source: Reebie and Associate. Florida Department of Transportation A Five-Year Plan to Accomplish the Mission of Florida's Seaports: 1997/1998 – 2001/2002. Florida Seaport Transportation and Economic Development Council. Table C-4.

The Florida rail system is comprised of 13 line-haul railroads and four terminal or switching companies, as shown in Table 5. The line-haul carriers range in size from small intrastate railroads such as the Florida West Coast to large rail systems extending from Florida into other regions of the US and Canada such as CSX Transportation. As seen in Table 5, these railroads comprise a total 2,887 miles of track.[1] CSX Transportation's (CSXT) 1,619 track miles represent 56.1 percent of the total statewide rail system. The Florida East Coast Railway (FEC), with 386 route miles, is the second largest carrier accounting for 13 percent of the total State rail system (see Table 5).

The State's rail system handles a variety of traffic, but bulk commodities and short-haul movements dominate. Freight railroads move just about everything from lumber to food, from coal to paper, from chemicals to transportation equipment, and nonmetallic ores waste. Table 6 shows the rail freight tonnages originating and terminating in Florida in both 1995 and 1997 by commodity classification. Of the total millions of tons originated or terminated, the majority was intrastate traffic (both originating and terminating within Florida). One commodity group dominates rail movements: nonmetallic minerals. This commodity group accounted for almost 50 percent of total originating and terminating

[1] Miles of track is the aggregate length of track owned, including yard tracks, sidings and spurs, over which railway transportation service is conducted. Parallel lines are counted separately (e.g., one mile of double track is counted as two miles of track, not just one). Miles of track owned differs from miles of track operated in that the latter includes mileage

tonnage in both 1995 and 1997. For 1995, in a distant second place, was chemicals and allied product and, for 1997, coal (12.1 percent) ranked second. In 1998, nonmetallic ores again dominated bulk rail commodities (see Figure 28) and miscellaneous mixed shipments dominated intermodal rail commodities followed closely by food products.

TABLE 5: Florida Freight Railroads 1996 and 1998

Railroad	Miles of Railroad Operated in Florida				Percent of Florida Rail System Owned/Leased	
	Owned/Leased		Trackage Rights			
	1996	1998	1996	1998	1996	1998
Alabama and Gulf Coast	n/a	44	n/a		n/a	1.5
Apalachicola Northern	96	96			3.4	3.3
Bay Line	63	63			2.2	2.2
Burlington Northern	44	n/a	28	n/a	1.6	n/a
CSX Transportation[1]	1,621	1,619	131	131	57.7	56.1
Florida Central	66	66	10	10	2.4	2.3
Florida East Coast	442	386			15.8	13.4
Florida Midland	40	40			1.4	1.4
Florida Northern	27	27			1	0.9
Florida West Coast	14	14			0.5	0.5
Georgia and Florida	48	48			1.7	1.7
Norfolk Southern[2]	96	96	53	53	3.4	3.3
Seminole Gulf	119	119			4.2	4.1
South Central Florida	101	158	22		3.6	5.5
South Florida Rail Corridor[3]	81	81				2.8
Terminal Companies	30	30			1.1	1
Totals	**2,888**	**2,887**	**244**	**244**	**100**	**100**

Source: *1998 Florida Rail System Plan*. Florida Department of Transportation. April 1999. Exhibit 2-2.

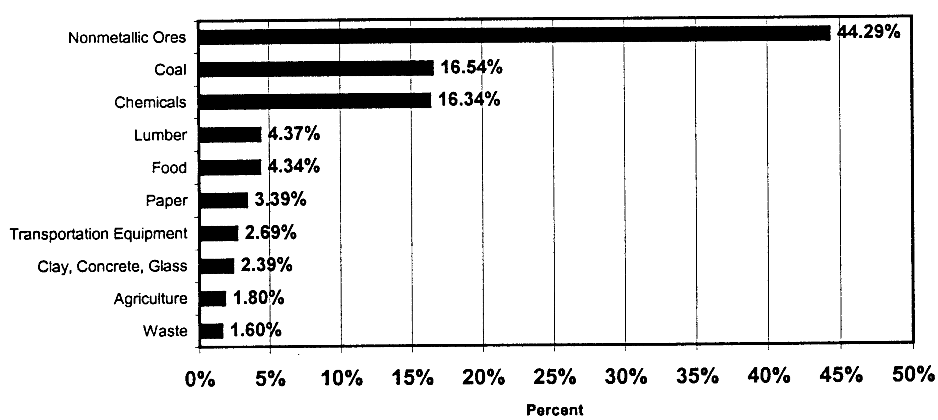
operated but not owned by the railroad.

TABLE 6: Florida Rail Freight Traffic 1995 and 1997

STCC	STCC Description	Originated (1000 Tons)		Terminated (1000 Tons)		Totals (1000 Tons)		Percent of Total	
		1995	1997	1995	1997	1995	1997	1995	1997
11	Coal	0	0	0	0	19,293	20914	11.6	12.1
14	Nonmetallic Minerals (except fuels)	40,258	41,565	44,153	43,144	84,411	84,709	50.9	49.0
20	Food or Kindred Products	2,190	2,010	3,786	3,960	5,976	5,970	3.6	3.5
24	Lumber or Wood Products (except furniture)	1,395	931	4,333	3,930	5,728	4,861	3.5	2.8
26	Pulp, Paper, or Allied Products	2,272	2,261	1,931	2,044	4,203	4,305	2.5	2.5
28	Chemicals or Allied Products	12,535	10,992	11,787	9,124	24,322	20,116	14.7	11.6
32	Clay, Concrete, Glass, or Stone Products	1,328	1,677	2,307	2,660	3,615	4,337	2.2	2.5
46	Miscellaneous Mixed Shipments	2,219	2,504	4,721	5,088	6,940	7,592	4.2	4.4
	All Others	4,436	6,447	10,433	13,694	14,896	20,140	9.0	11.6
	Totals	68,514	71,337	97,228	101,608	165,742	172,945	100	100

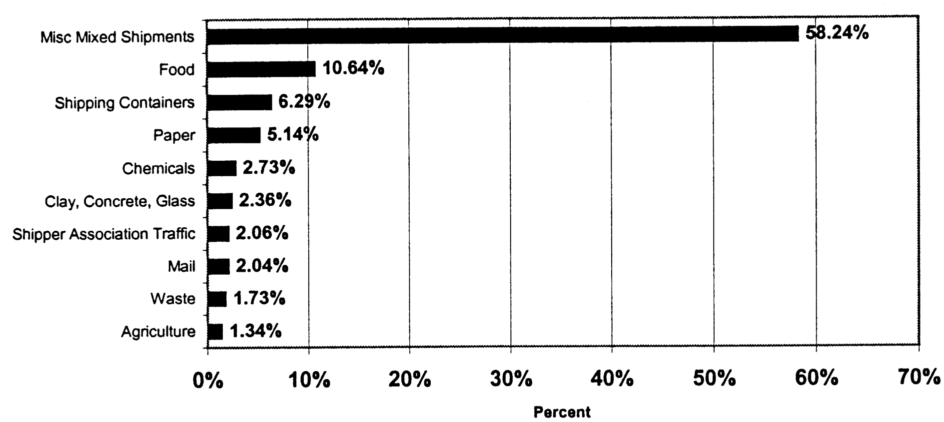
Source: *1998 Florida Rail System Plan*. Florida Department of Transportation. April 1999. Exhibit 2-3.

FIGURE 28: Bulk Rail by Percent Share of The Standard Transporation Commodity Classification (STCC) (1998)



Source: Florida Department of Transportation. Data provided to CUTR from the Department's commodity flow database for 1998.

FIGURE 29: Intermodal Rail by Percent Share of STCC (1998)



Source: Florida Department of Transportation. Data provided to CUTR from the Department's commodity flow database for 1998.

In 1998, major destinations of freight tonnage originating in Florida included Georgia, Tennessee, Ohio, and Illinois and major origins of freight tonnage terminating in Florida included Kentucky, Georgia, Alabama, Illinois, Tennessee, Louisiana, Virginia, Texas, and Ohio. However, the bulk of freight tonnage originates and terminates within Florida itself. According to data supplied by the Department, 83.25 percent of all rail freight movement originated within Florida and 84.63 percent of all rail freight movement terminated within Florida.[1]

Passenger Railroads

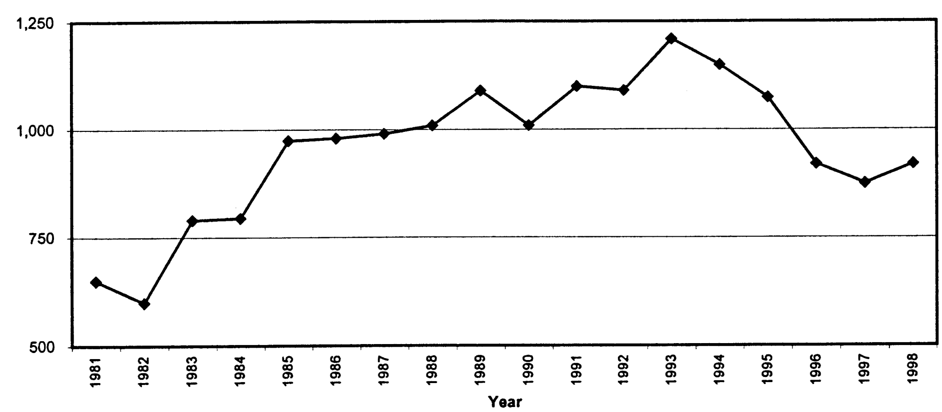
AMTRAK and Tri-County Commuter Rail Authority (Tri-Rail)

Florida's conventional intercity rail passenger service continues to be operated by the National Railroad Passenger Corporation or, as it is commonly known, Amtrak. Florida is fortunate as it has a variety of Amtrak services linking it with other parts of the US. Although there are numerous other commuter and heavy rail systems in the US, Amtrak is the sole provider of intercity passenger rail transportation. Amtrak owns and operates approximately 730 total miles of track, primarily along the Northeast Corridor from Boston to Washington, D.C., and has operating rights over about 22,000 miles of track

[1] Florida Department of Transportation. Data provided to CUTR from the Department's commodity flow database for 1998.

owned by freight railroads throughout the rest of the country. In 1998, carried approximately 925,000 passengers within Florida, as shown in Figure 30.

FIGURE 30: Florida Amtrak Ridership (000)



Source: 1998 Florida Rail System Plan. Florida Department of Transportation. April 1999. 3-3.

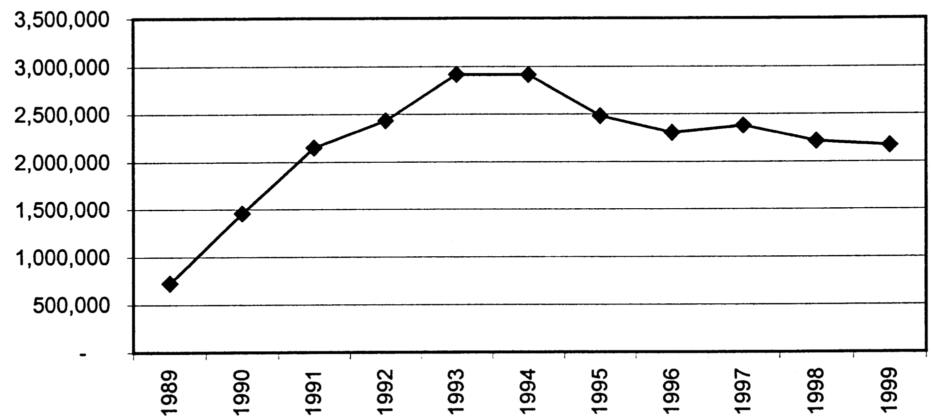
Tri-County Commuter Rail Authority (Tri-Rail)

Tri-Rail is South Florida's commuter (passenger) railroad. It operates seven days a week and serves 18 stations along a 71-mile rail corridor. Tri-Rail is the only regional commuter rail system in Florida. As the north-south spine of South Florida's transportation network, trains run parallel to Interstate 95 servicing Palm Beach, Broward, and Miami-Dade counties. Feeder bus service is available from all 18 stations.

Tri-Rail began passenger service in January 9, 1989 as part of a major traffic mitigation effort during construction and expansion of Interstate 95, which parallels the rail line. Tri-Rail currently operates 10 locomotives and 26 coaches in a push-pull method of operation. The average passenger trip length is 33 miles. Fares are based on a zonal system. Based on zoned travel, round-trip prices currently range from $3.50 to $9.25, monthly tickets available for $80.00 or discount $40.00.

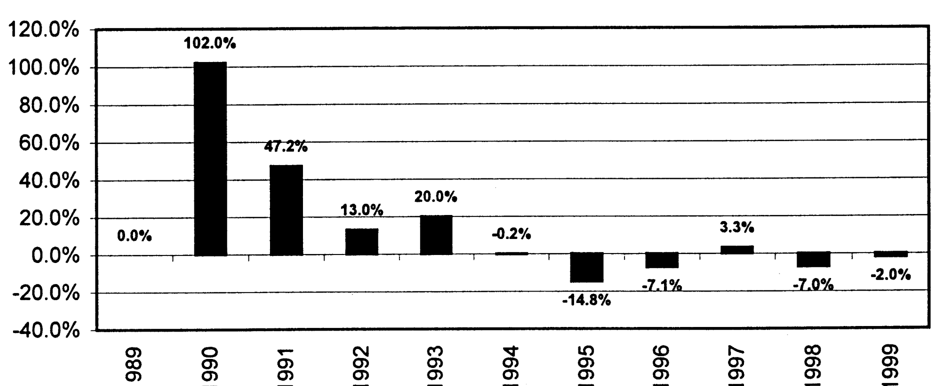
Figure 31 shows Tri-Rail ridership since the system began operation. There has been a significant upward trend with seasonal variations until about 1993 when it dropped off and the downward trend continued until 1997 (see Figure 32 for average annual percent change in ridership). Since 1997, ridership has remained steady. This decline in ridership appears to be directly related to implementation of the zonal fare system (and fare increases) and scheduling and on-time performance problems, which have resulted from a double-tracking project. Preliminary 2000 data indicate that ridership will increase once again. Tri-Rail is expected to remain a key part of the transportation network in this densely populated, heavily traveled corridor.

FIGURE 31: Tri-County Commuter Rail Authority Ridership



Source: Tri-County Commuter Rail Authority. Personal communication with Tri-Rail staff in November 2000.

FIGURE 32: Annual Percent Change in Tri-County Commuter Rail Authority Ridership



Source: Tri-County Commuter Rail Authority. Personal communication with Tri-Rail staff in November 2000.

SECTION VI
CONNECTIVITY AND CHOICE

Introduction

A well-planned and comprehensive transportation system moves people and goods efficiently. In addition, it strengthens the economy, protects the environment, and supports a high quality of life. There are many facets and conditions (or "sustainability indicators") that affect the quality of life. Of these indicators, the broad topic of transportation continues to be a major concern. The perceived and actual connectivity of transportation systems and sub-systems in Florida, which include freight and passenger services, naturally bear direct influence on such important factors.

The project research team intends to explore aspects of this connectivity of the transportation system in Florida by examining speed differences between already-existing roadway links connecting the 20 major metropolitan areas and the straight line distance between each of the node pairs. Actual roadway free-flow and congested travel time on those links will be compared with the travel time on the hypothetical free-flow straight line distance between node pairs. The following sections describe how the project team envisioned the accomplishment of this. In addition, these sections establish concerns and define data sources to be used to accomplish the tasks at hand.

Given that connectivity of various components of transit systems is a parameter of significant relevance, it was the intent of the project team to define a series of major activity nodes in Florida and, then, analyze the network that links these locations. The initial inclination was to focus on metropolitan areas of a given size; however, a number of questions arose when this issue was explored.

The definition of Metropolitan area as described by the Bureau of the Census (http://www.census.gov/) and the Bureau of Transportation Statistics (http://www.bts.gov/) will be utilized throughout the study for the sake of consistent reference. As described by the Bureau of the Census, "the general concept of a metropolitan area, or an MA, is that of a core area containing a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that core." Included between MA's are Metropolitan Statistical Areas

(MSA's), Consolidated Metropolitan Statistical Areas (CMSA's), and Primary Metropolitan Statistical Areas (PMSA's).

Since the 1960 U.S. Census, a question about place of work made available a national set of data on commuting, thus improving the accuracy and consistency of areas defined as metropolitan. Also, the standards now make greater use of commuting data. Some of the most important changes in the standards were announced before the 1980 U.S. Census (and were implemented in 1983). Chief among these were the provision for qualification of MA's on the basis of the Census Bureau's Urbanized Areas (or UA's) and the introduction of PMSA's as components of CMSA's.

In 1990, the Office of Management and Budget (OMB) established that MSA's were to be used as Federal statistical standards. To date, an MSA consists of one or more counties that contain a city of 50,000 or more inhabitants, or contain a Bureau-defined UA, and have a total population of at least 100,000. Counties containing the principal concentration of population—the largest city and surrounding densely settled area—are components of the MSA.

An area that meets the requirements to qualify as an MSA and also has a population of one million or more becomes a CMSA.

Sub-areas may be defined within an area that meets the requirements to qualify as an MSA and also have a population of one million of more. The definition of these subareas, called PMSA's, requires meeting specified statistical criteria and having the support of local opinion. This unit consists of a large, urbanized county or a cluster of counties that demonstrate strong internal economic and social links in addition to close ties with the central core of the larger area.

By 1993, the OMB issued redefinitions of MA's based on commuting and other data from the 1990 Census. The standards, however, changed only slightly from those of the previous decade. The most important changes were an expansion in the role of UA's in the qualification of outlying counties for inclusion in MA's. MSA's and PMSA's are categorized in one of the following levels based on total population:

Level A:	Areas of 1 million or more
Level B:	Areas of 250,000 to 999,999
Level C:	Areas of 100,000 to 249,999
Level D:	Areas of less than 100,000

CMSA's, by definition, have populations of one million or more.

Given these considerations, 20 MSA's currently exist in Florida (http://www.fishkind.com/). These MSA's, listed below, include the Counties that compose them:

MSA	Counties
Bradenton	Manatee
Daytona Beach	Flagler, Volusia
Fort Lauderdale - Hollywood	Broward
Fort Myers - Cape Coral	Lee
Fort Pierce - Saint Lucie	Martin, Saint Lucie
Fort Walton Beach	Okaloosa
Gainesville	Alachua
Jacksonville	Clay, Duval, Nassau, Saint Johns
Lakeland - Winter Haven	Polk
Melbourne - Titusville - Palm Bay	Brevard
Miami - Fort Lauderdale	Broward, Dade
Naples	Collier
Ocala	Marion
Orlando	Lake, Orange, Osceola, Seminole
Panama City	Bay
Pensacola	Escambia, Santa Rosa
Punta Gorda	Charlotte
Sarasota	Sarasota
Tallahassee	Gadsden, Leon
Tampa-Saint Petersburg-Clearwater	Hernando, Hillsborough, Pasco, Pinellas
West Palm Beach	Palm Beach

There are currently 17 CMSA's in the United States. Of those, two are found in Florida (http://www.policom.com/). They include the Miami and Fort Lauderdale areas, which are composed of Dade and Broward Counties, respectively. Since these adjoining areas demonstrate economic linkages, the unit is referred to as the Miami - Fort Lauderdale PMSA.

Given these parameters, the project team determined that it would be worthwhile to utilize metropolitan areas that at least met the criteria for the MSA classification. This, of course, includes: MSA's, CMSA's, and PMSA's. The primary task became one of discovery, in which the project team sought out currently existing cartographic data in a digital format. It was the intent that this inquiry would facilitate the mapping and analyses of the connectivity networks.

Data Sources

Appropriate digital files were located after a brief period of inquiry. The files were found to be derivative in origin. Essentially, the geographic and tabular characteristics of the original data came from many different sources. Many of the public domain-files appeared to have been improved upon by various governmental agencies. The main sources of data are listed below. They are presented in conjunction with their identifying characteristics as follows:

Data Abbreviation	**Brief Description**	**Source**
TIGER/Line files	Topologically Integrated Geographic Encoding and Referencing System	United States Bureau of the Census
GNIS Geological	Geographic Names Information System	United States Survey
DCW	Digital Chart of the World	United States Defense Mapping Agency
SHS, FIHS	State Highway System, Florida Intrastate Highway System	Florida Department of Transportation

Geographical Files

Geographical files that presented both county and state boundaries at two different degrees of precision were used. The high-resolution types of the files for the county and state boundaries were much larger and more detailed. These files were desired over lower-resolution and less accurate type files. Essentially, data sources of higher resolution may be used to produce more accurate large-scale maps, or output products that may be used to view a smaller area such as the State of Florida (relative to the size of the entire globe), with much detail and accuracy. Conversely, a smaller-scale map is most suitable when one desires to view a relatively larger area; for example, the entire United States, as compared to the State of Florida, or counties within its boundaries.

All of these files contain detailed tabular data from the 1990 United States Bureau of the Census (http://www.census.gov/). The data have been extracted from the Summary Tape File (STF) 3A and Summary Tape File 3B data tabulations. The STF 3A products consist of "state-specific" files and STF 3B products provide sample data for five-digit zip code areas.

Cartography

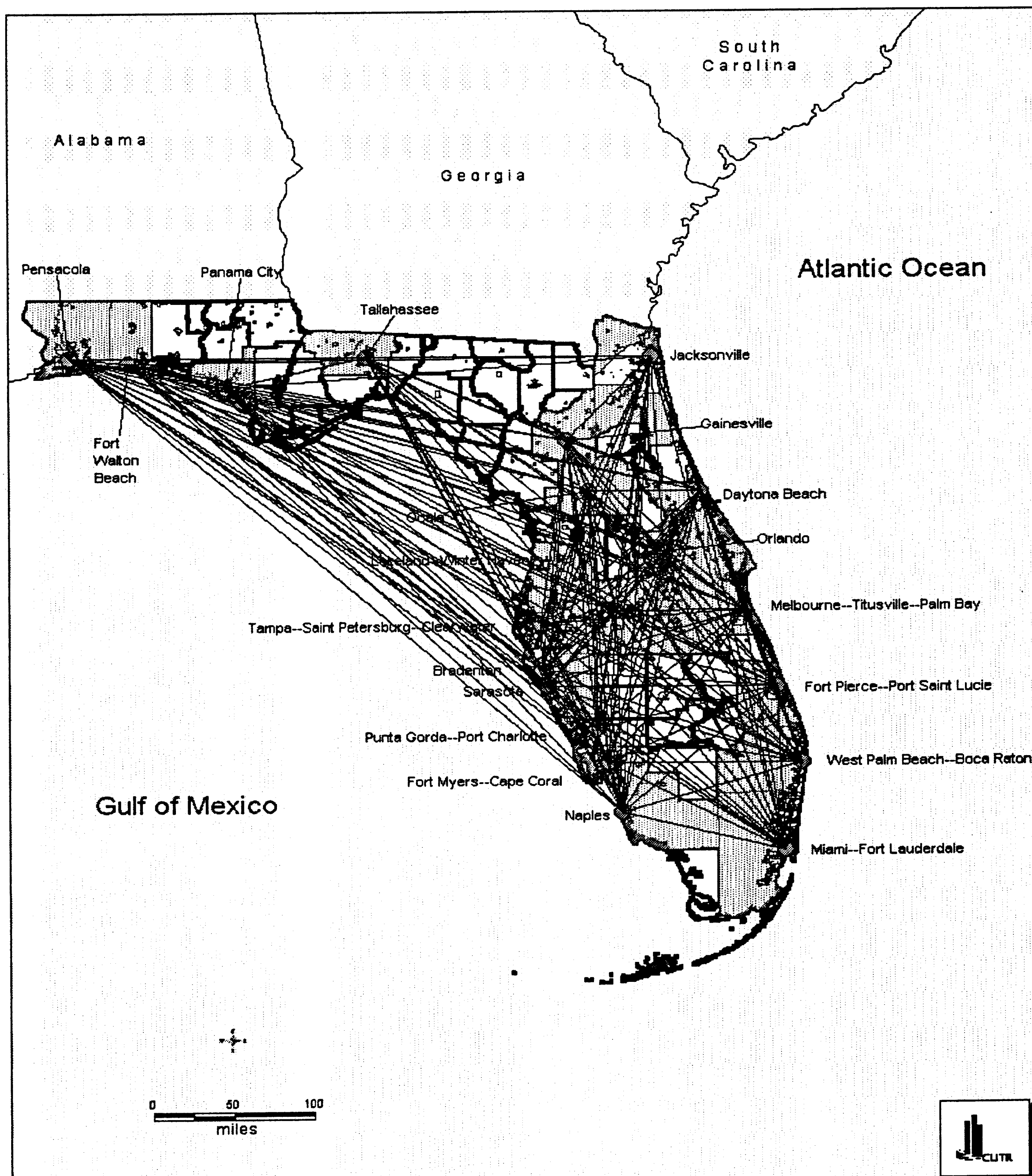
The fixed-format binary files shall be extracted using Maptitude, a package of Geographic Information Systems (GIS) software applications from Caliper Corporation. The databases will then be converted and saved into a MapInfo Interchange file (.mif) with the intent that they will be further processed using MapInfo, a GIS software applications package from MapInfo Corporation. This software package possesses many network analyses capabilities, including proportional buffering, that may become useful to this project. The .mif files will then be imported into MapInfo, and stored accordingly as tables (.tab).

During this tedious conversion process, the map projection of the source data will eventually be converted from an Albers Equal Area projection to a Latitude/Longitude format.

Connectivity Measurement

Following the base mapping of the areas of concern in Florida, aspects of network connectivity on a statewide basis will be examined. Because of the complexity of roadway networks and the relative scale of the area to be examined, the project team will select interstate routes that use the highest functional classification and highest speed facilities available for use in analysis. The links will connect central business districts, or area centroids, in the absence of a dominant downtown region. Where toll and non-toll routes are available it will be noted. Actual performance of connecting modes for both peak and off-peak conditions will be compared to free-flow hypothetical "airline" distance connections operating at free-flow Interstate facility speeds. Ratios of actual-peak and off-peak auto travel speeds will be compared to the hypothetical links and the results will be displayed in tabular and graphical forms. An example of the map may be found in Figure 1. The map shows the straight-line, or airline, travel paths between the city pairs.

FIGURE 1: Straight-Line Distances Between The 20 MSAs In Florida



A draft example of the type of data to be provided may be found in Table1. This matrix will include some basic descriptive data in the first several columns, then display connectivity data between respective city pairs in subsequent columns. The table only includes a single pair to exemplify the type of data that will be developed.

TABLE 1: Connectivity of Florida's Top 20 Urban Areas

1	1	3	4	5	6	7	8	9.00	10	11	12	13	14	15	16	17
Matrix of Connectivity Data																
	From	To --->														
Basic Data for Urban Areas							Daytona Beach--									
	MSA	Population	Area (square miles)	Population Density	Radius of Developed Area = R	Average Radial Distance to Centroid of Population from Center	Airline Distance from Centroid	Distance Including Access/ Egress	Perfect Auto Access Time	Perfect Air Access Time	Free Flow Actual Auto Access Time	Actual Air Access Time	Actual Congested Auto Access Time	Intercity Rail Access Time	Intercity Bus Access Time	
1	Bradenton--	211,707	754	281	15.5	11.0	150.115	174.52								
2	Daytona Beach--	370,712	1,138	326	19.0	13.5										
3	Fort Myers - Cape Coral--	335,113	813	412	16.1	11.4	185.343	210.17								
4	Fort Pierce - Port Saint Lucie--	251,071	1,134	221	19.0	13.4	135.616	162.51								
5	Fort Walton Beach--	143,776	939	153	17.3	12.2	344.898									
6	Gainesville--	204,111	1,220	167	19.7	13.9	84.751									
7	Jacksonville--	906,727	2,661	341	29.1	20.6	92.215									
8	Lakeland - Winter Haven--	405,382	2,012	202	25.3	17.9	93.133									
9	Melbourne - Titusville – Palm Bay --	398,978	1,048	381	18.3	12.9	81.825									
10	Miami - Fort Lauderdale - Hollywood--	3,192,582	3,205	996	31.9	22.6	240.539									
11	Naples--	152,099	2,045	74	25.5	18.0	214.945									
12	Ocala--	194,833	1,654	118	22.9	16.2	65.819									
13	Orlando--	1,072,748	2,688	399	29.3	20.7	46.496									
14	Panama City--	126,994	773	164	15.7	11.1	286.074									
15	Pensacola--	344,406	1,690	204	23.2	16.4	379.452									
16	Punta Gorda - Port Charlotte--	136,992	75	1827	4.9	3.5	167.272									
17	Sarasota--	277,776	577	481	13.6	9.6	156.889									
18	Tallahassee--	233,598	1,216	192	19.7	13.9	213.151									
19	Tampa - Saint Petersburg - Clearwater--	2,067,959	2,618	790	28.9	20.4	128.837									
20	West Palm Beach--	863,518	1,985	435	25.1	17.8	187.282									

In addition to the comparative analysis of speeds, an analysis of the accessibility of each of the 20 metro areas to other Florida population will be developed. This will be portrayed as a cumulative density function of the population accessible within given increments of travel time.

Implementation

The following is a basic discussion of the procedural approach that the project team will take to finish implementing the above-mentioned tasks. As mentioned earlier, MapInfo will be used since the software possesses many capabilities that are useful to the completion of tasks for this project. Technicians on the project team opened the applicable files using the graphical interface capabilities of the MapInfo software package. These tables were displayed on a computer monitor atop U.S. Bureau of the Census 1995 TIGER/Line base map data files. It must be noted that, although the U.S. Census is officially conducted every ten years, periodic updates, become public domain during periods of time that occur between the 10-year intervals in which official U.S. Censuses are conducted. These updated files were converted into formats that are consistent with those that are readily useable by the functionality of MapInfo products. These files were saved as tables and were arranged in a fashion that was consistent with standards of acceptable cartographic accuracy. Layers in this format were labeled in an appropriate fashion. Items included in the categorical description of "map jargon" such, as the title, scale bar, and so on, were an integral component of the final graphical representation, or map, of the deliverable product. A draft of the image may bee seen in Figure 1, as follows.

Units of distance were measured in statute miles, where one mile equals 5,280 feet. The distances were first measured and then displayed on the map in a precise fashion. Cities were labeled with unique identifiers on the map. These identifiers correspond with route distance information that may be found in a table. Because of the complexity of output, actual numerical distances were displayed in this table, rather than directly on the map. This approach seemed to be the most legible and understandable method by which to present information that may very easily be confusing and indistinguishable in other formats of expression. For further explanation, other significant information regarding routes of travel, such as major thoroughfare names, will be discussed in reports.

Develop Methodology to Measure Choices in Major Corridors

This task will develop a method by which to measure the degree of mode choice that is available in major corridors connecting the above referenced urban areas. The approach to this Task, as referenced in the original work scope as Task 5, is similar to that used in measuring connectivity. Matrices of available service options will be developed to display travel options between node pairs. Modes will be separately detailed for passenger and freight services. Parameters defining each mode will include:

- Availability (frequency, span of service, existing capacity)
- Speed (peak and off peak)
- Cost

A GIS software platform will be at the core of initial analytical and presentation media. The software application, which will most likely be MapInfo, will be used explore opportunities to examine actual mode and service level options in selected major corridors throughout the State. The terminal access and egress time considerations at trip ends, trip costs and other factors that would fully define a transportation choice will be explored to determine if a meaningful aggregate measure adds information with potential value to policy makers or other readers of the resultant report.

SECTION VII
CHAPTER OUTLINES

Introduction

This task was originally written when we anticipated that we would authoring various sections of the report and hence would compose the outline to complement our personal preferences for organization and content. In as much as the Universities are tasked with providing supporting research and report content but that authorship will be carried out by FDOT, the actual author will want to reserve discretion for designing the content of the chapters. However, the ideas and flow of information as outlined in these brief chapter outlines should provide some food for thought for the author. We anticipate that the actual chapter content will evolve as research is finalized.

TABLE 1: Original Trends and Conditions Report Chapter Outline Proposal

1. Introduction	Introduction, context and purpose	FDOT/CUTR
2. Demographics	Population	BEBR
3. The Economy	Economic conditions	BEBR
4. Travel Demand	Personal, business, tourist and freight travel	CUTR/BEBR/FDOT
5. The Transportation System	Transportation infrastructure and services	CUTR/FDOT
6. Transportation System Performance	Comparison of demand and supply	CUTR/FDOT
7. Safety	Safety	CUTR
8. Energy Use and Air Quality	Environment - energy, air quality	FAU/FIU Joint Center
9. Physical Environment	Habitat, cultural archeological sites, water systems	FAU/FIU Joint Center/BEBR
10. Settlement Patterns	Urban form and development	FAU/FIU Joint Center/BEBR
11. Implications	Implications	**FDOT/CUTR/BEBE/FAU/FIU Joint Center**

In developing the outlines we felt that chapters 5 and 6 as proposed should be integrated into a singe chapter as it will be easier to discuss the descriptive and performance data at the same time. The outline below proposes such integration.

As evidenced in Section VII of this document, the volume of descriptive and performance data is quite substantial and we will need to use the collective guidance of the project team to sort through priorities while providing a comprehensive and balanced overview.

CHAPTER 4 OUTLINE: Transportation Demand

1. A Conceptual Model for Exploring Transportation Demand
    a. The role of transportation in the economy and society
    b. Socio-economic conditions influencing demand
    c. The supply/demand relationship
    d. The impacts of demand
    e. Feedback from system performance
2. An Exploration of Personal Travel
    a. Empirical trends in person travel demand
    b. Factors influencing person travel trends
    c. Forecasting personal travel demand growth
    d. Implications of personal travel demand growth
        i. Geographic
        ii. Temporal
        iii. Modal
3. An Exploration of Visitor Travel
    a. Empirical trends in visitor travel demand
        i. Air
        ii. Auto
        iii. Other
    b. Factors influencing visitor travel trends
    c. Forecasting visitor travel demand growth
    d. Implications of visitor travel demand growth
        i. Geographic
        ii. Temporal
        iii. Modal
4. An Exploration of Freight Travel
    a. Empirical trends in Freight travel demand
        i. Truck
        ii. Air
        iii. Rail
        iv. Ports
    b. Factors influencing visitor travel trends
    c. Forecasting visitor travel demand growth
    d. Implications of visitor travel demand growth
        i. Geographic
        ii. Temporal
        iii. Modal
5. Total Transportation System Travel Demand
        i. Geographic
        ii. Temporal
        iii. Modal
6. Understanding Uncertainty in Future Demand Forecasts
7. Implications of Demand Growth on Travelers (time and resource implications, not transportation impacts of overall quality of life).

CHAPTER 5 OUTLINE: Descriptive Transportation System Data

Highways and Vehicles

Supply and Demand

1. Daily VMT, lane miles, centerline miles, registered vehicles, I-95 corridor congestion measures, and delays
2. Highway trends by functional class by urban and rural
3. Comparisons to national data
4. Ownership by road system
5. Growth in vehicles

SHS Summary by FDOT District (06/30/2000)

1. Centerline miles (urban, rural)
2. Lane miles (urban, rural, totals)
3. Daily miles of vehicle travel by federal functional roadway classification
4. Fixed and moveable bridges (if available)

Maintenance and Resurfacing (if data are available)

1. Resurfacing by functional classification
2. FDOT ratings
3. Pavement condition (deficiencies by district if available)

Public Transit

1. Ridership (trends for fixed-route and demand-response)
2. Other performance, efficiency, and effectiveness measures
3. Ratio of public transit growth (ridership) to population growth (trend)
4. Average age of transit fleets (US vs. FL)
5. Various per capita and expense performance ratios
6. Various performance measures, Florida compared to the US
7. Average age and growth in fleet size comparison
8. School bus/student transportation (total vehicles and students transported)
9. Comparisons to national data

Rail/Freight

1. Miles of railroad (owned, leased, trackage rights)
2. Tonnage share by mode, SSTC, imports/exports, originated/terminated
3. Commodities (SSTC)
4. Rail freight traffic history (tonnage)
5. Trade trends (airborne, waterborne, totals)
6. Florida Amtrak ridership (trend)

Aviation/Airports

1. Total enplanements (by state and FDOT district)
2. Total operations (by state and FDOT district)
3. General aviation (by state and FDOT district)
4. Commercial service (by state and FDOT district)
5. Performance – measured by delays (if data are available from FAA)
6. Comparison of Florida's largest airports

Deepwater Seaports

1. Cargo, container movements, passengers, operations
2. Embarkments and disembarkments (one-day, multi-day, totals)

Trends and Conditions Research Support Services

Year One Working Paper
Final Report

Prepared for
Florida Department of Transportation

Prepared by
Center for Urban Transportation Research
College of Engineering
University of South Florida
Tampa, Florida

February 2000