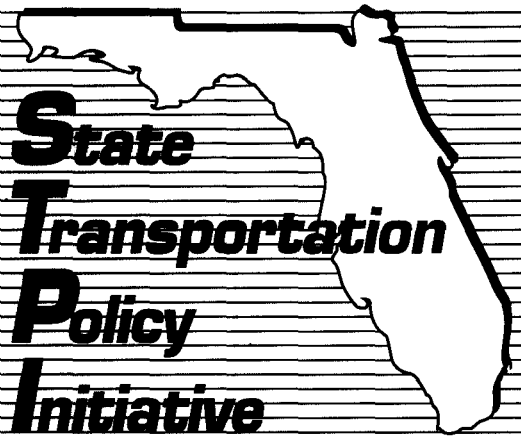

State Transportation Policy Initiative

Statewide Transportation Needs & Funding Study

Center for Urban Transportation Research

University of South Florida

Center for Urban Transportation Research

STATE
TRANSPORTATION
POLICY INITIATIVE

STATEWIDE TRANSPORTATION NEEDS AND FUNDING STUDY

Center for
Urban Transportation Research
University of South Florida

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Preface

Recent legislation and fiscal trends in Florida and nationwide have created a unique combination of constraints and opportunities, providing an impetus for examining the way Florida conducts transportation planning. In response to these challenges, the Florida Legislature and the Governor's Office directed the Center for Urban Transportation Research (CUTR) to undertake the State Transportation Policy Initiative (STPI). The purpose of this multi-phase study is to reevaluate the way transportation infrastructure and services are planned and developed at the state and local levels in Florida and to formulate options for implementing requirements of the 1991 Intermodal Surface Transportation Efficiency Act.

Efforts undertaken as part of Phase I of STPI include:

- a comprehensive review of local and regional planning in Florida in the context of State growth management requirements and federal legislation
- an evaluation of the impact of community design on transportation needs
- a review of the literature on the transportation costs of urban sprawl
- an evaluation of comprehensive transportation planning for state purposes
- an examination of the relationship between air quality and transportation planning, as practiced in Florida
- an evaluation of trends and forecasts of Florida's population and transportation characteristics
- a study of transit, transportation demand management, level of service, and concurrency issues and of congestion management and urban mobility planning
- preparation of a state land use map by Florida's Regional Planning Councils

Efforts undertaken as part of Phase II include:

- a study of statewide transportation needs and funding
- recommendations for a new strategic planning process for Florida that recognizes uncertainty
- a review of the extent to which local land development regulations complement comprehensive plans
- a study of sustainable community design and transportation.

This report is one of a series of reports produced as part of the State Transportation Policy Initiative.

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Executive Summary

This report examines the issues surrounding the definition and identification of Florida's transportation needs. Quantitative methods were used to assess aggregate needs by transportation mode. Four different policy alternatives for Florida's transportation future were examined, and needs were identified for each case. Existing and potential revenue sources were identified and funding projections were developed. Alternative measures of need were compared to projected revenue. Funding options for that portion of needs not covered by projected revenues were developed, with an accompanying policy narrative.

Alternative Definitions of Transportation Needs

The analysis included an examination of needs under four different scenarios. The scenarios are described below.

Scenario 1: Maintain Funding. This scenario assumes that existing revenue sources for each mode will remain in place, and that there will be no change in tax and fee rates. Revenue from these sources will change with the tax base (and in the case of state fuel taxes, through automatic indexation of rates). This stream of revenue is the upper limit on transportation spending under this scenario.

Scenario 2: Maintain Conditions. The second scenario assumes that improvements would be made to all modes and to intermodal connections as necessary to maintain the existing (1992) levels of service and physical conditions of facilities. No limit is set on transportation spending.

Scenario 3: Maintain Conditions with Maximum Lane Policy. This scenario assumes the same improvements as the previous scenario, subject to constraints on the number of lanes permitted for various roadway classifications. The lane limits are based on current (interstate highways) and proposed (all other roads) FDOT policy. The scenario assumes that the reductions in roadway expenditures caused by the lane constraints will result in an equal amount of expenditures being transferred to transit and rail modes, thereby reducing the emphasis on highways and increasing the role of transit and rail. No limit is set on transportation spending.

Scenario 4: Improve Conditions. In addition to maintaining conditions, the fourth and final scenario assumes that all current deficiencies in the physical condition of facilities and in levels of service would be corrected over the 20-year planning period. In addition to correcting deficiencies, the scenario assumes that there would be substantial increased emphasis on transit and rail modes. The scenario does not include the maximum lane policy or a limit on transportation spending.

As shown in Table S-1, total needs for all modes under the different scenarios range from $84 billion to $147 billion for the 20-year period. For most modes the needs identified under the fourth scenario are greater than the needs identified under the third scenario. However, for transit this is reversed. The transfer of a significant amount of roadway expenditures to transit results in a greater need for transit under the third scenario than under the fourth.

Declining Revenues, Growing Needs

With few exceptions, Florida's transportation revenue base cannot keep pace with the combined impact of continued growth in population and commerce and (even) moderate price inflation in the costs of transportation facilities and services.

Federal revenues, consisting primarily of fuel taxes, are expected to grow by about

one percent annually. This compares quite unfavorably to traffic growth (3.0 to 3.9 percent) and highway construction cost inflation (3.1 percent).

State revenues, consisting primarily of fuel taxes, vehicle registration and related fees, and Turnpike tolls, keep pace with traffic growth and with a portion of inflation. The indexation of state fuel taxes, combined with Florida's growth in fuel consumption and vehicle registrations, leads to a projected four percent annual growth in state revenues. Registration fees, tolls, and other sources are not indexed to inflation.

Local revenues consist primarily of fuel taxes and various other taxes and fees. Florida leads the nation in the use of local option fuel taxes, which have reduced reliance on property taxes. Appropriations from state and local sales taxes, impact fees, and tolls round out local revenue. None of these revenue sources is explicitly adjusted for inflation; however, a few secondary sources of revenue such as sales and property taxes can implicitly track inflation. Overall, local revenue is expected to grow at about 3.1 percent for roads and bridges and 3.4 percent for transit, paratransit, and rail.

Table S-2 shows the total needs under each scenario and the revenue available under current tax and fee rates to fund those needs. The table continues with the state and local revenue shortfalls that would have to be made up to fully fund each scenario. The total shortfalls are $27 billion

Table S-1
TWENTY-YEAR TRANSPORTATION NEEDS, ALL MODES
(millions of 1992 dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State-Owned Roads and Bridges	$45,607	$58,181	$51,201	$70,967
Locally-Owned Roads and Bridges	$23,240	$32,062	$32,062	$38,640
Transit	$7,900	$10,127	$18,853	$18,820
Paratransit	$3,007	$3,643	$3,643	$5,946
Rail	$2,016	$4,676	$4,914	$5,271
New Starts - Fixed Guideway	$0	$0	$0	$4,725
New Starts - Commuter Rail	$0	$0	$0	$104
Airports - State Share	$1,850	$2,337	$2,337	$2,337
Seaports - State Share	$159	$589	$589	$589
Total Needs	$83,779	$111,615	$113,599	$147,399

for the second and third scenarios and $58 billion for the fourth scenario.

Inadequate Transportation Infrastructure

Current federal, state, and local funding for the expansion and preservation of transportation infrastructure cannot keep pace with growth in population, commerce, and traffic. Thus, the operational and structural conditions of Florida's transportation infrastructure are expected to decline.

Roads/Bridges. Growth in traffic levels and the costs of road and bridge improvements will surpass the growth in existing federal, state, and local revenue sources. The result is the operational and physical deterioration of the system. These deficiencies are evident in three areas: pavement and bridge condition, congestion level, and safety. Each area is of critical importance to the safe and efficient functioning of the highway system.

Transit and Rail. Transit and rail service levels are expected to decline given the availability of current funding. Florida's transit and rail systems will lack the resources necessary to provide the existing level of service, let alone the ability to attract new passengers from single-occupant vehicles. The average age of transit vehicles will increase, leading to declines in reliability and rider appeal.

Paratransit. Paratransit service levels are expected to decline, given the availability of current funding. Even with the increase in state financial support in FY 1994-5, no sustained increase in the level of service is expected.

Airports. Current funding levels pose serious consequences for Florida's aviation system over the long term. Many of Florida's airports and many parts of its airspace are highly congested. Current revenue sources are insufficient to deal with existing as well as accruing deficiencies. These deficiencies directly reduce the safety and convenience of air transportation. Ultimately, declining aviation infrastructure can negatively affect tourism and international trade, two mainstays of the Florida economy.

Seaports. Seaports are vital to Florida's international trade. Failure to increase capacity and modernize equipment will reduce seaports' contribution to the state's economic development.

Table S - 2
TWENTY-YEAR REVENUE SHORTFALLS, ALL MODES
(millions of 1992 dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
Total Needs	$83,779	$111,615	$113,599	$147,399
Available Revenue	$83,779	$84,873	$86,858	$89,293
State Shortfall	$0	$16,291	$16,291	$33,526
Local Shortfall	$0	$10,450	$10,450	$24,581
Total Shortfall	$0	$26,741	$26,741	$58,107

Financing Better Transportation

The opportunities for funding Florida's transportation needs cover a broad spectrum that includes:

- Increase privatization of transportation facilities.
- Index current revenue sources to inflation.
- Increase the state's return–historically 80 percent–of its payments into the Federal Highway Trust Fund.
- Reduce the diversion of transportation user fees to non-transportation uses.
- Increase the use of revenue bonds based on user fees.
- Increase the use of toll financing.
- Seek additional federal funding.
- Develop new revenue sources.
- Increase existing taxes and fees.

The state's transportation revenue shortfalls can be met in a variety of ways by using different combination of the above options. One approach, as an example, would be to continue to use toll financing for new roadway and bridge facilities in the same proportion as in the past and finance the remainder of transportation needs by increasing current taxes and fees an equal percentage. The amounts of the increases required to meet state needs using this approach are shown in Table S-3 for each scenario (the increases for "Maintain Conditions" and "Maintain Conditions with Maximum Lane Policy" are identical). For this and all subsequent illustrations, the revenue yield of the inflation-indexed state motor fuels tax is used. If a non-indexed excise tax is used, a slightly higher tax rate must be applied to raise the same amount of revenue. Local needs could be met for the "Maintain Conditions" scenario by increasing the local motor fuels tax 3.9 cents per gallon and by increasing other local transportation fees and taxes 39 percent. The "Improve Conditions" scenario would require a local motor fuels tax increase of 8.1 cents per gallon and increases of 81 percent in other transportation revenue sources.

If the state relied entirely on the motor fuels tax (aviation fuel tax for aviation

Table S-3
INCREASES IN TAXES AND FEES REQUIRED TO MAKE UP TWENTY-YEAR STATE SHORTFALLS

Tax or Fee	*1994 Typical Charge*	*Increase Needed For Each Scenario*		
		1 Maintain Funding	*2 & 3 Maintain Conditions*	*4 Improve Conditions*
STATE SHORTFALLS				
Motor Fuels Taxes (per gallon)	12.6¢	0	5.7¢	11.9¢
Aviation Fuel Tax (per gallon)	6.9¢	0	3.8¢	3.8¢
Motor Vehicle License Fee	$35.10	0	$15.87	$33.28
Initial Registration Fee	$100.00	0	$45.21	$94.82
Rental Car Surcharge (per day)	$2.00	0	$0.90	$1.90
Incremental Title Fee	$24.00	0	$10.85	$22.76

shortfall) to make up the 20-year shortfalls, an increase of 9.2 cents per gallon would be required to meet the needs of the "Maintain Conditions" scenario and an increase of 19.2 cents for the "Improve Conditions" scenario, plus an increase in the aviation fuel tax of 3.8 cents per gallon for each scenario. Local needs under the "Maintain Conditions" scenario could be met with a 5.1 to 6.2 cents per gallon increase in the local motor fuels tax and, for the "Improve Conditions" scenario, with a 9.3 to 13.9 cents per gallon increase (the higher numbers for counties with transit systems).

Described below are actions recommended to be taken by the legislature and/or by state agencies involved in funding transportation services.

Encourage informed discussion on transportation funding issues by increasing public awareness of the consequences of the different needs and funding scenarios described in the report. The scenarios in this report range from making no changes in current transportation funding to maintaining current levels of service to correcting all deficiencies and increasing services. The consequences of not addressing Florida's transportation needs will be severe, but the public may not yet be adequately informed of those consequences. Public involvement, discussion, and understanding of the issues and consequences is an absolute necessity.

Index more transportation fees and taxes. The funding shortfalls forecasted in this report would be substantially worse if the state motor fuels tax were not indexed to the consumer price index. The motor fuels tax, however, accounts for only about a third of the state's transportation revenues. If more transportation funding sources were indexed to inflation the relationship of costs and revenues would be better balanced over time.

Increase transportation revenues. Florida's needs over the next 20 years will exceed available revenues. Indexing will help, but tax and fee rate increases also are necessary. The extent of the rate increases will depend, in part, on the definition of needs that develops out of informal public discussion. The source of additional revenues also is a subject for public discussion.

Seek continuance of federal funding participation. Federal sources currently account for 35 percent of the funding for Florida's State Highway System and are projected to decline to 27 percent by 2012. The federal share of transit funding in Florida is projected to decline from the current 28 percent to 18 percent by 2012. The state should encourage the federal government to take the necessary steps to continue or increase its current level of participation in transportation funding in Florida.

Recognize that some transportation investments should be policy driven rather than demand driven. Transportation investment decisions can be and often are made with the intention of achieving policy objectives beyond simply meeting the demand for transportation. Policy issues, such as air quality, transit dependency, and growth management, should also be considered when determining the appropriate levels of investment in the various transportation modes.

Explore other funding options. Other options that Florida should explore include privatizing transportation facilities; reducing the diversion of transportation user fees to non-transportation uses; increasing the use of revenue bonds; and pursuing greater equity in the distribution of federal transportation funding.

Introduction

The Statewide Transportation Needs and Funding Study is a work element of the State Transportation Policy Initiative. The study originated from an interest in providing information to assist the Florida Legislature in developing potential future legislative initiatives. One such potential future initiative concerns transportation infrastructure needs. At issue regarding transportation infrastructure is the proper level of investment in the transportation system and the sources of funding for this investment. This study provides insight into these issues, and presents potential action plans for the consideration of the Florida Legislature.

This study is not an attempt to duplicate the long-range planning effort of the Florida Department of Transportation. The focus is not on listing specific improvements to specific facilities, but rather on an aggregate analysis of needs for the various transportation modes under different scenarios and assumptions. By relating different levels of funding to performance levels, informed decisions can be made about the preferred level of performance.

The first chapter provides a definition of needs, analyzes possible methodologies for the determination of needs, and describes examples of needs analyses. The second chapter describes the current condition of each transportation mode in Florida and quantifies the needs for each mode for the 20-year period from 1993 to 2012. The third chapter describes current and historical funding for transportation in Florida and other states, and forecasts revenue for the 20-year period. The fourth chapter presents various options and recommendations for providing sufficient revenue to meet Florida's transportation needs.

This study assumes that Florida's population will grow at the medium growth rate forecast by the Bureau of Economics and Business Research, which averages 1.60 percent per year over the 20-year period. Except for road and bridge needs, inflation is assumed to increase an average of 3.4 percent a year, as forecasted by Data Resources, Incorporated. For road and bridge construction, FDOT's construction index is used. It averages 3.13 percent per year over the 20-year period. For road and bridge right of way and other non-construction costs, FDOT's assumption of 5 percent per year is used. FDOT's assumptions about the growth in federal and state transportation revenues attributable to growth in population and inflation also are used. These are 1 percent per year for federal revenues and 4 percent per year for state revenues. Other assumptions are described in each section and listed in the appendix.

Chapter 1

Literature Review and Methodology Development

Definition of Needs

The definition of public needs is a reflection of a society's values, culture, and governmental structure. Needs, therefore, are not absolutes; rather they represent a society's desires toward ultimate goals. In a representative democracy, needs are determined through the collective and collaborative efforts of the public, elected public officials, and the agencies and institutions charged with carrying out public policy.

One notable classification of needs was introduced by humanist psychologist Abraham Maslow in his book *Motivation and Personality*. The thrust of his argument is that there exists some basic level of needs without which individuals cannot survive. Once these more fundamental needs are met, individuals can proceed to higher levels of attainment. However, at higher levels of needs, varying attributes exist among the different sectors of society. For instance, once basic needs are addressed (e.g., food, shelter), individuals of different income levels, age groups, or geographical areas may have divergent opinions on what additional services are needed. Furthermore, these various groups may trade off one service to gain more of another service that they believe provides them with greater value.

Since societies operate with resource constraints, transportation–the business of transporting people and goods–is one of the services that must be traded off with other services. Transportation is not a need in itself; rather the level or quality of transportation needed is the result of a society's collective values and culture. After determining that transportation is–at some level–needed, the next step is to determine the goals to be accomplished by transportation. The actions required to attain these goals determine the investment required for transportation. Land access, economic development, emergency evacuation, and connectivity of population centers are all goals of transportation. These goals are not mutually exclusive, nor are they necessarily dependent on one another. Furthermore, the attainment of these goals is not necessarily all-or-nothing, as there may be degrees of attainment. For example, the transportation infrastructure required for emergency evacuation could range from infrastructure sufficient for the evacuation of a portion of the population in the event of an average-size hurricane to infrastructure sufficient for the evacuation of the entire population in the face of the largest possible hurricane. These scenarios translate into very different levels of transportation need and, therefore, in very different costs to society.

The traditional first step in a transportation needs study is simply to determine what is needed. The implication of such a traditional exercise is that the final result is an undisputed necessity. However, as previously discussed, the determination of needs is problematic. The needs are actually estimates conditioned on a set of underlying assumptions. These assumptions may reflect the political process, administrative controls, and/or the special interests of certain stakeholders, rather than a rigorous methodological treatment of the issue.

An alternative to the traditional approach is to develop numerous assumptions and scenarios, each with a corresponding needs

assessment. Differing assumptions can produce dramatically different needs estimates. Even a modest change in assumptions such as growth in population, the rate of inflation, or the size of the road system can cause large differences in estimated needs. Furthermore, needs can be measured using different methodologies that lead to dissimilar assessments. For instance, needs studies have historically been based on engineering or performance standards. In these studies needs are calculated as the difference between the chosen standard and the actual performance characteristics of the transportation facility. On the other hand needs can be determined from policies and objectives regardless of performance characteristics. The results of these methodologies can be extremely dissimilar.

Historically, there has been an absence of consumer demand analysis in the assessment of transportation needs, although it has often been suggested that the consumer's willingness to pay should play a significant role in the determination of transportation needs. Willingness to pay, when applied to highway transportation, is simply the price a consumer is willing to pay to travel on a particular roadway. Currently, there is no mechanism in wide use that forces consumers to reveal their preferences. Toll roads and congestion pricing are attempts to reveal the consumer's willingness to pay, but these mechanisms do not adequately capture all consumers' ranking of transportation against other public goods. These methods assume that ability to pay corresponds with willingness to pay.

Finally, needs studies may ultimately have different goals based on geographical scale. Local goals represent the objectives of a local homogeneous population by focusing on specific projects and improvements. The goals of local transportation policy might include improved land access, enhanced quality of life and community, and greater choice at the local level in matters of economic development and growth management. State goals are broad and provide the general policy framework for many heterogeneous communities. State goals usually involve system connectivity, emergency evacuation, and economic well being.

Discussion of Needs in the Context of Diverse Goals

It has been illustrated that the level and quality of transportation that is needed by a group or community is not absolute. Therefore, a framework is necessary to outline possible needs. The following framework does not include all possible scenarios of needs, but it attempts to encompass a reasonable range of levels of investment that might be chosen for the state of Florida. The four scenarios that were chosen to reflect a range of scenarios include (1) maintain funding, (2) maintain conditions, (3) maintain conditions with maximum lane policy, and (4) improve conditions. These are described briefly below and in more detail in Chapter 2.

Maintain Funding

- Assumes no new revenue sources.
- Assumes existing revenue sources remain in place at their current (base) tax and fee rates.
- Assumes revenue grows with the tax base.

Maintain Conditions

- Assumes that improvements are made to all modes and intermodal connections as necessary to maintain the current levels of service and physical conditions of facilities.

Maintain Conditions with Maximum Lane Policy

- Assumes the same improvements as the previous scenario subject to constraints on the number of lanes permitted for various roadway classifications.
- Assumes that the reductions in roadway expenditures caused by the lane

constraints result in an equal amount of expenditures being transferred to transit and rail modes, thereby reducing the emphasis on highways and increasing the emphasis on transit and rail.

Improve Conditions

- Assumes that conditions are not only maintained, but that all identified deficiencies in levels of service and the physical condition of facilities are corrected over the 20-year planning period.
- Assumes substantial enhancement of transit and rail modes beyond correcting deficiencies.

These four needs scenarios are the framework for this study. Appropriate methodologies for each transportation mode under each scenario were chosen from those identified in the following section. The detailed process for determining needs under each scenario for each transportation system is explained in a later section.

Methodologies

This section is a discussion of methodologies that have been used for the analysis of transportation needs at the national, state, and local levels. This list attempts to categorize available methodologies into logical groupings; however, they are not easily categorized. In application, these methodologies are sometimes combined to determine needs. In addition, the level of effort needed to perform each methodology varies greatly according to data availability and the complexity of analysis. Numerous assumptions must be made for each methodology, including the growth rate of population, the growth rate of demand for the transportation system, and the rate of inflation. These assumptions can greatly affect total calculated needs and the cost of meeting those needs. The methodologies described in this section are:

- Service/Engineering Standards
- Investment Analysis
- Budget Constraint
- Access Standards
- Plan Aggregation
- Local Surveys
- Policy-Driven Analysis

The advantages and disadvantages of each methodology are discussed below.

Service/Engineering Standards

Description. The establishment of service or engineering standards is a top-down methodology for the evaluation of transportation needs. Standards are determined at the aggregate level (the state) for facilities at all levels. These standards can be established for various parameters (e.g., safety, maintenance, capacity). Needs are then estimated based on improving and/or maintaining the transportation infrastructure to these standards. For example, minimum safety ratings, maintenance schedules, and volume to capacity ratios are often established to evaluate highway needs. These standards are used to evaluate deficiencies on each highway or section of highway, and to establish improvements needed in capacity or maintenance spending cycle to attain these standards over a specified period of time.

Most needs studies contain some type of service or engineering standard in their analysis. Minimum volume to capacity ratios, pavement conditions, and safety ratings have been established for different elements of the Florida Intrastate Highway System. Oregon has set minimum tolerable conditions for roads of different levels of importance. These minimum tolerable conditions include levels of service, volume to capacity ratios, pavement condition, and average speed, among other conditions. If a road falls below the threshold of one of these conditions, it is considered deficient. Alabama uses a similar process to determine the needs on their state road system.

Advantages. Standards are useful for the easy comparison of alternative scenarios.

For example, *The Status of the Nation's Highways, Bridges, and Transit: Conditions and Performances*, a report prepared biennially for the United States Congress, compares the investment requirements of two different scenarios: maintaining conditions and improving conditions. This comparison effectively illustrates the effect on costs when standards are modified.

Another advantage, when looking at facilities aggregated from multiple jurisdictions, is that the use of consistent standards facilitates comparison and allows consistent decision-making to occur comprehensively at the state level rather than on a county-by-county basis.

Disadvantages. The use of service/engineering standards is not appropriate for some transportation systems, such as transit. This methodology does not take into consideration the fact that transit needs are driven more by public policy than by demand. Service/engineering standards focus on correcting capacity deficiencies, whereas transit needs generally focus on increasing transit's share of trips.

Investment Analysis

Description. An investment analysis evaluates proposed improvements to transportation facilities according to their benefits and costs to users and to society. This methodology can measure the rate of return of a project, the benefit/cost ratio, the net present value, or any other formulation using benefits and costs. This methodology is generally used as a supplement to other methodologies that have already determined possible improvements. An investment analysis narrows the list of needed improvements according to a predetermined rate of return, benefit/cost ratio, or net present value. As well as measuring the benefits and costs of individual projects, this analysis can evaluate a type of investment (e.g., resurfacing of rural arterials) on an aggregate level. Therefore, this methodology does not preclude the use of other methodologies; rather it depends on other methodologies to determine the proposed improvements to be further analyzed from the investment perspective.

On the national level this method of evaluation has been used extensively. For example, in 1988 the Congressional Budget Office evaluated improvements proposed in *The Status of the Nation's Highways, Bridges, and Transit: Conditions and Performances* and established rates of return for levels and types of investment. The levels of investment ranged from those necessary to maintain spending to those required to remedy all deficiencies. For each level of investment the average annual cost was calculated and was compared against the average annual user savings from making these improvements. An annual rate of return was then derived from this relationship.

Advantages. The major advantage of an investment analysis is its ability to evaluate projects based on their return to society. These returns include decreased user costs and increased economic development. This method takes into account the preferences of all users rather than the preferences of a few users. In other words, this methodology attempts to maximize the net benefit of transportation improvements to society by eliminating those improvements that do not generate a prescribed benefit to society as a whole.

In addition to determining what is needed, investment analyses can also prioritize projects in the likely circumstance of limited funds. In Oregon, for example, the long-range needs analysis compiles needs given specific assumptions, then prioritizes those needs according to a benefit/cost analysis. This investment analysis helps the state determine which projects should be completed first.

Disadvantages. User benefits and costs are difficult to accurately quantify because of disagreement on which costs and benefits

to include. The method that is chosen to quantify benefits and costs can significantly affect the calculation of needs. For example, on the national scale the Congressional Budget Office (CBO) released a report calculating the rate of return for certain types of projects. In response to this report the Texas Transportation Institute published a subsequent report using the same statistics found in the CBO report but with very different results as to the rate of returns on certain types of projects. The difference in results was caused by the modification of a few assumptions, including life-cycle costs and the useful life of specific improvements.

Budget Constraint

Description. Budget constraints, like investment analyses, are generally an add-on to other methodologies. The budget is set prior to the determination of needs, and another methodology is used to determine the needs that will conform to that budget. Most needs analyses are influenced by a budget constraint of some type. These constraints can be placed on total needs or on individual types of needs. For example, a government institution may have separate constraints on maintenance and improvements.

Advantages. The advantage of a budget constraint is that, theoretically, a budget would indicate society's willingness to pay for transportation as compared to other public goods. The cost of perfecting the transportation infrastructure will almost always exceed the availability of resources. The budget is a good tool to determine society's willingness to pay for certain public goods. If the majority is not willing to pay for certain improvements those improvements may not be "needed."

Disadvantages. Under a budget constraint, the needs process is artificially constrained. Therefore, the needs process may not evaluate the most efficient level of spending because the budget is placed on the process exogenously. The most efficient level of spending may be above or below the predetermined budget.

Accessibility Standards

Description. Accessibility to the transportation infrastructure can be as important to a community as is level of service. Accessibility can include accessibility to land through a grid of local roads or accessibility of the majority of the population to certain functional classifications of transportation such as limited access freeways on the road system. For communities that value accessibility, accessibility standards can be used to determine needs. For example, a standard could be stated in the form of a specific number of center-line miles by population density by land-use type, or freeway accessibility for a certain percentage of the population within an area.

Advantages. Because this methodology takes both demographic characteristics (such as land use and population density) and infrastructure characteristics into consideration, it facilitates the examination of the transportation infrastructure as a whole rather than the separate examination of each individual facility.

Disadvantages. The goal of access may be one of many goals for a state or local government. This goal may need to be balanced with other goals, such as connectivity and mobility. Accessibility standards focus, obviously, on the goal of access only. Therefore, accessibility standards are not generally regarded as a stand alone methodology. One exception to this might be the determination of needs on the local (according to functional classification) road structure. The focus of these needs is land access rather than mobility.

Plan Aggregation

Description. Plan aggregation is a bottom-up methodology that compiles and aggregates all local plans throughout the state. This methodology allows local goals and

objectives to be taken into consideration by allowing a local government to decide the needs of the community. In essence, the local community can use any methodology it deems appropriate to determine its needs. More and more emphasis has been placed on this type of methodology in recent years due to the goal of returning decision-making power to local governments.

Advantages. Plan aggregation allows local governments to determine needs based on local goals and objectives such as infill development or reducing congestion. This process empowers local governments by allowing them more flexibility in determining transportation needs.

Disadvantages. Consistency is a problem when using this methodology. If the state does not provide a standard methodology, with standard assumptions and definitions, there is no consistency from one local area to the next. This makes it difficult to perform a comparative analysis of different scenarios at the state level. For example, "improving conditions" could be interpreted in many different ways by local governments. In the aggregation of local plans it is difficult to determine if methodologies are consistent. Furthermore, regional and state objectives may not be met by local plans.

Local Surveys

Description. This methodology takes the approach of directly asking local governments what their needs are rather than collecting the information from secondary sources (i.e., locally-provided plans) as in the previous scenario. The survey can either simply ask what the needs of a local area are, or it can set criteria for determining needs and ask the local government to include all projects that fit these criteria. Needs are then aggregated at the state level. For example, in 1989 the Florida Department of Transportation chose to use a local survey to meet its mandate to compile all local needs for municipalities within the state of Florida. The survey was sent out to all city and county governments within the state. The local governments were asked to report on all funded and unfunded needs for county roads, city streets, and public transit for a five-year period. Included in the survey were instructions to provide consistency in interpretation among respondents. The results were a total highway need for counties and cities of $6.3 billion for capital and $2.6 billion for operations and maintenance. For transit, the identified local capital needs were $853 million and the operation and maintenance needs were $1.3 billion.[1]

Advantages. The major advantage of this methodology is its method of collection. Using primary sources gives the surveyor some control over the data. In plan aggregation the information must be taken "as is." Using surveys helps to ensure methodological consistency when looking at many different scenarios.

Disadvantages. The main limitation of local surveys is a low response rate. Local governments do not have a legal mandate to respond to a survey outside of their required aggregation of needs. In the state survey mentioned previously, the response rate was 36 percent for county government and 25 percent for city government. This methodology also tends to result in overstated needs, as many local governments are likely to have planned for more development than will actually occur.

Policy-Driven Analysis

Description. A policy-driven analysis can originate from a "round table" discussion consisting of a gathering of professionals, from a directive of one individual, or from the goals and objectives of society at large. With this method an analysis of needs is based on professional judgment rather than engineering standards or investment analysis. An example of this process is the recent Florida decision to limit urban interstates to ten lanes. This decision was a

policy-driven analysis of the goals and objectives stated in the Florida Transportation Plan rather than an analysis based on demand.

Advantages. One advantage of this methodology is its direct link to the goals and objectives of the state on the aggregate level. This link is not as evident when looking at engineering standards or levels of service on a segment-by-segment basis.

Disadvantages. The main disadvantage of a policy-driven analysis is its limitation to broad issues or decisions. It is not cost effective to address each individual issue on a state level in this manner. Furthermore, this process can be very subjective and inconsistent and could cause conflicting policies.

Needs Assessment Examples

In application, most needs assessment methodologies do not neatly fall into the methodologies just described. Most methodologies on the local, state, and national level are hybrids or combinations of two or more of the methodologies. In this section, both the Florida needs process and three other interesting, innovative, and comprehensive needs studies (one from the federal government and two from other states) are examined in detail.

Federal Study

The Status of the Nation's Highways, Bridges and Transit: Conditions and Performances— This is a report provided to the United States Congress on a biennial basis. The purpose of this report is to provide an objective appraisal of:

- current and anticipated demand for surface transportation services that will likely be provided by highway and transit systems;
- highway, bridge, and transit finance;
- current physical conditions and operating performance of these systems; and
- 20-year estimates of capital investment requirements by federal, state and local governments for maintaining or improving the physical and operating conditions of this system.

The data required for these analyses originate from three sources. Highway conditions and performances are analyzed using the Highway Performance Monitoring System (HPMS), a database containing a sample of 105,000 highway sections from all states. Bridge information is obtained from the National Bridge Inventory, which contains detailed information on conditions and performances on all bridges of 20 feet or greater length within the United States. Transit data originate from the Section 15 transit data reporting system, which contains detailed information on facilities and fleets.

These highway, bridge, and transit data are analyzed using three models: the Highway Performance Monitoring System Analytical Process, the Bridge Needs and Investment Procedure, and transit equipment and facility replacement rates. Two capital investment scenarios were analyzed using these models. These are the costs to maintain the overall physical condition and performance and the costs to improve the conditions and performance to a specified engineering performance standard over a 20-year time period. The report states that "the purpose of the scenarios is to provide general financial and performance benchmarks and a basis for development and evaluation of policy and program options." In other words, this report is not aimed at predicting facility-by-facility improvements. It is meant to be a guide for policymakers to make decisions about the long-range allocation of resources for transportation.

The result of this analysis was a nationwide annualized investment of $55.5 billion uninflated 1991 dollars to maintain conditions and performance from 1992 to 2011 for highways, bridges, and transit. The

nationwide annualized cost to improve conditions and performance was estimated at $73.7 billion un-inflated 1991 dollars.

Oregon Study

1993 Oregon Roads Finance Study—The purpose of this study was to provide the Oregon State Legislature with an estimate of funding requirements for the state's roads over a 20-year time period and give recommendations of revenue options to pay for these needs. The study examined the complete highway system of the state of Oregon including state-owned, county-owned, and city-owned roads. First, it determined the roadway needs from 1993 through 2012. Second, it prioritized those needs. Finally, it evaluated the funding of those needs under different priorities.

Roadway needs were determined using the Highway Performance Monitoring System Analytical Process (HPMS Model) developed by the Federal Highway Administration to analyze roadway sections. The HPMS Model was applied to a large sample of road miles from each functional classification and jurisdiction within the state. Current condition ratings for each segment in the sample were recorded in the database. These conditions mainly relate to traffic level of service and pavement condition. Also incorporated into the model were assumptions regarding the growth in vehicle miles traveled and inflation over the 20-year time frame. The model then compared the current conditions to minimum tolerable conditions, which reflect minimum standards of acceptability in road and bridge congestion, safety, and structural integrity according to recognized authorities such as the American Association of State Highway and Transportation Officials and the Federal Highway Administration. A need was identified when a segment fell below any one of these minimum tolerable conditions within the 20-year time period. Sample statistics were then used to make inferences about the entire inventory of roads to determine an unconstrained cost estimate for the needs to maintain or improve roads to specified minimum tolerable conditions. The result of this analysis was a total road and bridge needs over the twenty year period of $48.8 billion in 1991 constant dollars and $79.4 billion in inflated dollars. This estimate included eliminating the current backlog of deficiencies and performing all needs for preservation, improvement, and operation of 41,370 miles of roadway and 6,938 bridges over the 20-year time period.

After all needs were identified according to the minimum tolerable conditions criteria, the needs were prioritized using a return-on-investment analysis. This prioritization was useful in determining which projects to delay under a budget constraint. The result of this analysis was a ranking of needs into four categories by descending importance. These rankings are 1) preservation of the current system, 2) safety improvements, 3) critical capacity expansion, and 4) facility upgrades. From this ranking it was determined that the first three categories were high-priority needs. Therefore, the high-priority needs for the 20-year time period were estimated at $26.3 billion in constant 1991 dollars and $42.9 billion in inflated dollars.

Washington State Study

Washington Statewide Multimodal Transportation Plan—This document is a 20-year plan for the state-owned highways, ferry system, and airports in Washington state. For each of these three transportation systems three sets of service objectives were compiled: maintenance objectives, preservation objectives, and improvement objectives. These objectives range from general to specific. For example, highway objectives include providing safe, reliable roadway surfaces; providing level of service "C" on rural highways and HOV lanes; and connecting all urban areas with over 50,000 population with four-lane, limited-access facilities. In total, there were 34 highway

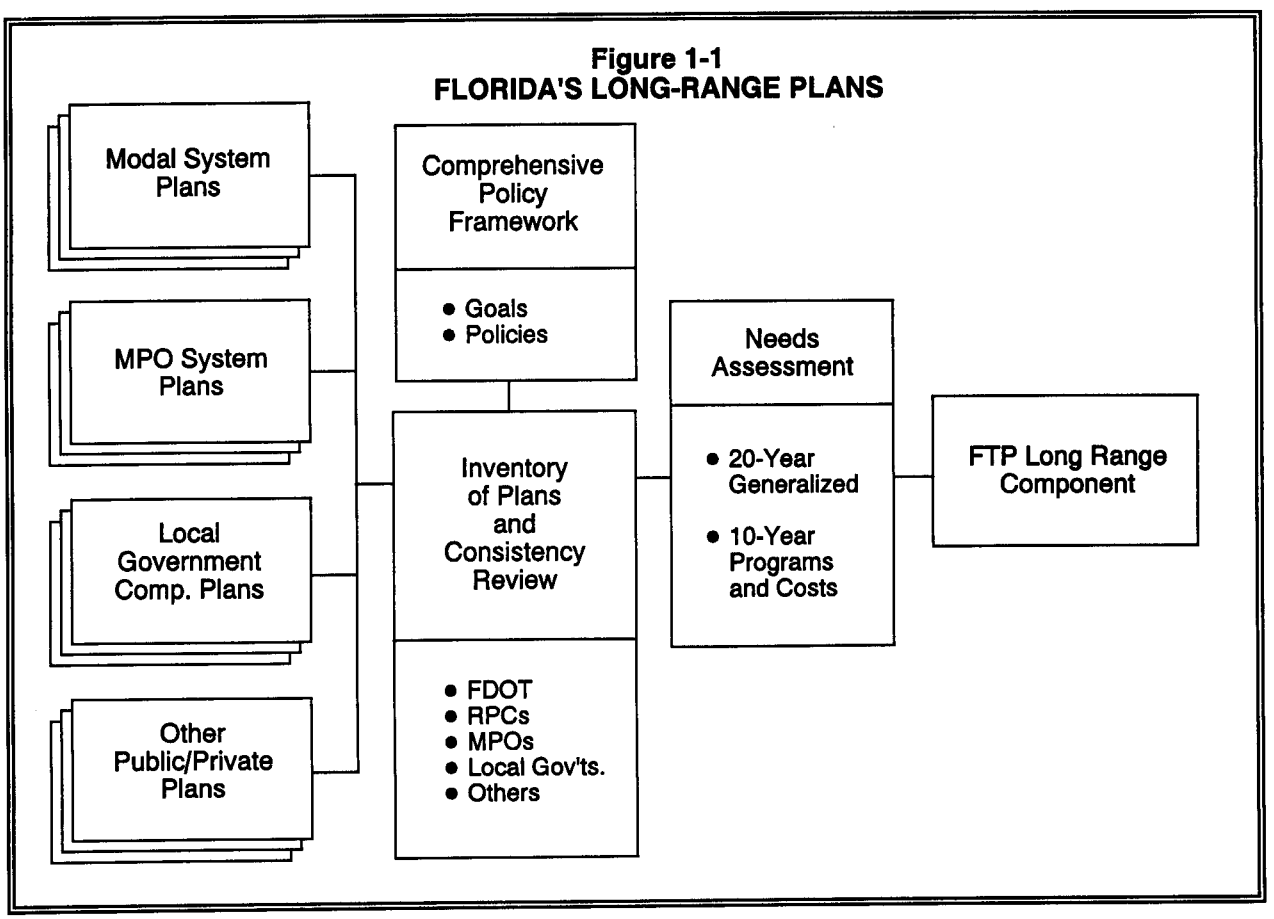
objectives, 8 ferry system objectives, and 4 airport objectives.

After determining the service objectives for each system the plan then examined the unconstrained cost of meeting those objectives over a 20-year period. The final step of the process was an examination of needs with constrained funding. Three possible scenarios were addressed: maintaining current levels of revenue (requiring lowered expectations regarding service objectives), fully funding the service objectives over twenty years, and fully funding the service objectives over a longer period.

Florida's Needs Process

The Florida integrated planning process began with the passage of the *1985 State Comprehensive Plan* and the 1985 *Growth Management Act.* Local governments subsequently prepared comprehensive plans as an integral component of their planning process. Metropolitan planning organizations (MPOs), created in 1975, also adopted long-range transportation plans. Similarly, FDOT adopted statewide modal system plans that complied with federal and state policies and procedures. These collective actions comprise today's state comprehensive long-range transportation plan, illustrated in Figure 1-1. In addition, recent legislation such as the federal Intermodal Surface Transportation Efficiency Act of 1991, and Clean Air Act Amendments of 1990, and the Florida Environmental Land Management Study II 1993 Legislation (Local Government Comprehensive Planning and Land Development, CS/HB 2315), have created additional requirements for the long range component (LRC) of the *Florida Transportation Plan* (FTP).

Figure 1-1
FLORIDA'S LONG-RANGE PLANS



Source: 1993 Florida Transportation Plan.

The first LRC is scheduled to be developed in 1994 as a part of the FTP. The focus of this document, as stated in Florida Statute 339.155, is to document the goals and long-term objectives necessary to implement FDOT's findings from its examination of 25 different plan development criteria, such as strategies to incorporate bicycle transportation facilities, address recreational travel and tourism, and reduce traffic congestion. The statute states that the FTP shall consider the needs of the entire state transportation system, examine the use of all modes to effectively and efficiently meet such needs, and provide for the interconnection of all types of modes in a comprehensive intermodal transportation system.

Although the first documented, publicly-available transportation needs assessment was prepared in 1988, it was not until 1991 that FDOT proposed a formalized transportation needs process. This was the first step in developing a comprehensive, long-range transportation system plan that incorporates all modes and is consistent with local government comprehensive plans.

The primary function of the needs assessment process as outlined in the *1991 State Transportation Needs Assessment Summary Report* is to establish consensus with local governments as to what transportation improvements are needed to satisfy demand over a 10-year period. The process is designed to identify various options and alternatives that could later be evaluated to a greater extent or could prompt policy changes related to transportation investments and allocations in the future. Initially, prospective improvements are identified without regard to fiscal constraints or feasibility.

A departmental task force made up of FDOT district and central office representatives developed the four-part methodology to estimate statewide needs by category and district. These estimates are used in the development of the annual Program and Resource Plan (PRP), which in turn is used in the preparation of the Work Program. The sources of information used by each district consist of modal system plans and work program, local government comprehensive plans, MPO plans, and other state and local plans.

The key assumptions and criteria underlying the methodology as stated in the report include the following:

- The measurement of needs must not be constrained by funding or production limitations.
- To comply with growth management efforts, the needs must not be inconsistent with other state plans, regional policy plans, or local government comprehensive plans.
- Existing plans, studies, and processes would be used to the greatest extent possible. Consistency must be maintained on inter-district projects.
- Projects identified as needed within the first ten years will, to the maximum extent feasible include a range of projected costs in present-day dollars.
- Needs must incorporate multi-modal tradeoffs, so that trips assigned to one mode are not duplicated by being assigned to a second mode.
- Projects must be based on adopted projections of land use.

The methodology was developed to be implemented in a four-step process with each step containing a unique definition of needs. The salient features of each step are summarized below:

Step One: Needs are defined as the measure of unconstrained mobility demand by a particular agency. Each agency and organization independently evaluates mobility needs for its jurisdiction and from its perspective for the next 20 years. The criteria for determining such needs are the locally-adopted level of service standards.

Step Two: Needs are defined as the measure of unconstrained mobility demand as identified by consensus. FDOT evaluates the mobility needs provided by MPOs, county governments (in non-urbanized areas), and other agencies and organizations in step one. The principal objective is to maintain consistency throughout the transportation system, and, secondly, to achieve consensus. Other significant policy issues for each local jurisdiction are documented along with projected long-term land use and economic growth trends.

Step Three: Needs are represented as a list of facilities and services determined through consensus (after the consideration of appropriate constraints), and designed to address previously identified mobility demands. FDOT together with the MPO or local government develops a list of the facility and service needs for the first ten years of the 20-year period. At this stage appropriate constraints must be considered, and cost estimates for each improvement are generated in present-day dollars. Improvements are then ranked according to their priority as listed below:

- Priority 1 - Projects with existing or prior commitment (i.e., included in FDOT's Work Program, adopted plans of local governments and MPOs, etc.).
- Priority 2 - Backlogged facilities and services, and those facilities and services needed to maintain existing levels of service while accommodating projected growth and increased travel demand.
- Priority 3 - New transportation needs determined through the consensus building process with local governments, which will improve levels of transportation service for Florida's communities.

Step Four: In the final step all improvements are compiled and evaluated for any inconsistencies or conflicts by representatives from the modal offices. This results in the development of the Statewide System Plan. The final products are subject to public review. Finally, the principal issues identified in step two are evaluated for future policy recommendations.

To summarize, the Florida needs process provides 10-year facility and service estimates for each of the seven FDOT districts and the Florida Turnpike. Estimates are calculated in present-day costs, ranked in descending priority, and cataloged according to mode. The needs assessments are updated and reported as part of the Florida Transportation Plan documentation to facilitate decision making. The intent of this needs-based planning process, as stated in the report, is to provide the general framework for more detailed analysis of specific transportation opportunities, including assessments of mobility demand, identification of corridors to be protected, and recommendations for future policy direction. The needs assessment exercise has also enhanced communication and cooperation between the different levels of government.

The Florida needs process is aimed at giving a project-by-project view of future needs. The purpose of the present study is to examine needs from an aggregate level in order to evaluate revenue needs and the appropriateness of different funding options. It, therefore, was not used for this study's analysis of long-term needs.

Chapter 2

Determination of Needs

The transportation infrastructure of the state of Florida consists of many facilities, modes, and programs, including roadways, bridges, transit, paratransit, bicycles, pedestrians, airports, seaports, rail, and intermodal systems. In this section, characteristics and an inventory of each of these are presented.

Roads and Bridges

The roadway system is unquestionably the largest portion of Florida's transportation infrastructure. It is made up of interstates, freeways, expressways, other principal arterials, minor arterials, collectors, and local roads and streets. Bridges on this system include movable span bridges, fixed span bridges, and culverts.

The roadway system consists of 110,569 centerline miles and 10,856 bridges, which are split up into state and local jurisdictional responsibility. The state has responsibility for 10.7 percent of Florida's centerline miles of roads, and local governments have jurisdictional responsibility for the remaining 89.3 percent of centerline miles.

Tables 2-1 and 2-2 show the amount of annual travel in Florida by functional classification. Lower classifications such as collectors carry very little traffic per centerline mile as compared to the higher

Table 2-1
1992 CENTERLINE MILES (CLM) AND VEHICLE-MILES TRAVELED (VMT), STATE-OWNED ROADS

Functional System	*Total CLM*	*Percentage of Total CLM*	*Total Annual VMT (in millions)*	*Percentage of Total VMT*
Rural				
Interstates	1,000	8.5%	9,835	13.1%
Other Principal Arterials	3,652	30.9%	11,432	15.2%
Minor Arterials	2,255	19.1%	4,193	5.6%
Major Collectors	697	5.9%	889	1.2%
Urban				
Interstates	413	3.5%	11,663	15.5%
Other Freeways & Expressways	244	2.1%	4,489	6.0%
Other Principal Arterials	2,171	18.4%	22,923	30.5%
Minor Arterials	1,303	11.0%	9,380	12.5%
Collectors	67	0.6%	332	0.4%
Total	11,803	100.0%	75,137	100.0%

Source: 1992 Highway Performance Monitoring Systems Database, FDOT.

classifications such as arterials. Table 2-3 shows the number of bridges by jurisdiction.

Conditions and Performance

This section identifies the current conditions and performance of Florida's roadway system. This information is useful to establish the baseline of conditions and performance to compare to future conditions and performances given different levels of funding.

The physical condition of a section of roadway is judged by pavement condition, lane width, horizontal and vertical alignment, and drainage adequacy. Table 2-4 presents statistics on the pavement conditions for 1992 of Florida's state-owned and locally-owned roads (excluding local roads by functional classification). The scale by which the condition of pavement is defined in this table is the present serviceability rating (PSR) system. The ratings range from 0, which is poor, to 5, which is good. As shown in the table, Florida has 6.5 percent of its lane miles in poor pavement condition and 45.0 percent of its lane miles in good pavement condition.

The performance of roadways is judged in terms of congestion. Congestion is the measure of volume per capacity of a facility. Presented in Table 2-5 is the measure of volume of traffic per lane of roadway compared with capacity per lane. As shown, 2.8 percent of all lane miles in Florida are moderately congested and 3.8 percent are highly congested. The majority of the congestion occurs on urban interstates, with 65.2 percent of those lane mile being congested at the peak hour.

The condition of bridges in the state's highway system is measured by the number of structurally deficient bridges and the number of functionally obsolete bridges. As shown in Table 2-6, in the 1992 base year 7.9 percent of state and local bridges were rated as structurally deficient. A structural

Table 2-2
1992 CENTERLINE MILES (CLM) AND VEHICLE-MILES TRAVELED (VMT), LOCALLY-OWNED ROADS

Functional System	*Total CLM*	*Percentage of Total CLM*	*Total Annual VMT (in millions)*	*Percentage of Total VMT*
Rural				
Minor Arterials	110	0.1%	467	1.0%
Major Collectors	3,780	3.8%	2,682	6.0%
Minor Collectors	5,364	54.3%	1,925	4.3%
Local	45,093	45.7%	3,302	7.3%
Urban				
Other Principal Arterials	41	0.0%	356	0.8%
Minor Arterials	946	1.0%	5,219	11.6%
Collectors	4,791	4.9%	9,830	22.0%
Local	38,642	39.1%	20,881	47.0%
Total	98,766	100.0%	44,662	100.0%

Source: 1992 HPMS.

Table 2-3 1992 BRIDGES BY JURISDICTION	
Jurisdiction	*Number of Bridges*
State-Owned	6,046
Locally-Owned	4,810
Total	10,856

Source: 1993 National Bridge Inventory Data Base, FDOT.

deficiency usually indicates that a bridge is unable to handle the vehicle loads or speeds that are normally expected on the highway segment where the bridge is located. Functional deficiencies on the other hand, indicates a bridge that has inadequate width or vertical clearance when compared to the associated highway segment. For example, many bridges become functionally obsolete when lanes are added or widened on the approach to the bridge. In 1992, 28.6 percent of state and local bridges in Florida were functionally deficient.

Calculation of Needs

The analysis of road and bridge needs for this study was conducted using large scale computer models along with comprehensive statewide road and bridge data bases. This study marks the first application of this software at the state level in Florida and a departure from previous needs assessment methods. The following section describes the analytical process and the road and bridge inventory data used in the analysis.

Table 2-4
1992 ROAD PAVEMENT CONDITION BY PERCENT OF LANE MILES, STATE AND LOCAL ROADS

Functional System	*Poor*	*Mediocre*	*Fair*	*Good*	*Total*
Rural					
Interstates	13.1%	17.9%	21.1%	47.9%	100.0%
Other Principal Arterials	4.1%	7.7%	37.6%	50.6%	100.0%
Minor Arterials	3.5%	9.8%	19.1%	67.6%	100.0%
Major Collectors	0.4%	21.2%	44.8%	33.6%	100.0%
Minor Collectors	13.1%	34.3%	29.3%	23.3%	100.0%
Urban					
Interstates	16.7%	7.1%	11.3%	64.9%	100.0%
Other Freeways & Expressways	0.1%	2.2%	15.4%	82.3%	100.0%
Other Principal Arterials	3.9%	11.4%	36.7%	48.0%	100.0%
Minor Arterials	2.8%	13.2%	28.1%	55.9%	100.0%
Collectors	9.3%	14.6%	34.8%	41.3%	100.0%
Total	6.5%	16.3%	32.2%	45.0%	100.0%

Poor: 0.0 - 2.0 (2.5 for interstate)
Mediocre: 2.1 - 2.5 (2.6 - 3.0 for interstate)
Fair: 2.6 - 3.4 (3.1 - 3.4 for interstate)
Good: 3.5 - 5.0

Source: 1992 HPMS.

Table 2-5
1992 CONGESTED PEAK HOUR TRAVEL BY PERCENT OF LANE MILES, STATE AND LOCAL ROADS

Functional System	*Moderately Congested*	*Highly Congested*	*Total Congested*
Rural			
Interstates	7.3%	2.9%	10.2%
Other Principal Arterials	0.1%	0.0%	0.1%
Minor Arterials	0.0%	0.5%	0.5%
Major Collectors	0.0%	0.7%	0.7%
Minor Collectors	0.1%	0.0%	0.1%
Urban			
Interstates	14.2%	51.0%	65.2%
Other Freeways & Expressways	10.3%	13.9%	24.2%
Other Principal Arterials	7.7%	5.9%	13.6%
Minor Arterials	5.8%	7.0%	12.8%
Collectors	0.8%	1.0%	1.8%
Total	2.8%	3.8%	6.6%

Moderately congested: volume/service flow ratio between 0.8 and 0.95.
Highly congested: volume/service flow ratio greater than 0.95.
Source: 1992 HPMS.

Roads. Roadway data were obtained from the Highway Performance Monitoring System (HPMS). HPMS was developed by the federal government to ensure that adequate roadway transportation information is available to support the many functions and responsibilities of government. In cooperation with state agencies, local governments, and metropolitan planning organizations, HPMS data is collected in each state in the nation to facilitate transportation planning, policy, and decisionmaking. Extensive data (78 items) on physical and operational characteristics are collected for a representative sample of the nation's roadways. States submit HPMS data to the Federal Highway Administration (FHWA) each year for further analysis. The premier report prepared from HPMS data is the biennial report to Congress on the status of the nation's highways, bridges, and transit. This report is prepared through the use of

Table 2-6
1992 BRIDGE DEFICIENCIES

Deficiency	*Percent of Bridges*
Structurally Deficient	7.9%
Functionally Deficient	28.6%
Functionally Adequate	63.5%

Source: 1993 BNIP.

specially developed software, the HPMS Analytical Process.

The HPMS Analytical Process has been made available to the states for their own use through FHWA's ongoing technology transfer program. This engineering-based procedure uses HPMS data to develop relationships between various levels of capital investment and resulting future conditions and performance of the roadway system. Given changing resource constraints, it has become increasingly important not only to assess the current conditions of the roadway system, but also to predict future conditions under different investment strategies. This functionality provides the decisionmakers with the information necessary to better balance potential outcomes against potential financial resources.

The analytical model evaluates HPMS data on interstate, arterial, and collector functional systems using a statistical sample with an accuracy of within five percent, plus or minus, at a 90 percent confidence level. Thirty separate computer programs are dynamically linked to provide many complementary analyses including base year analysis, composite index analysis, deferred cost and impact analyses, investment analysis, and needs analysis. The steps involved in the major needs analysis include identifying deficiencies, selecting improvements types from a prioritized ranking scheme, and simulating the impact of improvements along with their respective costs. Costs are then summarized by improvement type that represent the dollar value of needs for the analysis period, given user-specified assumptions and parameters.

The assumptions and parameters used in the process are critical because they can significantly affect the resulting needs. Therefore, the analytical process was customized with Florida specific parameters. These parameters were applied to both state-owned roads and locally-owned roads.

The analytical process is an engineering standards driven analysis incorporating three major parameter sets: threshold levels, design standards, and construction and right-of-way costs. Threshold levels represent the minimum desired standards of acceptability in highway congestion, safety, and structural integrity. The specific threshold levels for each functional classification of roadway differ according to traffic volumes and terrain. In the state of Florida, two types of terrain exist—flat and rolling. In practice, when a roadway segment falls below a threshold level, the model looks forward for other future deficiencies in an effort to time and coordinate improvements in the most cost efficient manner. When a roadway segment falls below a threshold standard a need is identified.

Threshold levels are established for the following categories to determine deficiencies:

- lane width
- right shoulder width
- shoulder type
- pavement condition
- volume/capacity ratio
- surface type
- horizontal alignment
- vertical alignment

The second parameter set used in the analysis is design standards. When conditions deteriorate below state defined threshold levels, improvements are built to design standards. Therefore, design standards represent FDOT's current standards for new construction, reconstruction, and other improvements to a facility. In the dynamic framework of the analytical process, design standards are used to assign new condition values to the improved facility.

The final parameter sets used in the analysis are construction and right-of-way costs. The costs of improvements include typical types of work constructed to state-determined design standards. Costs are defined

as either rural or urban due to the divergence in such costs and are reduced to a standard unit of measurement, the total cost per lane-mile. The national default costs have been amended by an adjustment factor to represent the true cost of construction improvements in the state of Florida. The adjustment factor is derived using a market basket of actual material and labor cost in Florida.

In addition to the parameter sets discussed above, other assumptions are also important in the model simulation process. For example, the rate of growth of vehicle miles traveled (VMT) can have a sizable affect on the estimated needs. In this analysis, the projected average increase in VMT over the next 20 years of three percent per year was used.[2] This projection was provided by FDOT in the coded HPMS data base submitted to FHWA. Of course, the more vehicle miles traveled on the state's roadways the greater the need for capacity, maintenance, and safety improvements. Other recent research conducted by the Center for Economic and Management Research at the University of South Florida as part of the State Transportation Policy Initiative forecasts higher rates of growth in VMT.

Using an econometric model, the Center for Economic and Management Research forecasted the consumption of motor fuels as the first step in forecasting the rate of growth in VMT. Motor fuels consumption was then multiplied by fleet fuel efficiency to derive this relationship. Using two separately specified econometric models, VMT was forecasted to grow at 3.1 to 3.9 percent annually over the time period 1991 to 2010. Again, an estimate of 3.0 percent annual VMT growth was used because this rate is encoded in the data provided by FDOT.

Another important assumption in the final estimation of needs is the assumed rate of inflation. In this study, needs have been presented in both 1992 constant (uninflated) dollars and in current (inflated) dollars with an assumed rate of inflation. Constant dollars provide ease in comparison, but they do not portray total future revenue needs. The difficulty lies in the fact that costs and thus funding requirements increase as a result of inflation while not all revenues do. Florida's motor fuels tax, however, contains two components, the fuel sales tax and the State Comprehensive Enhancement Transportation System (SCETS) tax, that are adjusted annually to an inflation index. Nevertheless, this does not eliminate the disparity between funding needs and revenues. Because federal, local, and the remaining state tax sources do not routinely adjust with inflation an ever widening gap will persist between future needs and revenues.

Inflation factors for roads and bridges in this study were based on long-term construction cost forecasts for the construction component and an assumed five percent annual rate of inflation for right-of-way and other non-construction components. Both estimates were supplied by FDOT. As previously stated, the effect of compounded inflation over the 20-year analysis period is significant. Given FDOT's construction inflation forecast, a $1 roadway need identified today will cost $1.80 in the year 2012, and a $1 right-of-way need identified today will cost $2.65 in the year 2012, attributable entirely to inflation.

The HPMS Analytical Process is oriented towards capital improvement and preservation projects. Thus, project development costs such as planning, preliminary design, environmental analysis, right-of-way consulting services and litigation support, final design, and construction engineering inspection must be added-on by the user. In this analysis, long term proportions of these "product support" items were derived from FDOT Program and Resource Plan data. These proportions were used to "mark-up" raw construction and right-of-

way costs to produce a more fully inclusive estimate of overall project cost. A similar approach was taken with respect to maintenance, operating, and administrative costs, which were also calculated on a proportionate basis.

Bridges. Bridge needs are estimated in a similar fashion to roadway needs, but in a separate system. The National Bridge Inventory (NBI) contains data furnished by the states for each bridge in the United States with a length of 20 feet or more. These data are furnished in accordance with the requirements of the *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.* These are the only condition and inventory data used by the Bridge Needs and Investment Process (BNIP), the analytical process used in this study.

FHWA has developed BNIP to estimate current and future bridge needs, both backlog and accruing, of the nation's bridges. The process projects the deterioration of bridges and estimates the conditions for a specified analysis period. BNIP is a system analysis tool that is intended to forecast general types of deficiencies, improvements, and costs that will be needed on a systemwide, statewide, or nationwide basis. The analytical process was customized to incorporate Florida specific parameters. FDOT supplied the threshold levels and the design standards for this analysis.

BNIP is an engineering standards driven analysis incorporating three major parameter sets: threshold levels, design standards, and improvement and replacement costs. Threshold levels are used by the process to identify deficiencies. A deficiency is identified by comparing the values of conditions to the threshold levels. If the ratings do not meet the values of the threshold levels for any element, the bridge is deficient.

Threshold levels are established for the following categories to determine deficiencies:

- bridge width and traffic
- lane width
- shoulder width
- bridge load capacity
- vertical clearance
- deck condition
- superstructure condition
- substructure condition
- culvert condition

The second parameter set used in the analysis is design standards. The design standards are used in replacement and widening improvements. The design standards represent FDOT's current standards for bridges.

The final parameter sets used in the analysis are improvement and replacement costs. In this analysis, improvement costs are determined in terms of rehabilitation or widening of the three bridge elements: deck, superstructure, or substructure. Bridge replacement costs are measured in terms of dollars per square foot of deck area.

The analytical model evaluates all NBI data for bridges on the interstate, arterial, and collector systems including culverts, under both state and local jurisdiction. BNIP provides base year analyses, investment analysis, and needs analysis. The analyses begin by placing each structure into one of three categories. The three categories are structurally deficient, functionally deficient, or functionally adequate. Subsequent steps in the analysis differ depending on the category in which a bridge is classified.

The first phase of the analysis determines if the bridge is structurally deficient. The critical element used to determine structural deficiency is load carrying capacity. If a structure is not found to be structurally deficient, then the next phase determines whether it is functionally deficient. Measures of functional deficiency include the vertical clearance ratio, or waterway adequacy. If a structure is not categorized as either structurally or functionally deficient, then

it is assumed functionally adequate, although the analysis does not stop here. All functionally adequate structures are compared against threshold levels to determine if a condition deficiency exists. If the ratings on deck, superstructure, and substructure do not meet these threshold levels, the bridge is deficient.

The process uses certain factors and relationships to predict future deficiencies. These include deterioration equations, traffic growth rates, and K-factors for estimating design-hour volume or traffic. The deterioration equations were developed by the Transportation Systems Center of the U.S. Department of Transportation using NBI data. Coefficients for these equations were developed for each state and for 13 structure types. Traffic growth rates are determined from the inspection year ADT and the future year ADT coded in the data record for each structure. The traffic K-factors were developed by FHWA for each state and functional system using HPMS data.

The analysis of roadways and bridges included the examination of needs under the four scenarios described in chapter one. The following is an analysis of each scenario.

Maintain Funding Scenario. This scenario considers a budget constraint for the 20-year analysis period, thus restricting the available level of funding. Under this scenario, future funding for roads and bridges by the state, counties, and cities is limited to amounts currently forecasted by FDOT and other sources under current law. The purpose of this analysis is twofold: (1) to determine the total effect of limiting road and bridge expenditures to current projected levels; and, (2) to serve as the reference scenario to be used in the calculation of shortfalls when evaluated against other alternatives. The resulting future conditions and performance of the system under this scenario were then evaluated in terms of deteriorating conditions, safety, and service.

For the initial 10-year period, expenditures on improvements, preservation, and maintenance and operations by the state were obtained from FDOT's 30-Year Program Plan.[3] Local expenditures were determined from local transportation improvement programs and statistics reported in Federal Highway Administration's *Highway Statistics.*

A number of assumptions were necessary for application of this analysis. Assumptions on revenue growth of current sources were adopted from FDOT's Revenue Forecasts and Proposed Program Levels for Statewide and MPO Plans. The federal share of revenue on roads and bridges is forecasted to increase at approximately one percent per year for each of the next 20 years. State revenue sources are projected to increase approximately four percent per year.

Local revenues do not keep pace with inflation and traffic growth. Fuel taxes levied for/by local governments grow with fuel consumption, but are not indexed to inflation. Sales and property taxes grow with the general level of economic activity. These levies are not explicitly indexed to inflation, but ultimately generate additional revenue when general inflation affects the dollar value of taxable sales and property values. The composition of Florida local government revenue for transportation has shifted towards local option fuel taxes (which grow at about 2.5 percent per year) and away from sales and property taxes (which grow in the range of four to seven percent per year). This shift in emphasis has increased the long-run impact of inflation on real local transportation revenues. Extrapolation of this trend produces an average growth rate of local highway revenue of 3.1 percent per year.

As shown in Table 2-7, state road and bridge needs for the first ten years of this

scenario total $24.2 billion in 1992 dollars and $28.1 billion in inflated dollars. Needs for the entire 20-year period total $45.6 billion in 1992 dollars and $63.9 billion in inflated dollars. The higher inflated revenues are the result of indexed state motor fuels taxes, the growth in vehicle-miles traveled, and the growth in population. Each of these variables has an effect on the amount of revenue generated. For example, both the state motor fuels sales tax and the SCETS tax are adjusted annually by the consumer price index (CPI). Similarly, growth in VMT and population increase the motor fuels tax base and vehicle registration fees, respectively. However, real uninflated expenditures will decrease under this scenario, because road and bridge expenditures are subject to inflation while all revenue sources are not.

Table 2-8 presents needs for locally-owned roads and bridges for the first scenario. For the first ten years of the 20-year period local needs total $11.6 billion in 1992 dollars and $13.0 billion in inflated dollars. The 20-year local needs total $23.2 billion

Table 2-7
STATE ROADS AND BRIDGES TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Current Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
10 Year 1992 Dollars	$24,217	$28,993	$25,618	$32,203
10 Year Inflated Dollars	$28,086	$34,319	$30,008	$37,947
20 Year 1992 Dollars	$45,607	$58,181	$51,201	$70,967
20 Year Inflated Dollars	$63,947	$83,651	$73,589	$103,870

Table 2-8
LOCAL ROADS AND BRIDGES TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Current Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
10 Year 1992 Dollars	$11,620	$15,329	$15,329	$18,689
10 Year Inflated Dollars	$13,048	$17,677	$17,677	$21,555
20 Year 1992 Dollars	$23,240	$32,062	$32,062	$38,640
20 Year Inflated Dollars	$30,918	$44,721	$44,721	$54,294

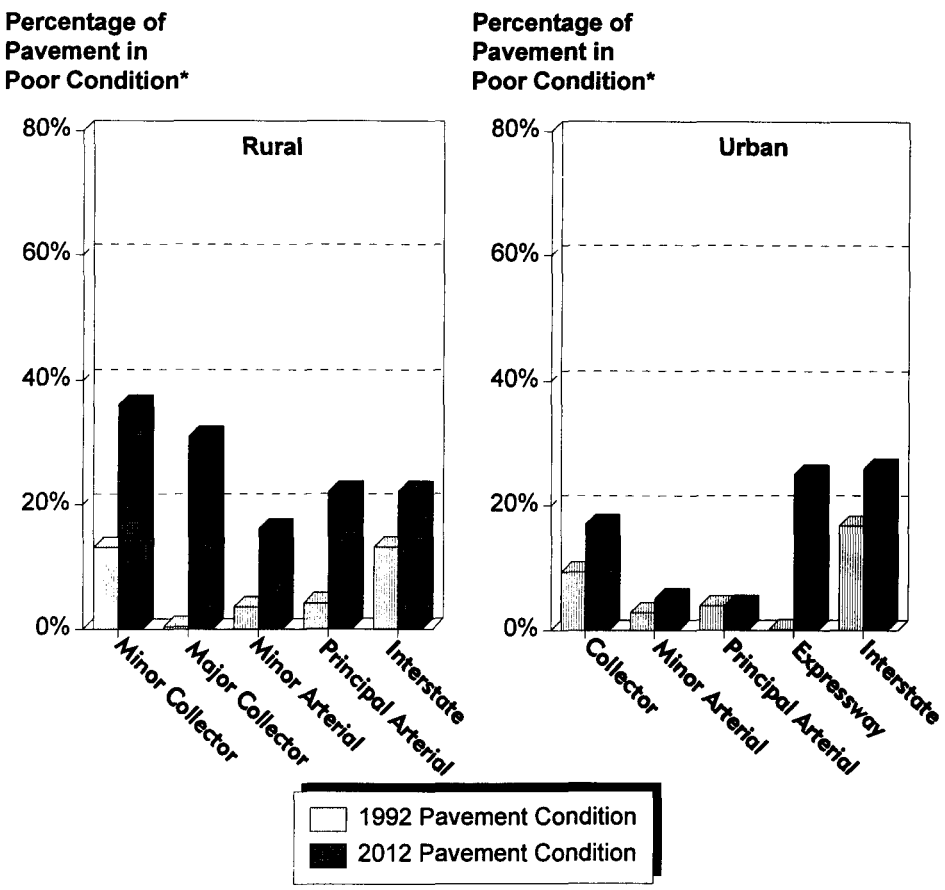
in 1992 dollars and $30.9 billion in inflated dollars.

Figures 2-1 and 2-2 show graphically the effect of declining real revenues on pavement condition and level of congestion, respectively. FDOT proposed maximum lane policies were used in this analysis.

Maintain Conditions Scenario. Under this scenario, improvements are made to maintain current conditions in pavement condition, safety, and congestion over the 20-year time period. However, some road and bridge system characteristics are not simply maintained under this scenario. In fact, bridge replacement/repair, and routine maintenance are actually improving under this scenario due to statutory requirements. Florida Statute 334.046 establishes the program objectives of the Florida Department of Transportation for the purpose of enhancing public safety and providing for a comprehensive transportation system. Compliance with these objectives is accomplished by planning and programming the necessary projects to meet the specific goals in the timeframe outlined. FDOT has adopted agency operating policies to achieve these statutory mandates. FDOT has outlined certain targets, through its agency operating policies, to meet these legislative mandates.

The following is a partial list of FDOT's program objectives.

Figure 2-1
PAVEMENT CONDITION GIVEN CURRENT FUNDING



*Based on highway industry standards.

- To complete the Florida interstate system.
- To meet the annual needs for resurfacing of the state highway system, including repair and replacement of bridges on the system, and to provide routine and uniform maintenance of the state highway system.
- To reduce congestion on the state transportation system, the generation of pollutants, and fuel consumption by:

1) developing and implementing the Florida intrastate

highway system as approved by the legislature;

2) reducing deficient lane miles through new construction and expansion of existing facilities;

3) constructing intersection improvements, grade separations, and other traffic operation improvements;

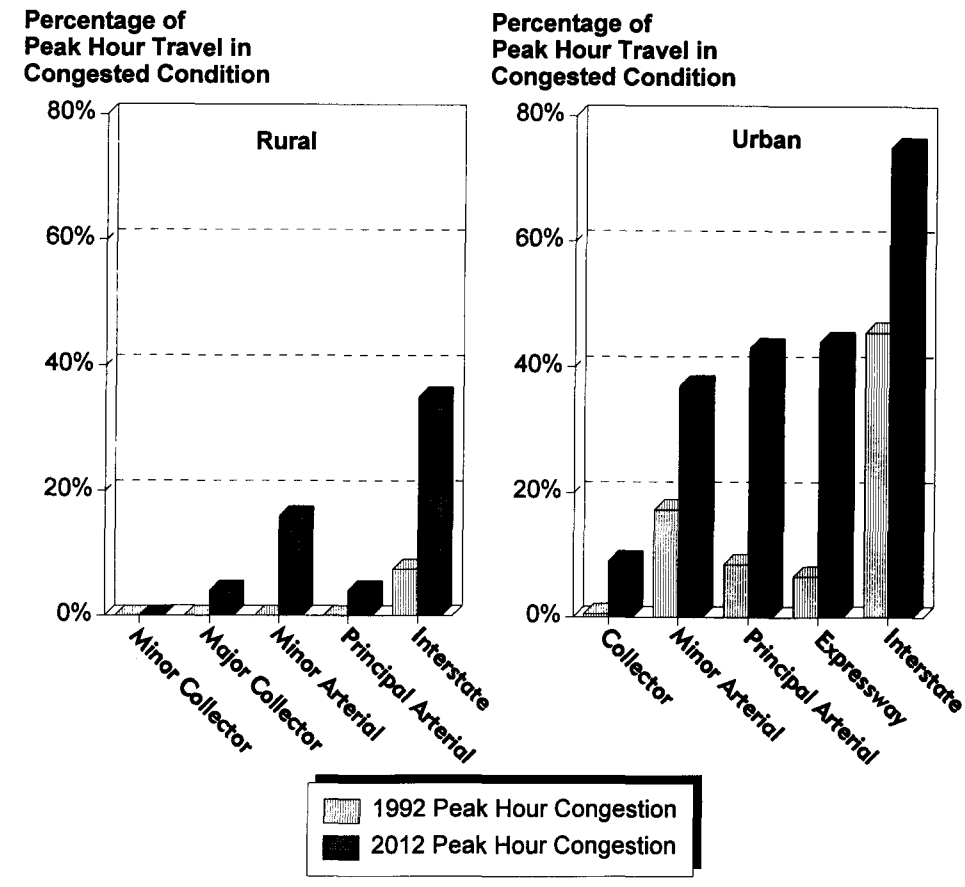
4) participating in the development of toll roads; and

5) promoting all forms of public transit.

According to the findings reported by the Florida Transportation Commission, the state work program is planned to meet the goals for resurfacing, bridge repair, bridge replacement, and routine maintenance. To the extent that these goals are currently programmed, they are contained in the "Maintain Funding" scenario. This is the case because current funding was derived from programmed projects. However, the statutory requirement to "reduce congestion" is more a matter of degree. Currently programmed capacity improvements will reduce congestion from levels that would exist had the improvements not been made. Nevertheless, at current funding levels total congestion will continue to increase because these improvements cannot keep up with the forecasted growth in VMT. Reductions in total congestion can only be accomplished either by reducing the growth in VMT, by increasing transportation expenditures, by implementing transportation demand management strategies, or by changing funding priorities. FDOT's current ranking of priorities are: (1) safety, (2) preservation, and (3) capacity/mobility improvements.

The "Maintain Conditions" scenario assumes that bridge repair and replacement, and routine maintenance are carried out as in "Maintain Funding." In other words, these statutory program objectives are also met in this scenario. The result of meeting

Figure 2-2
PEAK HOUR CONGESTION
GIVEN CURRENT FUNDING



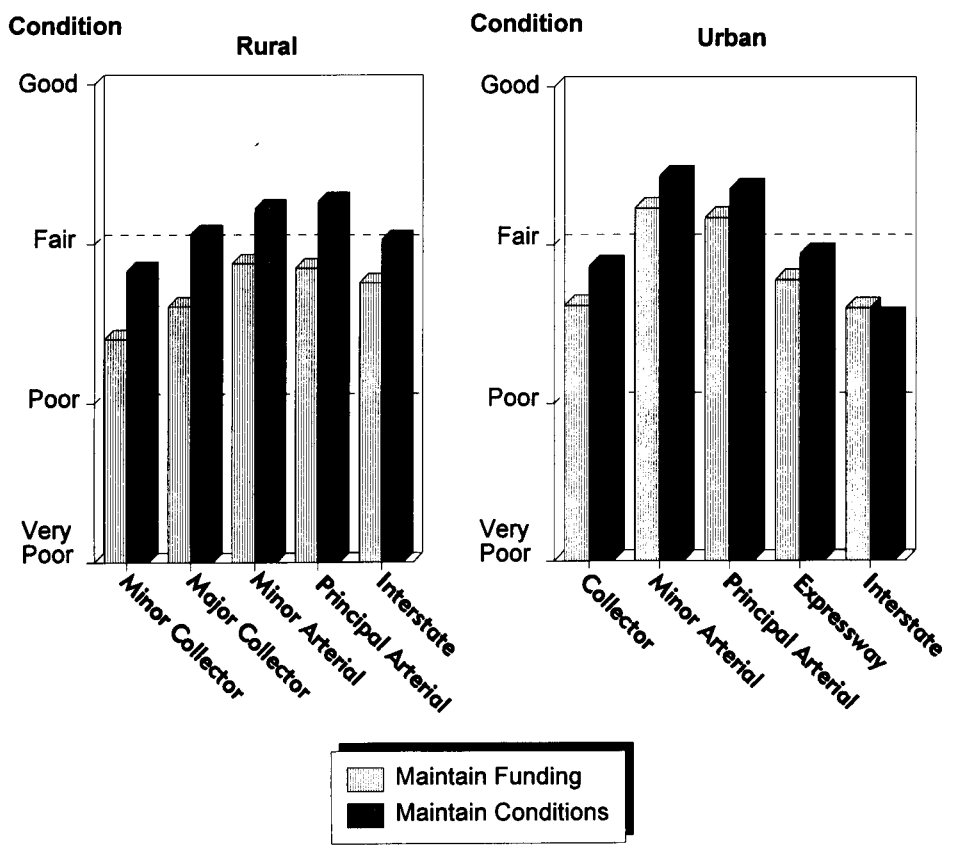
Note: Congested travel has a volume to service flow ratio greater than 0.90.

program objectives actually translates into improved conditions for these elements as backlogs are reduced from previous levels and accruing deficiencies are addressed as they occur. However, such is not the case for safety, pavement condition, and congestion level. The "Maintain Funding" scenario leads to worsened conditions for these elements relative to the status quo embodied in the "Maintain Conditions" scenario.

The HPMS analytical process was used to evaluate needs for this scenario. Under this methodology, data collected by FDOT for the FHWA Highway Performance Monitoring System was used. This data set contains a statistically valid sample of roadway segments and bridges from each functional classification across the state. This sample is representative of the entire state system and contains detailed statistics on conditions and performance for each segment. To determine needs, growth factors and assumptions about current levels of service were applied to the data to determine what improvements are necessary to maintain these current conditions over the 20-year time period. The output of this analysis on the sample of roadways was then translated to apply to all roadways within the state system. The result is a determination of the state's road and bridge needs under a scenario of maintaining current conditions.

The current conditions for this scenario were obtained from the HPMS base year

Figure 2-3
PAVEMENT CONDITION IN 2012
MAINTAIN FUNDING VERSUS MAINTAIN CONDITIONS

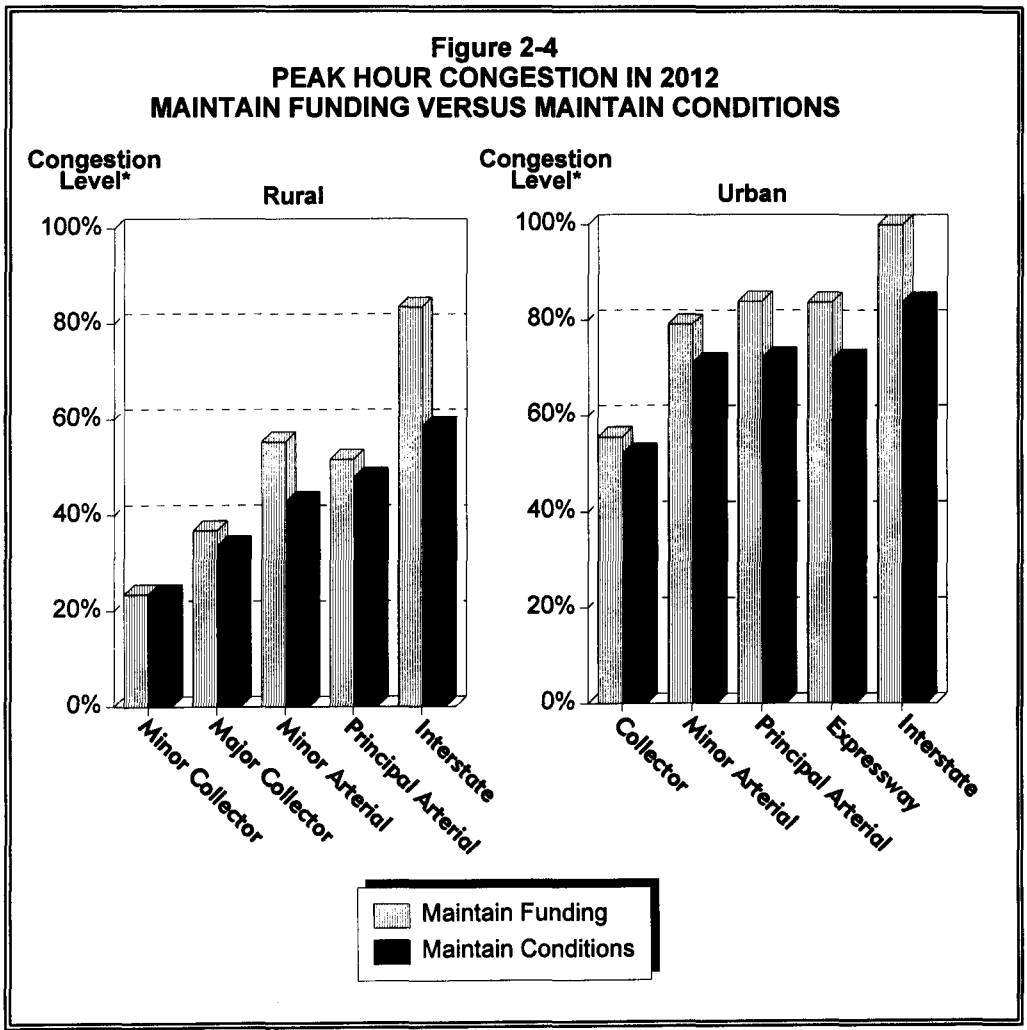


(1992) weighted composite index tables. The composite index is based on a concept similar to the sufficiency rating procedure employed by many states to numerically evaluate roadway segments. The composite index is the weighted sum of three component indices–condition, safety, and service. The first component, condition, relates to the physical condition of the roadway and contains such variables as pavement type and condition rating, and drainage adequacy. The second component, safety, is measured in terms of lane, shoulder, and median width as well as alignment adequacy. The third and final component in the composite index is service, which is determined by the volume to capacity ratio and access control. A composite index value of 100 represents a newly constructed roadway segment that meets all applicable state design standards. Base year values for each functional system are listed below.

Urban Systems		*Rural Systems*	
Interstate	74.0	Interstate	85.9
F'way/Exp'way	82.2	Principal Arterial	83.5
Principal Arterial	78.4	Minor Arterial	89.9
Minor Arterial	86.5	Major Collector	89.1
Collector	91.3	Minor Collector	87.2

Once the base year conditions were obtained, an iterative process was conducted to determine funding levels for improvements to maintain the same composite index rating as in the base year. Funding in future periods is provided to keep the same

Figure 2-4
PEAK HOUR CONGESTION IN 2012
MAINTAIN FUNDING VERSUS MAINTAIN CONDITIONS



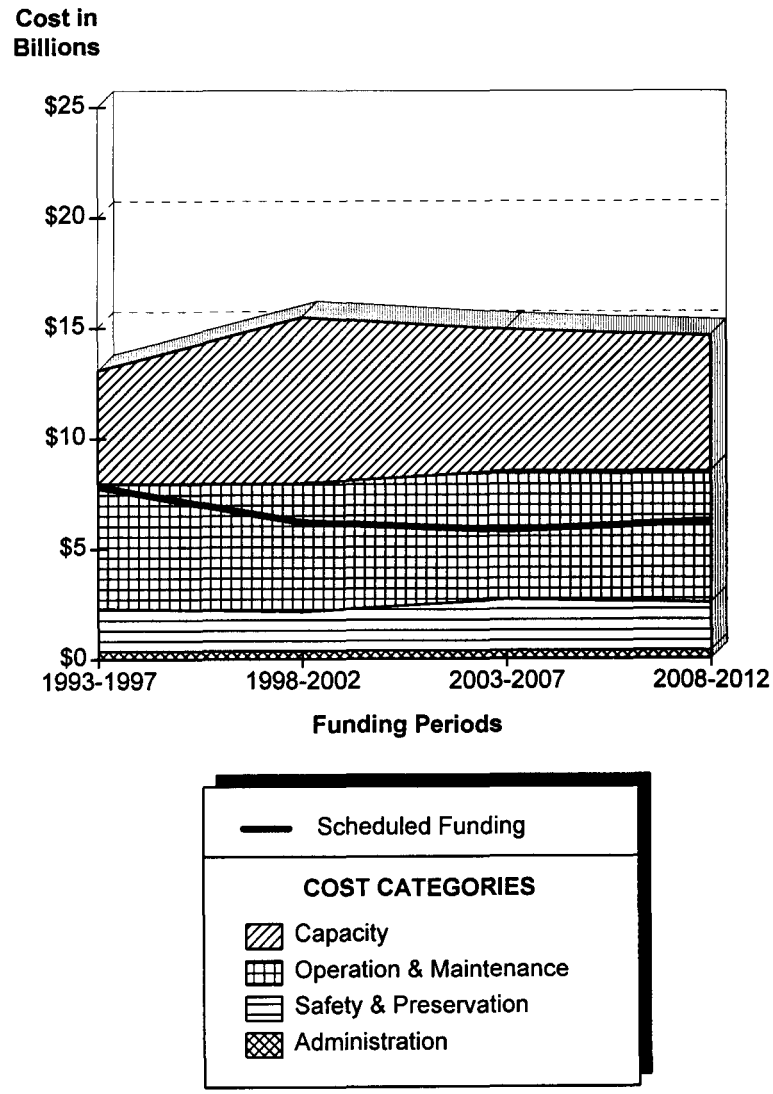
*Average volume to service flow ratio.

conditions on the road system over the 20-year period.

The analytical process also provides a future data set for the target year (2012) once the iterations are complete. The data set provides information on the conditions and performance characteristics of the system in the target year in terms or physical condition, safety, and service.

Under this scenario, composite averages of the future physical condition of the roadway, safety features, and service are consistent with the original data for the base year. Figures 2-3 and 2-4 show graphically the difference in pavement conditions and level of congestion, respectively, between the scenario and "Maintain Funding."

Figure 2-5
STATE ROAD AND BRIDGE NEEDS VERSUS SCHEDULED FUNDING: MAINTAIN CONDITIONS

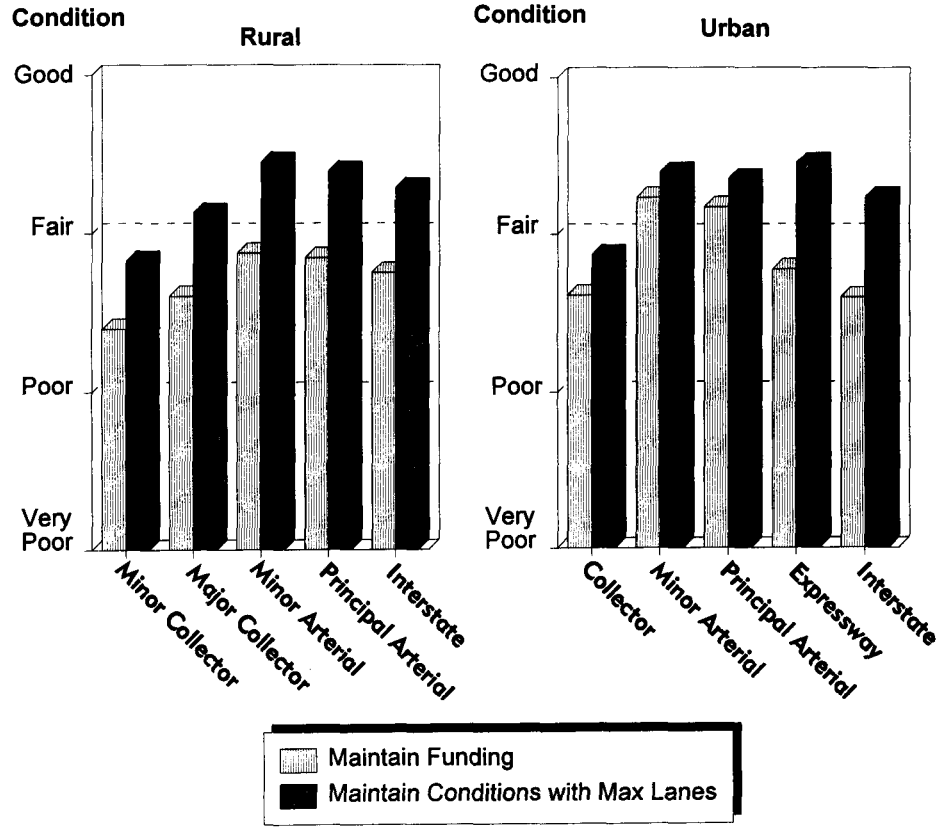


As shown in Table 2-7, for the first 10 years of the 20-year period state needs total $29.0 billion in 1992 dollars and $34.3 billion in inflated dollars. For the entire 20 years of the period state needs for the second scenario total $58.2 billion in 1992 dollars and $83.7 billion in inflated dollars. The inflation index used for road needs is based on long-term construction cost forecasts supplied by FDOT.

Table 2-8 presents needs for locally-owned roads and bridges for the second scenario. For the first 10 years of the 20-year period local needs total $15.3 billion in 1992 dollars and $17.7 billion in inflated dollars. The 20-year local needs total $32.1 billion in 1992 dollars and $44.7 billion in inflated dollars. Figure 2-5 graphically illustrates the difference between highway needs under this scenario and scheduled funding.

Maintain Conditions (with Maximum Lane Policy) Scenario. This scenario is identical to the previous scenario with an additional assumption that constrains the maximum number of lanes for each road of a particular functional classification. The maximum number of lanes policy assumption is based on the actual FDOT maximum lane policy for Interstate highways and the proposed land standards contained in the draft 2020 Florida Transportation Plan. If a road reaches its maximum allowable lanes before the end of the 20-year period, no additional capacity is added even if the level of service deteriorates due to increasing demand. The difference in

Figure 2-6
PAVEMENT CONDITION IN 2012
MAINTAIN FUNDING VERSUS MAINTAIN CONDITIONS WITH MAXIMUM LANE POLICY



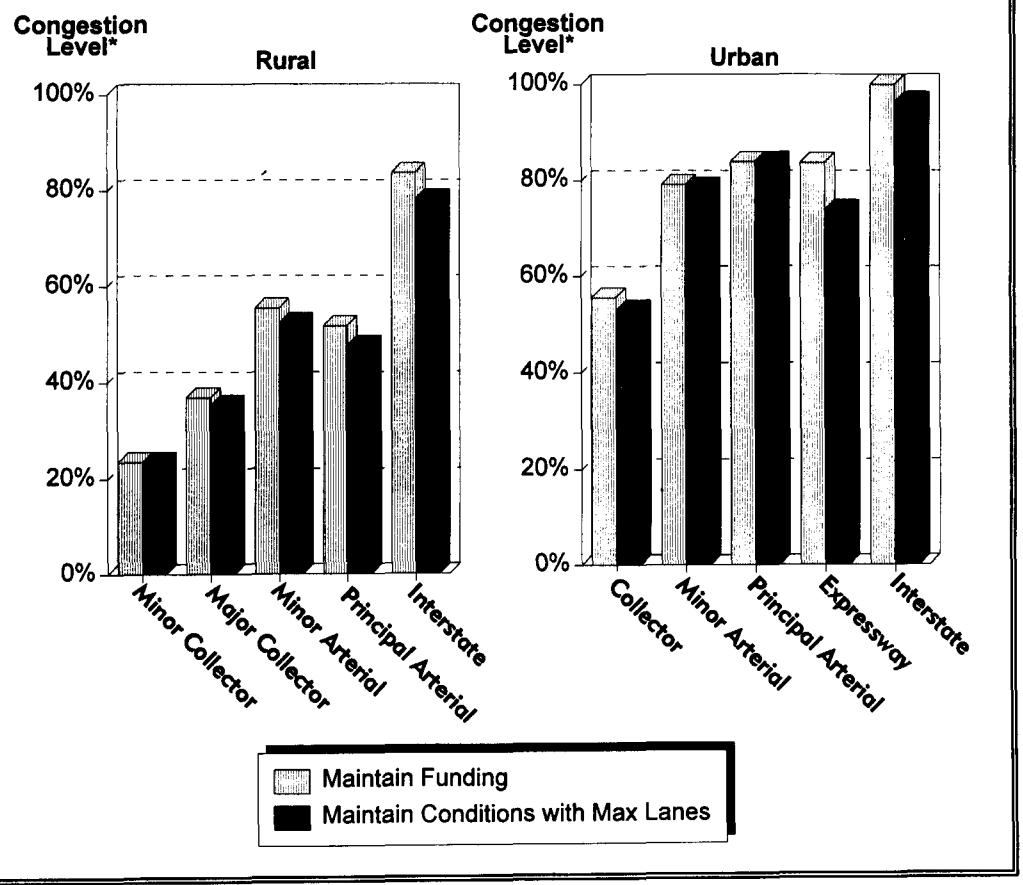
expenditure level between maintaining conditions and maintaining conditions with maximum lane policy is then transferred to modes of public transportation. This scenario is policy driven with the result that the decrease in supply from limiting capacity improvements on the road system would be shifted to transit and rail. The maximum number of lanes allowed for each functional system are listed below.

Urban		*Rural*	
Interstate	10	Interstate	6
F'way/Exp'way	10	Principal Arterial	6
Principal Arterial	6	Minor Arterial	4
Minor Arterial	6	Minor Collector	4
Collector	6	Minor Collector	4

Once again, the HPMS analytical process was used to determine needs under the scenario. The same assumptions for conditions as in the previous scenario were applied to the process while imposing a cap on the number of lanes. However, this added assumption caused the target year conditions for the urban systems to vary from the base year conditions. The composite index and the target year data set show where these discrepancies arise. When the maximum number of lanes have been constructed the future conditions for the target year (2012) are affected and further improvements are restricted.

The effects of the maximum lane policy on condition, safety, and service, as captured

Figure 2-7
PEAK HOUR CONGESTION IN 2102
MAINTAIN FUNDING VERSUS MAINTAIN CONDITIONS WITH MAXIMUM LANE POLICY

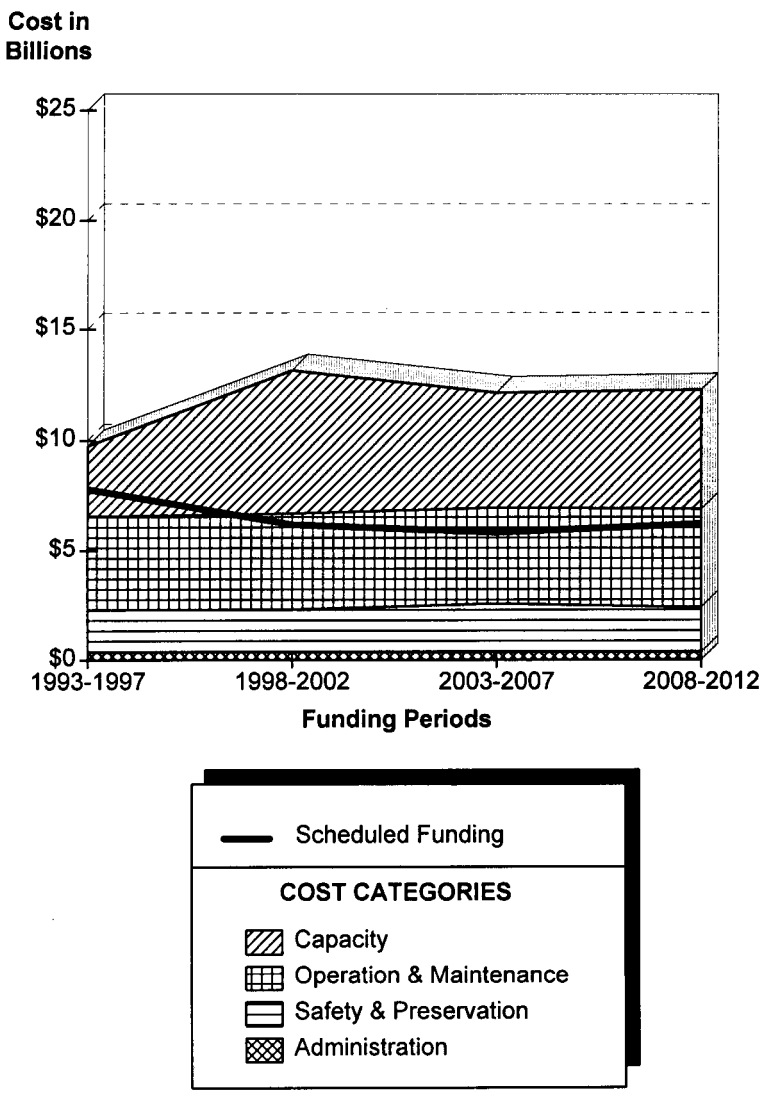


*Average volume to service flow ratio.

in the composite index, are illustrated in the following list of urban systems. The composite index for interstates, freeways/ expressways, principal arterials, and minor arterials shows a slight decline in the target year index. When the maximum number of lanes is reached, no further expansion of the highway is possible; this leads to the evident deterioration in the composite

Urban Functional System	*Base Year Composite Index*	*Target Year Composite Index*
Interstate	74.0	72.9
Freeway/Expressway	82.2	81.5
Principal Arterial	78.4	72.4
Minor Arterial	86.5	83.0
Collector	91.3	91.1

Figure 2-8
STATE ROAD AND BRIDGE NEEDS VERSUS SCHEDULED FUNDING: MAINTAIN CONDITIONS WITH MAXIMUM LANE POLICY



index. Figure 2-6 and 2-7 show graphically the difference in pavement condition and level of congestion, respectively, between this scenario and "Maintain Funding."

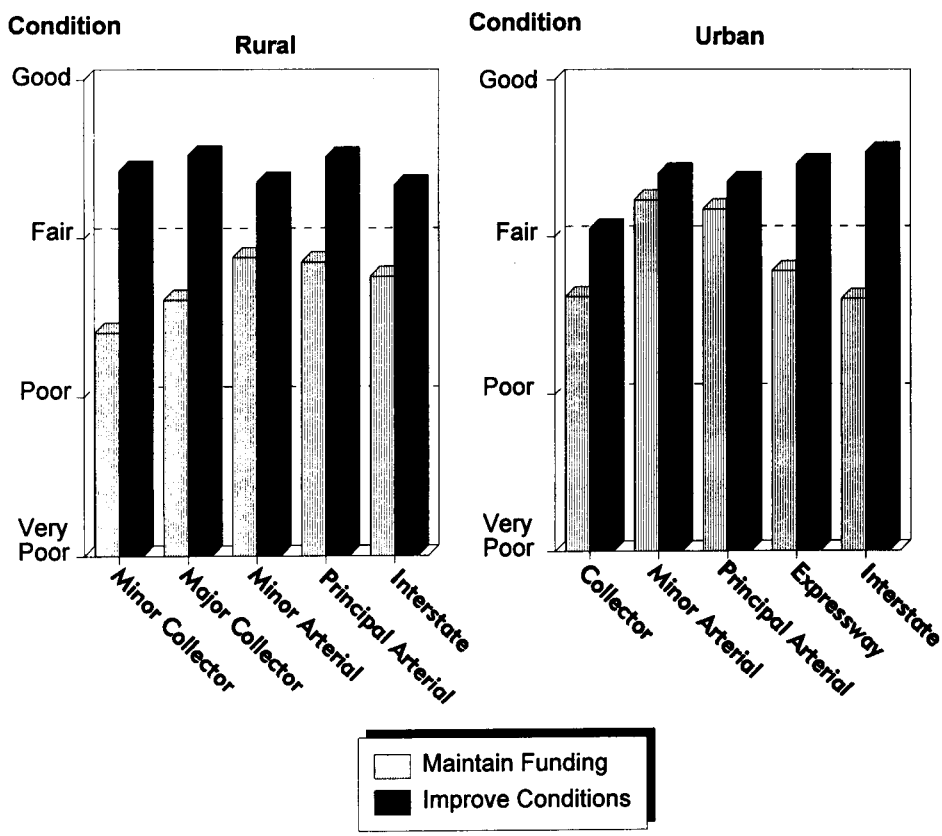
As shown in Table 2-7, for the first 10 years of the 20-year period, state needs total $25.6 billion in 1992 dollars and $30.0 billion in inflated dollars for the third scenario. For the entire 20 years of the period, state needs for the third scenario total $51.2 billion in 1992 dollars and $73.6 billion in inflated dollars. The inflation index used for road needs are based on long term construction cost forecast for construction components and five percent per year for non-construction components.

Table 2-8 presents needs for locally-owned roads and bridges for the third scenario. For the first 10 years of the 20-year period local needs total $15.3 billion in 1992 dollars and $17.7 billion in inflated dollars for the third scenario. The 20-year local needs for the third scenario total $32.1 billion in 1992 dollars and $44.7 billion in inflated dollars. There is no change from the previous scenario "Maintain Conditions" because the maximum lane policy only applies to state-owned roads. Local governments may set the number of lanes to reflect the local communities desires or may choose not to impose any lane restrictions. However, flexibility in this area is ultimately restricted by concurrence laws. Figure 2-8 graphically illustrates the difference between highway needs under this scenario and scheduled funding.

Improve Conditions. This scenario provides an unconstrained measure of total needs, where all deficiencies are corrected to a set of standards based on both current and proposed FDOT standards.

The first step in analyzing needs under this scenario requires the identification of existing deficiencies. The process identifies deficiencies for the base year as well as those simulated to occur during a specified analysis period. If no deficiencies are found in the base year, the process continues

Figure 2-9
PAVEMENT CONDITION IN 2012
MAINTAIN FUNDING VERSUS IMPROVE CONDITIONS



through the analysis period until a deficiency is found or until the end of the period is reached. After all deficiencies have been identified, the needs process selects improvements to correct these deficiencies. Once a specific improvement type has been selected, the improvement is "made" on a simulation basis. Relevant data items are changed to reflect the improvement, and the process continues. Construction and right-of-way costs are estimated for each improvement made to the simulated highway system.

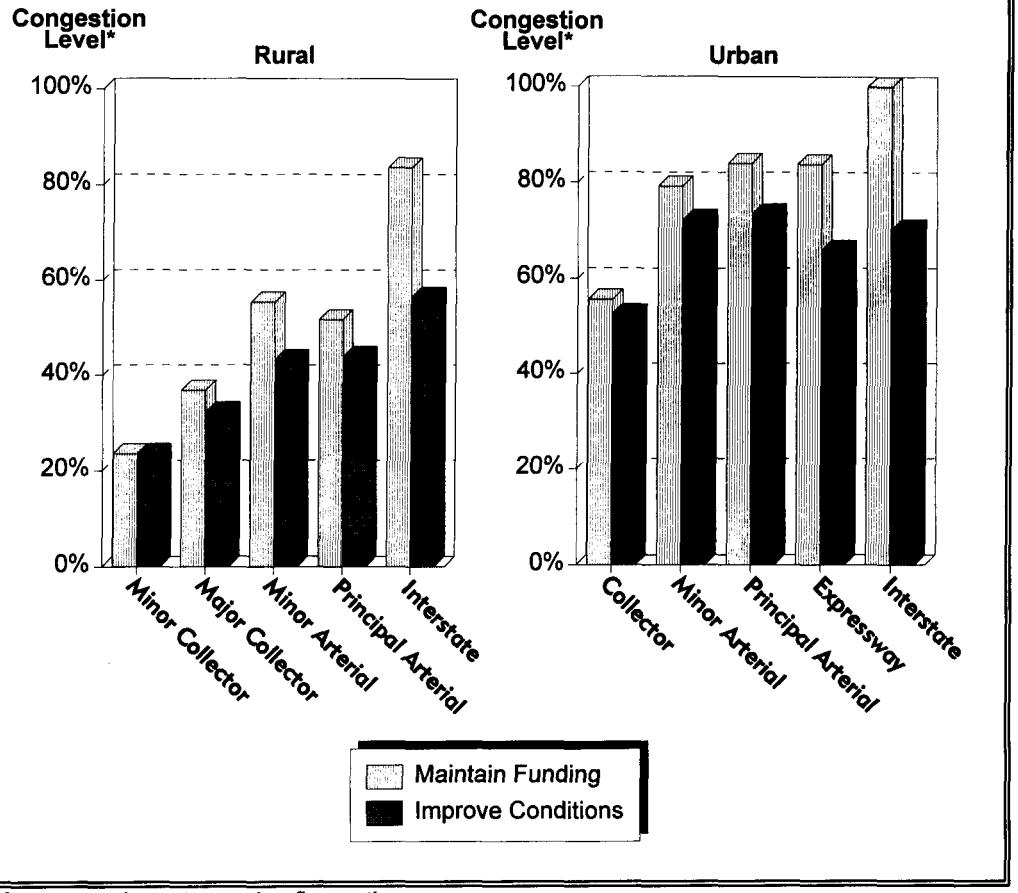
Although an absolute reduction in total congestion was not achieved under the "Maintain Funding" and "Maintain Conditions" scenarios, congestion is reduced in this scenario. Improvements are initiated when a facility falls below the state-defined threshold levels for congestion. In addition, resurfacing, bridge repair/replacement, and routine maintenance are improved to levels that exceed the other scenarios. Necessary improvements are determined by the state-defined threshold levels. Figures 2-9 and 2-10 show graphically the difference in pavement condition and level of congestion, respectively, between "Improve Conditions" and "Maintain Funding."

Funding levels are set to the maximum possible for each funding period in this scenario. This allows all needed improvements to be funded. Backlog deficiencies are corrected as well as future simulated deficiencies.

As shown in Table 2-7, for the first 10 years of the 20-year period state needs total $32.2 billion in 1992 dollars and $37.9 billion in inflated dollars for the fourth scenario. For the entire 20 years of the period, state needs in the improve conditions scenario total $71.0 billion in 1992 dollars and $103.9 billion in inflated dollars.

Table 2-8 presents needs for locally-owned roads and bridges for the improve condi-

Figure 2-10
PEAK HOUR CONGESTION IN 2012
MAINTAIN FUNDING VERSUS IMPROVE CONDITIONS

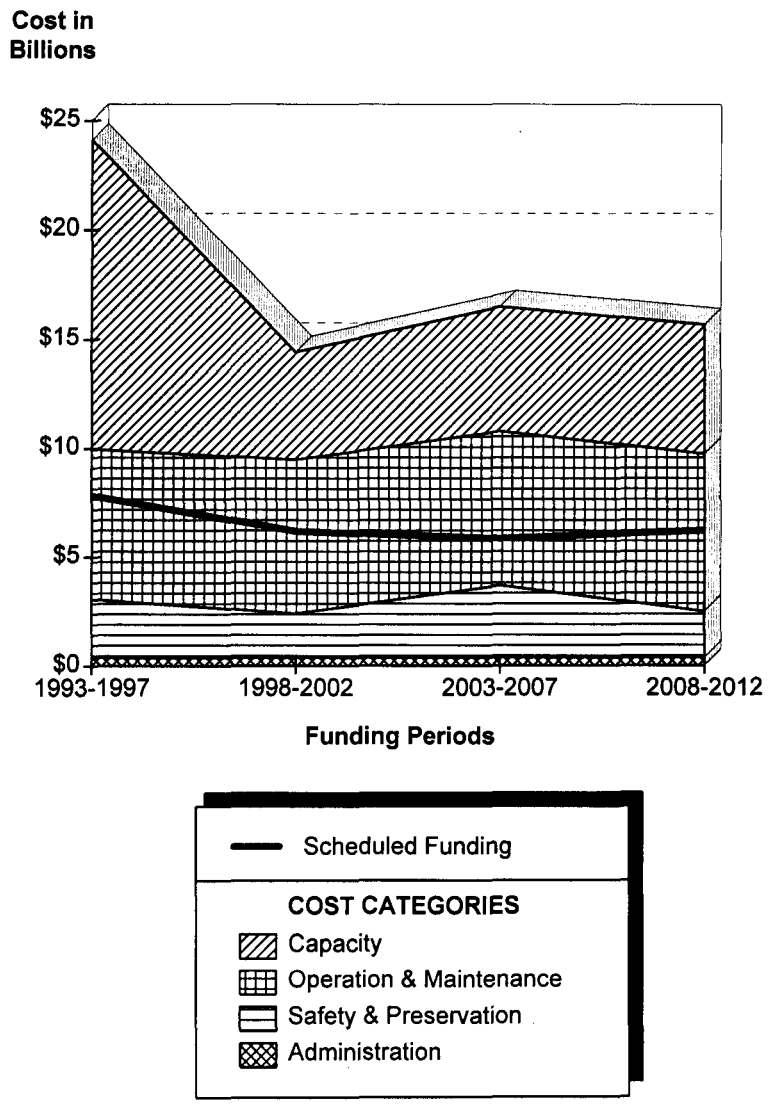


*Average volume to service flow ratio.

tions scenario. For the first 10 years of the 20-year period, local needs total $18.7 billion in 1992 dollars and $21.6 billion in inflated dollars. The 20-year local needs total $38.6 billion in 1992 dollars and $54.3 billion in inflated dollars. Figure 2-11 graphically illustrates the difference between highway needs under this scenario and scheduled funding.

The composite index and other data for the target year show the condition, safety, and service levels given unlimited funding for improvements. The results of this scenario are presented in Tables 2-9 and 2-10. As shown in a comparison of tables 2-4 and 2-9, the percent of roads with poor pavement ratings decreases from 6.5 percent in 1992 to 0.6 percent in 2012. As shown in a comparison of tables 2-5 and 2-10, the percent of urban interstate experiencing some degree of peak hour congestion decreases from 65.2 percent in 1992 to 8.0 percent in 2012.

Figure 2-11
STATE ROAD AND BRIDGE NEEDS VERSUS SCHEDULED FUNDING: IMPROVE CONDITIONS



Ten- and Twenty-Year Revenue Shortfalls. After estimating total needs under each scenario, the expected state and local revenue shortfalls for each scenario were forecasted. Several assumptions were made to estimate these revenue shortfalls. Table 2-11 shows the 10-year state revenue shortfalls for state roads and bridges expressed in 1992 dollars. There is no expected revenue shortfall in the "Maintain Funding" scenario because it is assumed that all

sources of revenue would continue at their current funding levels for the 20-year period. For the second scenario, "Maintain Conditions," there is a forecasted 10-year state shortfall of $4.8 billion. The shortfall in this scenario can be attributed to increased real expenditures needed to maintain conditions. In the third scenario, the expected 10-year state shortfall totaled $1.4 billion. Again, the shortfall can be attributed to the aforementioned factor. However, with the inclusion of the lane cap, the shortfall has decreased significantly in this scenario. Finally, for the fourth scenario, the 10-year state shortfall totaled $8.0 billion. This shortfall is the result of the increased real expenditures needed to improve conditions, or stated another way, the increased expenditures for total needs.

The table also shows these shortfalls in inflated dollars. In all scenarios, it is assumed that federal revenue for roads and bridges will grow at an annual rate of one percent, or in other words, real federal revenue will decrease over the analysis period. State revenue is forecasted to increase four percent per year with real revenues showing a slight increase over the 20-year period. It is assumed that 1992 state funding represents the maximum allowable revenue that can be raised given the current authorized level of taxes and fees. Therefore, the road and bridge expenditures that exceed current federal funding allocations are the responsibility of the state. It should be mentioned, however, the one percent growth in federal revenues is a conservative estimate. It is expected that Florida's

Table 2-9
2012 ROAD PAVEMENT CONDITION BY PERCENT OF LANE MILES UNDER IMPROVE CONDITIONS SCENARIO

Functional System	*Poor*	*Mediocre*	*Fair*	*Good*	*Total*
Rural					
Interstates	0.0%	29.3%	40.3%	30.4%	100.0%
Other Principal Arterials	0.1%	1.6%	33.5%	64.8%	100.0%
Minor Arterials	0.0%	0.5%	53.4%	46.1%	100.0%
Major Collectors	0.2%	0.1%	46.0%	53.7%	100.0%
Minor Collectors	0.5%	0.3%	61.3%	37.9%	100.0%
Urban					
Interstates	5.9%	23.5%	29.8%	40.8%	100.0%
Other Freeways & Expressways	0.0%	0.0%	68.9%	31.1%	100.0%
Other Principal Arterials	0.1%	6.2%	52.2%	41.5%	100.0%
Minor Arterials	0.5%	5.2%	55.3%	39.0%	100.0%
Collectors	0.9%	22.5%	63.6%	13.0%	100.0%
Total	0.6%	8.7%	50.2%	40.5%	100.0%

Poor: 0.0 - 2.0 (2.5 for interstate) Mediocre: 2.1 - 2.5 (2.6 - 3.0 for interstate)
Fair: 2.6 - 3.4 (3.1 - 3.4 for interstate) Good: 3.5 - 5.0

Source: 1992 HPMS.

allocation of federal dollars may increase as a result of the year 2000 ensus, which would tend to reduce the need for some state and local funding. Projections of the increase vary due to uncertainty but range between one and three percent.

Table 2-12 presents the 10-year revenue shortfall for locally-owned roads and bridges under the different scenarios, also expressed in 1992 dollars. For the "Maintain Funding" scenario, there is no expected local revenue shortfall. For the second scenario, "Maintain Conditions," there is a forecasted 10-year local shortfall of $3.7 billion. In the third scenario, the expected 10-year local shortfall totaled $3.7 billion. For the fourth scenario, the 10-year local shortfall totaled $7.1 billion. It is assumed that there are no current deficiencies in functionally classified local roads. A distinction should be drawn, however, between locally-owned roads and local roads, where the latter is just one class of road under local government ownership. The table also shows these shortfalls in inflated dollars.

Table 2-13 shows the 20-year state revenue shortfall for state roads and bridges under the different scenarios, expressed in 1992 dollars. There is no expected revenue shortfall in the "Maintain Funding" scenario. For the second scenario, "Maintain Conditions," there is a forecasted 20-year state shortfall of $12.6 billion. In the third scenario the expected 20-year state shortfall totaled $5.6 billion. And, for the

Table 2-10
2012 CONGESTED PEAK HOUR TRAVEL BY PERCENT OF LANE MILES UNDER IMPROVE CONDITIONS SCENARIO

Functional System	*Moderately Congested*	*Highly Congested*	*Total Congested*
Rural			
Interstates	0.0%	0.0%	0.0%
Other Principal Arterials	0.1%	0.2%	0.3%
Minor Arterials	0.7%	0.3%	1.0%
Major Collectors	0.0%	0.0%	0.0%
Minor Collectors	0.0%	0.1%	0.1%
Urban			
Interstates	8.0%	0.0%	8.0%
Other Freeways & Expressways	8.7%	0.0%	8.7%
Other Principal Arterials	16.1%	10.9%	27.0%
Minor Arterials	17.1%	7.5%	24.6%
Collectors	5.9%	1.1%	7.0%
Total	5.0%	2.0%	7.0%

Moderately congested: volume/service flow ratio between 0.8 and 0.95.
Highly congested: volume/service flow ratio greater than 0.95.

Source: 1992 HPMS.

fourth scenario, the 20-year state shortfall totaled $25.4 billion. The table also shows these shortfalls in inflated dollars. Figure 2-12 illustrates the relationship between total needs and shortfalls for state roads and bridges.

Table 2-14 presents the 20-year local revenue shortfall for locally-owned roads and bridges under the different scenarios, expressed in 1992 dollars. For the "Maintain Funding" scenario there is no expected local revenue shortfall. For the second scenario, "Maintain Conditions," there is a forecasted 20-year local shortfall of $8.8 billion. In the third scenario, the expected 20-year local shortfall totaled $8.8 billion. And, for the fourth scenario, the 20-year local shortfall totaled $15.4 billion. The table also shows these shortfalls in inflated dollars. Figure 2-13 graphically illustrates the relationship between total needs and shortfalls for local roads and bridges.

Transit

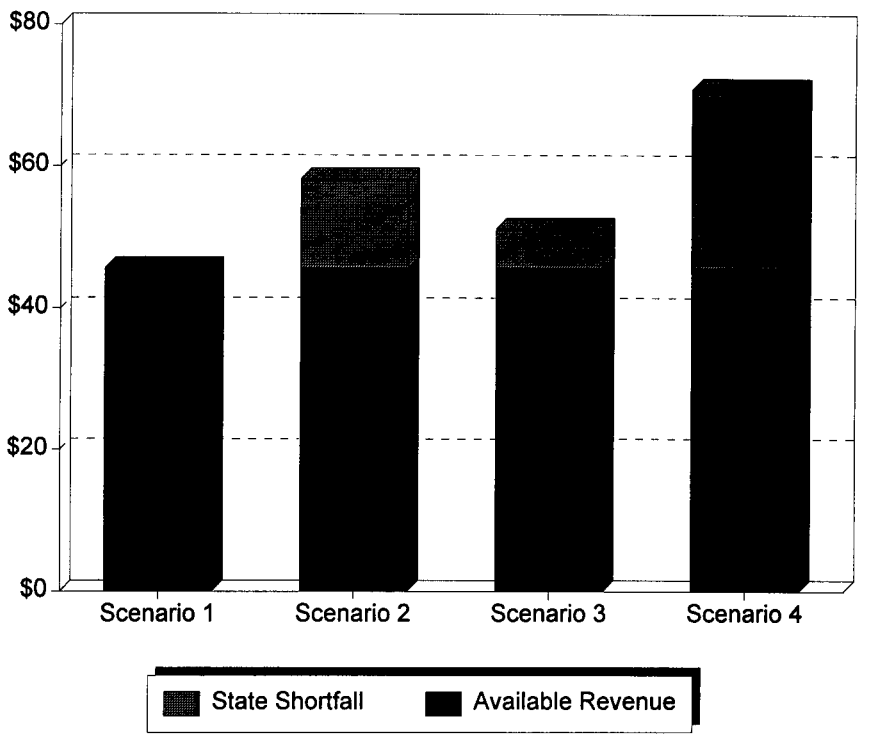
Conditions and Performance

There are currently 19 agencies that receive state financial support to provide fixed-route public transit in Florida. The service provided by one of these agencies (the Tri-County Commuter Rail Authority, which provides commuter rail service in Palm Beach, Broward, and Dade counties) is discussed in the "Rail" section. The other eighteen agencies operate fixed route bus service, the predominant public transit service available in Florida. One agency, the Metro-Dade Transit Agency (MDTA) that serves Dade County (the county that includes Miami), operates heavy rail service. Two agencies operate automated guideway ("people mover") service, MDTA in Dade County and the Jacksonville Transportation Authority in Duval County (the privately operated Harbour Island people mover in Tampa is not included). Vanpool service is available through Lynx in Orange, Osceola, and Seminole counties and through Space Coast Area Transit (SCAT)

Table 2-11
STATE ROADS AND BRIDGES TEN YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$24,217	$28,993	$25,618	$32,203
Available Revenue	$24,217	$24,217	$24,217	$24,217
State Shortfall	$0	$4,776	$1,401	$7,986
Inflated Dollars				
Total Needs	$28,086	$34,319	$30,008	$37,947
Available Revenue	$28,086	$28,086	$28,086	$28,086
State Shortfall	$0	$6,233	$1,922	$9,861

Figure 2-12
TWENTY-YEAR NEEDS FOR STATE ROADS AND BRIDGES
(billions of 1992 dollars)

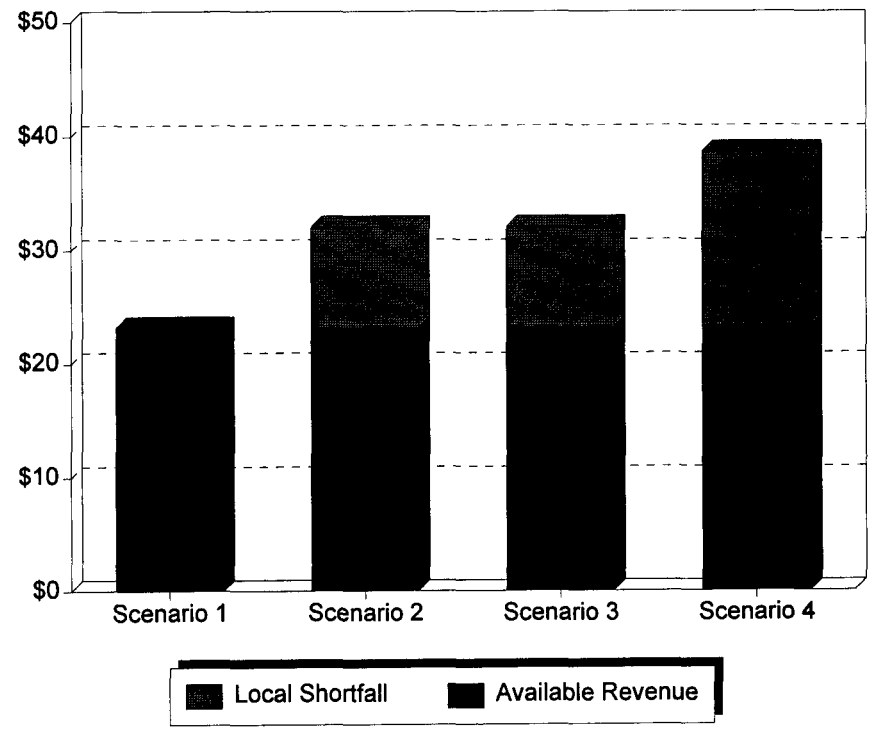


in Brevard County. The demand-responsive service provided by most of these agencies is included in the paratransit section. (The only exception is the demand-responsive service reported by SCAT, which is included in this section as bus service. The characteristics of the demand-responsive service reported by SCAT are much like the bus service provided by that agency.)

Public transit data are available through the annual Section 15 transit data reports submitted to the Federal Transit Administration. All transit properties must submit these reports to receive federal funding. These reports, which have been collected since 1979, are subject to careful review and validation. They provide data that allow comparison of transit properties. The Section 15 reports include data for the Federal Fiscal Year (FY) from October 1 through September 30.

As shown in Table 2-15, in FY 1991-92 Florida transit systems supplied 148.6 million passenger trips and 722.4 million passenger miles in 2,205 vehicles. Approximately 131.6 million (88.6 percent) of the passenger trips were bus trips. One agency (MDTA) provided 72.4 million passenger trips, amounting to 48.7 percent of the total. Approximately 13.7 million trips (9.2 percent) were provided on heavy rail by MDTA, 3.0 million trips (2.0 percent) on automated guideway (2.7 million of these by MDTA), and 0.3 million trips (0.2 percent) by vanpool service. The 722.4 million passenger miles included 593.7 million bus miles (82.2 percent), 109.7 heavy rail miles (15.2 percent), 2.8 million

Figure 2-13
TWENTY-YEAR NEEDS FOR LOCAL ROADS AND BRIDGES
(billions of 1992 dollars)



automated guideway miles (0.4 percent), and 16.3 million vanpool miles (2.3 percent). The average age of the 2,205 vehicles was 7.2 years. The fleet included 1,945 buses with an average age of 7.3 years, 136 heavy rail vehicles with an average age of 10.0 years, 14 automated guideway vehicles with an average age of 6.4 years, and 110 vans with an average age of 1.9 years.

Public transit data are also available through the Nationwide Personal Transportation Survey (NPTS), a periodic national survey of trip and travel behavior. It was most recently conducted in 1990 and is planned to be conducted again in 1995. The NPTS provides data on the use of various modes of travel, including public transit. The 1990 NPTS surveyed 22,317 households (48,385 persons) throughout the U.S., including 930 households (1,691 persons) in Florida. Trip data were collected for a 24-hour period and a two-week period on all trips taken by all modes (excluding boats or ships) by all members age five or older of the surveyed households.[4]

The 1990 NPTS data suggest that, in Florida, public transit was used for one percent of all trips made. Public transit usage in Florida was two percent of civic/educational trips, one percent of work-related trips and family/personal trips, and less than one-half of one percent of social/recreational and other trips. Public transit usage in the U.S. as a whole was significant-

Table 2-12
LOCAL ROADS AND BRIDGES TEN YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$11,620	$15,329	$15,329	$18,689
Available Revenue	$11,620	$11,620	$11,620	$11,620
Local Shortfall	$0	$3,709	$3,709	$7,069
Inflated Dollars				
Total Needs	$13,048	$17,677	$17,677	$21,555
Available Revenue	$13,048	$13,048	$13,048	$13,048
Local Shortfall	$0	$4,629	$4,629	$8,507

Table 2-13
STATE ROADS AND BRIDGES TWENTY YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$45,607	$58,181	$51,201	$70,967
Available Revenue	$45,607	$45,607	$45,607	$45,607
State Shortfall	$0	$12,574	$5,594	$25,360
Inflated Dollars				
Total Needs	$63,947	$83,651	$73,589	$103,870
Available Revenue	$63,947	$63,947	$63,947	$63,947
State Shortfall	$0	$19,704	$9,642	$39,923

ly higher than in Florida, at two percent of all trips made.[5]

Calculation of Needs

For all scenarios, the estimated transit needs include both operating and capital needs. Transit funding includes federal, state, and local government assistance, and system revenue (e.g., farebox, advertising). It is assumed that transit per-unit-of-service costs will remain the same (in 1992 dollars) as the weighted average for the five-year period from 1988 to 1992. To estimate inflated transit needs for the 20-year period, the rate of inflation is assumed to be 3.4 percent annually.[6]

Maintain Funding Scenario. Under this scenario, it is assumed that all federal funding will grow at one percent per year and all state funding will grow at four percent per year. These rates of growth are due to expected increases in the consumption of motor fuels, and with one exception, will not adjust to inflation. Local funding will increase at an average rate of 3.4 percent annually. It is assumed that system revenue will continue to supply the same percentage of operating funding as in 1992, and that it will continue to supply none of the capital funding. Averaged over the 20-year forecast period, in 1992 dollars, the federal share of all funding would be 21.4 percent, the state share would be 8.9 percent, and local assistance would be 47.3 percent. System revenue would make up the remaining 22.4 percent.

In addition to this funding, the transit mode includes FDOT intermodal development-rail funding for expansion of fixed-guideway systems in Dade and Duval Counties. It is assumed that this state funding will continue over the 20-year forecast period.

As shown in Table 2-16, this transit funding scenario for the first ten years of the 20-year period could total $4.1 billion in 1992 dollars and $4.9 billion in inflated dollars.

Table 2-14
LOCAL ROADS AND BRIDGES TWENTY YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
1992 Dollars				
Total Needs	$23,240	$32,062	$32,062	$38,640
Available Revenue	$23,240	$23,240	$23,240	$23,240
Local Shortfall	$0	$8,822	$8,822	$15,400
Inflated Dollars				
Total Needs	$30,918	$44,721	$44,721	$54,294
Available Revenue	$30,918	$30,918	$30,918	$30,918
Local Shortfall	$0	$13,803	$13,803	$23,376

Table 2-15
1992 FLORIDA TRANSIT CHARACTERISTICS

Characteristic	*Total*	*Percent of Total*
Passenger Trips		
Bus	131,609,110	88.6%
Heavy Rail	13,701,605	9.2%
Automated Guideway	2,965,591	2.0%
Vanpool	293,611	0.2%
Total	148,569,917	100.0%
Passenger Miles		
Bus	593,682,290	82.2%
Heavy Rail	109,689,014	15.2%
Automated Guideway	2,753,806	0.4%
Vanpool	16,263,890	2.3%
Total	722,389,000	100.0%
Vehicles		
Bus	1,945	88.2%
Heavy Rail	136	6.2%
Automated Guideway	14	0.6%
Vanpool	110	5.0%
Total	2,205	100.0%
Infrastructure		
Miles of Guideway Track	58.1	n/a

Source: 1992 Section 15 Reports.

Funding for the entire 20-year period would total $7.9 billion in 1992 dollars and $11.3 billion in inflated dollars.

The level of transit service provided over the 20-year period would be expected to decline under the maintain funding scenario if, as expected, costs inflate at a greater rate than revenues increase. In addition, according to data contained in Section 15 reports, over the five-year period from FY 1987-88 to FY 1991-92 the average age of transit vehicles in Florida has increased. Under this scenario, it is to be expected that the average age of transit vehicles would continue to increase.

Maintain Conditions Scenario. Needs under this scenario were calculated under the assumption that a stable, near proportional relationship exists between comprehensive service expansions and ridership.[7] Passenger trips were estimated using projections developed in a Statewide Transit Development Plan technical memorandum. The projection in the statewide TDP was that passenger trips will grow at 1.7 percent annually from 1995 to 1999.[8] In the present context, it was assumed that trips would continue to grow at 1.7 percent annually for the 20-year forecast period. The costs associated with operating the additional service, vehicles, and facilities needed were estimated by applying unit cost measures to the estimated passenger trips required. As with the previous scenario, this scenario includes FDOT intermodal development-rail funding.

As shown in Table 2-16, under the "Maintain Conditions" scenario, transit needs for the first 10 years of the 20-year period total $4.7 billion in 1992 dollars and $5.7 billion in inflated dollars. Needs for the entire 20-year period total $10.1 billion in 1992 dollars and $14.9 billion in inflated dollars.

Maintain Conditions with Maximum Lane Policy Scenario. Under this scenario, needs include those identified in the previous scenario plus additional needs that have shifted from highways to transit due to the imposition of a maximum lane policy. This transfer is based on an assumption of a policy decision to shift supply from highways to transit. As shown in Table 2-16, under this scenario transit needs for the first 10 years of the 20-year period total $8.9 billion in 1992 dollars and $11.1 billion in inflated dollars. Needs for the entire 20-year period total $18.9 billion in 1992 dollars and $27.5 billion in inflated dollars.

Improve Conditions Scenario. As well as addressing transit needs from a demand-driven perspective, as in the previous scenarios, needs were examined from a policy-driven perspective. Given the growth restrictions placed on highways, transit will in the future need to absorb some of the expected increase in travel. This would lead to an increased mode split for transit. The expected growth in transit supply due to this modal shift was estimated based on a methodology developed in the technical memorandum mentioned above.[9] For the present report, it was assumed that each transit system would increase its capacity sufficiently to allow each system's mode split to increase by 100 percent by 1997, and that each urbanized area that does not currently have a fixed-route transit system would implement such a system. (For the urbanized areas that do not currently have a fixed-route transit system, the target modal split capacity for 1997 was a 100 percent increase over the lowest current mode split of those urbanized areas that do currently have a fixed-route system.) To place this "100 percent increase" in perspective, it is the equivalent of the 1970 mode split for transit–two percent statewide. The additional potential ridership resulting from this capacity increase was added to the ridership estimated in the "maintain conditions" scenario to estimate the total potential ridership under this scenario. The annual increase in ridership once the mode split target is reached in 1997 was estimated based on a 1.7 percent annual increase, as in scenarios two and three.

Table 2-16
TRANSIT TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
10 Year 1992 Dollars	$4,100	$4,689	$8,914	$8,327
10 Year Inflated Dollars	$4,930	$5,675	$11,072	$10,183
20 Year 1992 Dollars	$7,900	$10,127	$18,853	$18,820
20 Year Inflated Dollars	$11,330	$14,889	$27,479	$27,966

The costs associated with operating the additional service vehicles and facilities needed were estimated by applying unit cost measures to the expected ridership. The incremental one-time increase in capital costs necessary to purchase additional vehicles and facilities to supply the service resulting from the increase in mode share was also estimated by applying unit cost measures. This scenario also includes the FDOT intermodal development-rail funding that was included in the previous scenarios.

As shown in Table 2-16, under the improve conditions scenario transit needs for the first ten years of the 20-year period total $8.3 billion in 1992 dollars and $10.2 billion in inflated dollars. Needs for the entire 20-year period total $18.8 billion in 1992 dollars and $28.0 billion in inflated dollars. (If the mode split increase were 50 percent rather than 100 percent, the 20-year totals would be $15.1 billion in 1992 dollars and $22.3 billion in inflated dollars.)

Ten- and Twenty-Year Revenue Shortfalls. After estimating total needs under each scenario, the expected state and local revenue shortfalls for each scenario were forecasted. Several assumptions were made to estimate the revenue shortfalls. There is no expected revenue shortfall in the "Maintain Funding" scenario because under that scenario expenditures would equal the available revenue. For scenarios two, three, and four, it is assumed that system revenue will provide the same percentage of total revenue as in scenario

Table 2-17
TRANSIT TEN YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
1992 Dollars				
Total Needs	$4,100	$4,689	$8,914	$8,327
Available Revenue	$4,100	$4,229	$5,163	$5,034
State Shortfall	$0	$71	$3,362	$506
Local Shortfall	$0	$389	$389	$2,787
Total Shortfall	$0	$460	$3,751	$3,293
Inflated Dollars				
Total Needs	$4,930	$5,675	$11,072	$10,183
Available Revenue	$4,930	$5,095	$6,288	$6,091
State Shortfall	$0	$89	$4,293	$630
Local Shortfall	$0	$491	$491	$3,462
Total Shortfall	$0	$580	$4,784	$4,092

one. It is assumed that the federal revenue estimated for the first scenario represents the maximum amount of revenue that will be available from that source. In all scenarios, the programmed FDOT intermodal development-rail funding is assumed to continue over the 20-year forecast period. It is assumed that the state funding (in addition to the FDOT intermodal funding) and the local funding estimated in the first scenario represent the maximum amount of revenue that can be raised from these sources given the currently authorized level of taxes and fees.

Available revenue was estimated by adding together system revenue, federal revenue, FDOT intermodal development-rail funding, and current state and local revenue. It is assumed that the state and local responsibility for transit expenses will maintain the same proportion relative to each other as in the first scenario. Thus, the responsibility for unfunded transit expenses in scenarios two and four is allocated to state and local governments in the same proportion as the scenario one funding from those sources. For scenario three, the shortfall beyond that identified under scenario two is assumed to be entirely the responsibility of the state.

Table 2-17 shows the 10-year state and local revenue shortfalls for transit under the different scenarios. As discussed, there is no expected revenue shortfall in the "Maintain Funding" scenario. For the second scenario, in 1992 dollars there is a forecasted ten-year

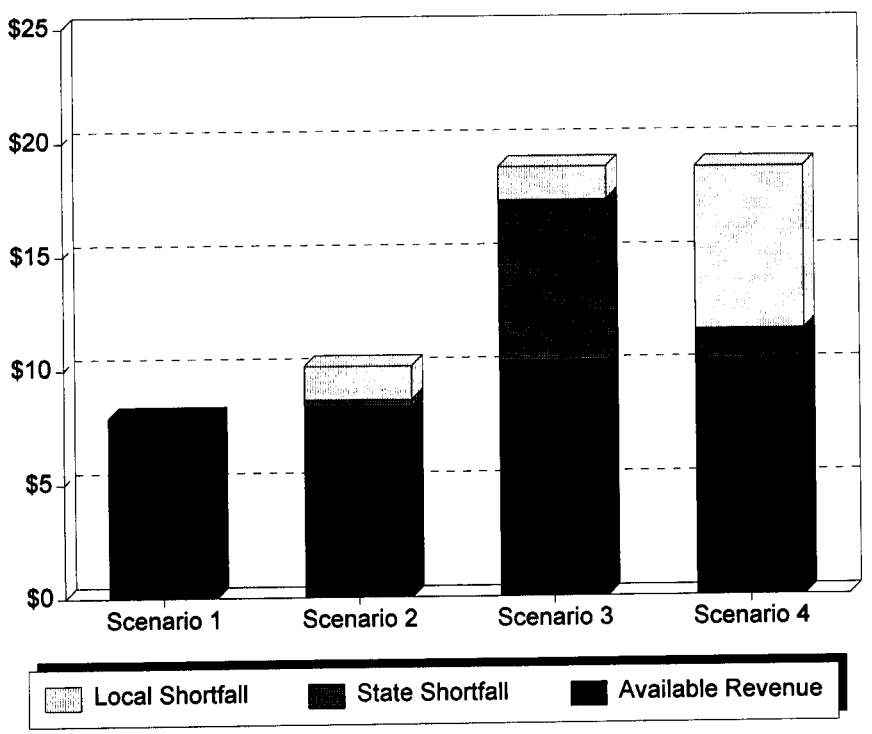
Table 2-18
TRANSIT TWENTY YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$7,900	$10,127	$18,853	$18,820
Available Revenue	$7,900	$8,399	$10,352	$10,344
State Shortfall	$0	$272	$7,045	$1,336
Local Shortfall	$0	$1,456	$1,456	$7,140
Total Shortfall	$0	$1,728	$8,501	$8,476
Inflated Dollars				
Total Needs	$11,330	$14,889	$27,479	$27,966
Available Revenue	$11,330	$12,130	$14,957	$15,066
State Shortfall	$0	$437	$10,200	$2,044
Local Shortfall	$0	$2,322	$2,322	$10,856
Total Shortfall	$0	$2,759	$12,522	$12,900

state shortfall of $71 million and a forecasted 10-year local shortfall of $389 million, for a total 10-year shortfall of $460 million. For the third scenario, in 1992 dollars there is a forecasted 10-year state shortfall of $3,362 million and a forecasted 10-year local shortfall of $389 million (the same as in scenario two), for a total 10-year shortfall of $3,751 million. For the fourth scenario, in 1992 dollars the state 10-year shortfall is forecasted at $506 million and the local 10-year shortfall at $2,787 million, for a total 10-year shortfall of $3,293 million. The table also shows these shortfalls in inflated dollars.

Table 2-18 shows the 20-year state and local revenue shortfalls for transit under the different scenarios. As in the 10-year forecasts, there is no expected shortfall in the "Maintain Funding" scenario. For the second scenario, in 1992 dollars there is a forecasted 20-year state shortfall of $272 million and a forecasted 20-year local shortfall of $1,456 million, for a total 20-year shortfall of $1,728 million. For the third scenario, in 1992 dollars there is a forecasted 20-year state shortfall of $7,045 million and a forecasted 20-year local shortfall of $1,456 million (the same as in scenario two), for a total 20-year shortfall of $8,501 million. For the fourth scenario, in 1992 dollars the state 20-year shortfall is forecasted at $1,336 million and the local 20-year shortfall at $7,140 million, for a total 20-year shortfall of $8,476 million. The table also shows these shortfalls in inflated dollars. Figure 2-14 graphically illustrates the relationship between total needs and state and local shortfalls for transit.

Figure 2-14
TWENTY-YEAR NEEDS FOR TRANSIT
(billions of 1992 dollars)



Paratransit

Conditions and Performance

Florida has pursued the development of paratransit service, also known as specialized transportation service, for individuals who are elderly, disabled, and/or low income, and for children who are "high risk" or "at risk" of developmental disability. In Florida, these persons are referred to as the transportation

disadvantaged (TD) population. Chapter 427 of the Florida Statutes charges the Florida Commission for the Transportation Disadvantaged with the responsibility to "... accomplish the coordination of transportation services provided to the transportation disadvantaged." To ensure coordination of these services, the Commission contracts with community transportation coordinators (referred to as local coordinators) to provide TD transportation services within each county.

Data on the estimated total paratransit budgets of the agencies that purchase paratransit service are available in Annual Budget Estimates (ABEs) submitted by these purchasing agencies to the Commission. A comparison of the federal and state funds estimated in the FY 1992-93 ABEs to the federal and state funds reported by the local coordinators suggests that 75 percent of all paratransit service provided in the state in FY 1992-93 was provided within the coordinated system (i.e., by the local coordinators), and that the remaining 25 percent was provided outside of the coordinated system.[10]

Data on paratransit service provided within Florida's coordinated TD system are submitted annually to the Commission by the state's local coordinators in the form of annual operating reports (AORs). Table 2-19 shows statewide total operating data aggregated from the AORs submitted for FY 1992-93 on the service provided within the coordinated system. As shown in the table, 48 CTCs submitted AORs for FY 1992-93 covering 65 of Florida's 67 counties.

Estimates of the demand for, and supply of, paratransit service in FY 1992-93 were developed using the methodology described in the 1993 report *Methodology Guidelines for Forecasting TD Transportation Demand at the County Level*, prepared by CUTR for the Commission. Statewide application of this methodology results in an estimated demand for 33.5 million paratransit trips statewide in FY 1992-93. The supply of paratransit trips in FY 1992-93 included a reported 14.8 million trips provided or arranged by the local coordinators within the coordinated system (as shown in the table) and an estimated 5.1 million trips provided outside of the coordinated system, for an estimated total of 19.9 million paratransit trips provided statewide in FY 1992-93. The unmet demand for paratransit trips beyond those that were provided can be estimated by subtracting the number of trips supplied from the number of trips

Table 2-19
1993 FLORIDA PARATRANSIT CHARACTERISTICS

Operating Statistics	*Urban CTCs**	*Rural CTCs*	*All CTCs*
Number of CTCs That Submitted AORs	27	21	48
Number of Counties Covered	35	30	65
Total Population	12,603,117	1,103,804	13,706,921
Number of Transportation Operators	206	68	274
Passenger Trips	13,342,250	1,442,332	14,784,582
Vehicle Miles	55,622,504	10,746,999	66,369,503
Operating Expense	$83,599,111	$11,330,493	$94,929,604
Vehicles	2,864	406	3,270

*Includes all CTCs where the service area contains an urbanized area with a population of 50,000.

Sources: Annual operating reports, 1993. *Statewide Operations Report: Fiscal Year 1992/93*, CUTR, January 1994.

demanded, resulting in an estimated unmet demand for 13.6 million paratransit trips in FY 1992-93.

The supply of paratransit trips includes two types of trips, referred to as program trips and general trips. A program trip is one made by a client of a government or social service agency for the purpose of participating in a program of that agency. Examples of program trips are trips to congregate dining facilities, sheltered workshops, job training facilities, and Medicaid services. A general trip is one made by a transportation disadvantaged person to a destination of his or her choice, not to an agency program. Examples of general trips are trips to work, grocery stores, and recreational areas. The distinction between program trips and general trips is important when estimating future revenue availability. Most of the revenue for program trips is supplied by social service agencies, while revenue for general trips usually comes from more traditional sources of transportation revenue such as motor fuels tax and vehicle registrations.

The ongoing implementation of the complementary paratransit service mandated by the Americans with Disabilities Act of 1990 (ADA) is expected to have an impact on the supply of paratransit service in the state. Between now and January 1997 (when full implementation of ADA complementary paratransit is required), it is expected that the supply of service will grow at a rate higher than the historical rate of growth.

The complementary paratransit service mandated by ADA is not expected to increase the estimated demand for paratransit service, because the recommended methodology for estimating demand already assumes that a high level of service is available. However, non-transportation mandates of ADA may eventually increase the demand for paratransit service. Due to ADA mandates, public facilities will eventually be fully accessible to persons with disabilities, and these persons will enter the work force in increased numbers. It is likely that the number of paratransit trips demanded by a typical ADA-eligible person will increase due to these factors.

Calculation of Needs

For all scenarios, the estimated paratransit needs include both operating and capital needs. Paratransit funding includes federal, state, and local government assistance, and system revenue. It is assumed that paratransit per-unit-of-service costs will remain the same (in 1992 dollars) as in 1993. To estimate inflated paratransit needs through the 20-year period, the rate of inflation is assumed to be 3.4 percent annually.[11]

Maintain Funding Scenario. Under this scenario, it is assumed that federal funding from traditional transportation revenue sources will grow at one percent per year and state funding from such sources will grow at four percent per year. These rates of growth are due to expected increases in the consumption of motor fuels and will not change as the rate of inflation changes. It is assumed that social service funding, like local funding, will increase at 3.4 percent per year. It is assumed that system revenue will continue to supply the same percentage of operating funding as in 1993, and that it will continue to supply none of the capital funding.

As shown in Table 2-20, under the "Maintain Funding" scenario paratransit needs for the first 10 years of the 20-year period total $1.5 billion in 1992 dollars and $1.8 billion in inflated dollars. Needs for the entire 20-year period total $3.0 billion in 1992 dollars and $4.4 billion in inflated dollars.

In general, as with transit, paratransit service levels would be expected to decline under current funding levels. However, the state financial support for paratransit services increased beginning in FY 1994-1995 due to an additional dollar collected on each vehicle registration. This additional

dollar means that the purchasing power of paratransit funds may be expected to increase slightly over the 20-year period, but this increase in purchasing power is not expected to be sufficient to keep pace with increases in demand for the service.

Maintain Conditions Scenario. For this scenario, needs have been estimated for maintaining the existing paratransit system at the present conditions and level of service. The current ratio of the quantity of paratransit service supplied to the quantity of service demanded would not change.

Growth in the demand for, and the supply of, service was estimated using the methodology described in the 1993 CUTR report "Methodology Guidelines for Forecasting TD Transportation Demand at the County Level." The rate of growth in demand for paratransit service was assumed to equal the rate of growth in the estimated number of persons eligible for the service (i.e., the TD population), and it was assumed that the supply of paratransit service would increase accordingly. The need for sufficient additional vehicles to maintain the current average annual service supply per vehicle, and for replacement vehicles, was calculated based on the estimated supply of service.

The costs associated with operating the service and with the additional vehicles needed to maintain the current conditions and level of service as the supply of service increases were estimated by applying unit cost measures to the expected supply of paratransit service under these scenarios.

As shown in Table 2-20, under the "Maintain Conditions" scenario, paratransit needs for the first ten years of the 20-year period total $1.6 billion in 1992 dollars and $1.9 billion in inflated dollars. Needs for the entire 20-year period total $3.6 billion in 1992 dollars and $5.2 billion in inflated dollars.

Maintain Conditions with Maximum Lane Policy Scenario. For paratransit there is no difference in needs between this scenario and the previous scenario because it is assumed that imposing a maximum lane policy on roadways by type would not have a noticeable impact on needs for paratransit service.

Table 2-20
PARATRANSIT TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
10 Year 1992 Dollars	$1,506	$1,644	$1,644	$2,639
10 Year Inflated Dollars	$1,821	$1,945	$1,945	$3,136
20 Year 1992 Dollars	$3,007	$3,643	$3,643	$5,946
20 Year Inflated Dollars	$4,352	$5,244	$5,244	$8,580

Improve Conditions Scenario. This scenario includes the needs outlined in the "Maintain Conditions" scenario plus the elimination of deficiencies. To eliminate deficiencies, it is assumed that paratransit service sufficient to eliminate unmet demand for these services will be supplied. The number of vehicles needed to supply service sufficient to eliminate deficiencies was estimated using a methodology similar to that used in the previous scenario to estimate the vehicle needs to maintain conditions. That is, it was assumed that as the supply of service increases, additional and replacement vehicles would be purchased at a rate sufficient to supply the increased service. The costs associated with operating the service and with the additional vehicles needed as supply increases were estimated by applying unit cost measures to the expected supply of service.

The growth in supply from scenario one to scenarios two and three represents growth in both program trip supply and general trip supply. The growth in supply from scenarios two and three to scenario four is entirely growth in the supply of general trips. (The growth from scenarios two and three to scenario four represents the elimination of deficiencies. Deficiencies are defined as the general trips that are currently demanded but not supplied.)

As shown in Table 2-20, under the improve conditions scenario paratransit needs for the first 10 years of the 20-year period total $2.6 billion in 1992 dollars and $3.1 billion in inflated dollars. Needs for the entire 20-year period total $5.9 billion in 1992 dollars and $8.6 billion in inflated dollars.

Ten and Twenty Year Revenue Shortfalls. After estimating total needs under each scenario, the expected state and local revenue shortfalls for each scenario were forecasted. Several assumptions were made to estimate the revenue shortfalls. There is no expected revenue shortfall in the "Maintain Funding" scenario because under that scenario expenditures would equal the available revenue. It is assumed that the social service agencies that supply most of the funding for program trips (as discussed previously) will continue to provide sufficient revenue to cover the expense of those trips as the supply increases. Thus, under all scenarios there is no expected revenue shortfall for program trips. Revenue shortfalls are expected in scenarios two, three, and four for general trips, which are funded primarily by traditional transportation revenue sources (as discussed previously).

For scenarios two, three, and four it is assumed that system revenue will provide the same percentage of total revenue as in scenario one. It is assumed that the federal revenue for general trips estimated for the first scenario represents the maximum amount of revenue that will be available from that source. It is assumed that the estimated scenario one state and local funding for general trips represent the maximum amount of revenue that can be raised from these sources given the currently authorized level of taxes and fees. It is assumed that the state and local responsibility for general trip expenses will maintain the same proportion relative to each other as in scenario one. Thus, the responsibility for unfunded general trip expenses is allocated to state and local governments in the same proportion as the FY 1992-93 general trip revenue from those sources.

Table 2-21 shows the 10-year state and local revenue shortfalls for paratransit under the different scenarios. As discussed, there is no expected revenue shortfall in the "Maintain Funding" scenario. For the second and third scenarios, there is a forecasted 10-year state shortfall of $20 million and a forecasted 10-year local shortfall of $7 million, for a total 10-year shortfall of $27 million. For the fourth scenario, the state 10-year shortfall is forecasted at $741 million and the local 10-year shortfall at $267 million, for a total 10-year shortfall of $1,008

million. The table also shows these shortfalls in inflated dollars.

Table 2-22 shows the 20-year state and local revenue shortfalls for paratransit under the different scenarios. As in the 10-year forecasts, there is no expected shortfall in the "Maintain Funding" scenario. For the second and third scenarios, there is a forecasted 20-year state shortfall of $96 million and a forecasted 20-year local shortfall of $32 million, for a total 20-year shortfall of $128 million. For the fourth scenario, the state 20-year shortfall is forecasted at $1,798 million and the local 20-year shortfall at $599 million, for a total 20-year shortfall of $2,397 million. The table also shows these shortfalls in inflated dollars. Figure 2-15 graphically illustrates the relationship between total needs and state and local shortfalls for paratransit.

Rail

Conditions and Performance

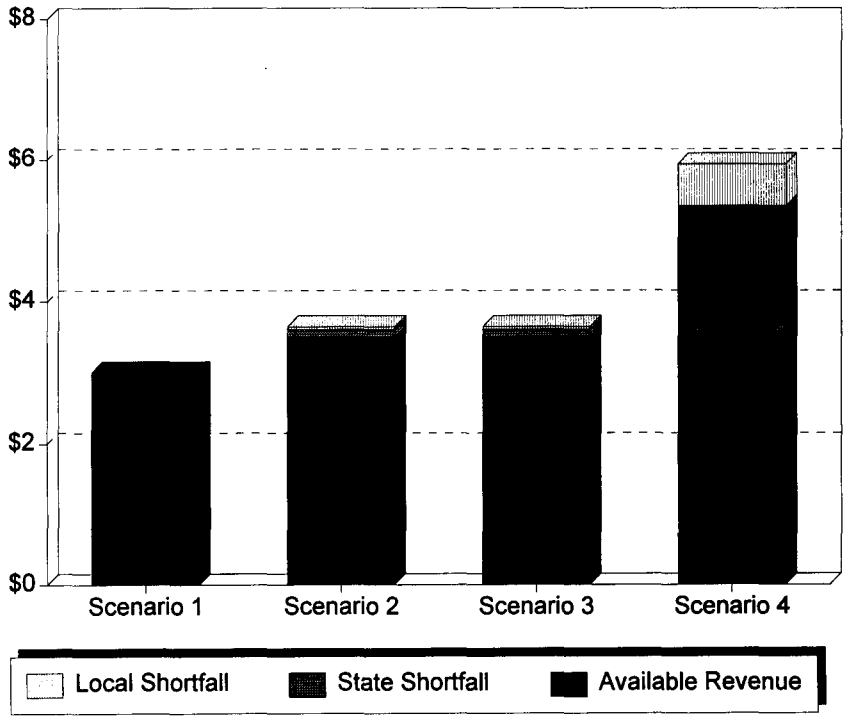
The rail infrastructure of Florida currently consists of commuter rail, public grade crossings, and private freight lines. It is expected that in the future Florida will also have high speed rail. Although state rail funding is primarily for commuter rail and high speed rail, there is limited state funding for grade crossing safety and local freight assistance.

The existing commuter rail service in Florida is described below. The heavy rail

Table 2-21
PARATRANSIT TEN YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$1,506	$1,644	$1,644	$2,639
Available Revenue	$1,506	$1,617	$1,617	$1,631
State Shortfall	$0	$20	$20	$741
Local Shortfall	$0	$7	$7	$267
Total Shortfall	$0	$27	$27	$1,008
Inflated Dollars				
Total Needs	$1,821	$1,945	$1,945	$3,136
Available Revenue	$1,821	$1,921	$1,921	$1,938
State Shortfall	$0	$18	$18	$884
Local Shortfall	$0	$6	$6	$314
Total Shortfall	$0	$24	$24	$1,198

Figure 2-15
TWENTY-YEAR NEEDS FOR PARATRANSIT
(billions of 1992 dollars)



and automated guideway services currently operating in the state are included in the transit section earlier in this report. For ease of reference, all new starts for commuter rail, heavy rail, and automated guideway are discussed in a later section titled "Other Systems."

Commuter rail systems are characterized as connecting suburban centers and a center city by running large passenger-cars on freight railroad lines. They often have few stops and high average speeds between stations. The Tri-County Commuter Rail Authority (Tri-Rail), serving parts of Palm Beach, Broward, and Dade counties, is the only such system currently operating in Florida. Tri-Rail operates a 30-train per day schedule between West Palm Beach and Miami on the state-owned Southeast Florida Rail Corridor. According to the Section 15 report submitted for FY 1991-92, Tri-Rail provided 2.3 million passenger trips and 76.9 million passenger miles in 28 passenger cars. The average age of the passenger cars was 4.5 years.

Calculation of Needs

For all scenarios, Tri-Rail needs include both operating and capital needs. Tri-Rail funding includes federal, state, and local government assistance, and system revenue. It is assumed that Tri-Rail per-unit-of-service costs will remain the same (in 1992 dollars) as nationwide average commuter rail per-unit-of-service costs in 1992. To estimate inflated Tri-Rail costs through the 20-year period, the rate of inflation is assumed to be 3.4 percent annually, the DRI long-term forecast.[12]

Maintain Funding Scenario. Under this scenario, it is assumed that all federal funding will grow at one percent per year and all state funding will grow at four percent per year. These rates of growth are due to expected increases in the consumption of motor fuels, and will not change as the rate of inflation changes. Tri-County Rail did not receive any local government assistance in FY 1991-92, but it is assumed that beginning in FY 1994-95 local government will supply 50 percent of net operating costs (i.e., total operating costs minus federal funds and system revenue). It is assumed that system revenue will continue to supply the same percentage of operating funding as in 1992, and that it will continue to supply none of the capital funding. Averaged over the 20-year forecast period, in 1992 dollars, the federal share of all costs would be 11.7 percent, the state share would be 57.9 percent, and local assistance would be 17.6 percent. System revenue would make up the remaining 12.8 percent.

In general, commuter rail service levels would be expected to decline under current funding levels. However, because a large proportion of commuter rail funding comes from the state, and this state funding is expected to increase at a rate somewhat greater than the rate at which costs are forecasted to inflate, the purchasing power of commuter rail funds may be expected to increase very slightly over the 20-year period. However, this increase in purchasing power is not expected to be sufficient to keep pace with increases in demand for the service.

Table 2-22
PARATRANSIT TWENTY YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$3,007	$3,643	$3,643	$5,946
Available Revenue	$3,007	$3,515	$3,515	$3,549
State Shortfall	$0	$96	$96	$1,798
Local Shortfall	$0	$32	$32	$599
Total Shortfall	$0	$128	$128	$2,397
Inflated Dollars				
Total Needs	$4,352	$5,244	$5,244	$8,580
Available Revenue	$4,352	$5,062	$5,062	$5,113
State Shortfall	$0	$137	$137	$2,613
Local Shortfall	$0	$45	$45	$854
Total Shortfall	$0	$182	$182	$3,467

In addition to Tri-Rail funding, this scenario includes funding for intermodal rail access and for railroad branchline rehabilitation. It is assumed that this state funding will continue over the 20-year forecast period. This scenario also includes state funding from FY 1992-93 through FY 1996-97 for the purchase of the southeast Florida rail corridor and, beginning in FY 1997-98, for high speed rail.

As shown in Table 2-23, under this scenario rail funding for the first ten years of the 20-year period would total $0.9 billion in 1992 dollars and $1.1 billion in inflated dollars. Funding for the entire 20-year period would total $2.0 billion in 1992 dollars and $2.8 billion in inflated dollars.

Maintain Conditions Scenario. For this scenario, needs have been estimated for maintaining the existing commuter rail service at its present condition and level of service. The costs associated with operating the service and with the additional vehicles needed to maintain the current condition and level of service as demand increases were estimated by applying unit cost measures to the expected supply of service. Growth in the supply of commuter rail service was estimated under the assumptions that Tri-Rail ridership will grow to 15,000 trips per day by the year 2000 (to meet latent demand for the service), and will grow at 3.0 percent annually from 2000 to 2012 (to keep pace with population growth). It was assumed that this growth in supply would be sufficient to maintain the present conditions and level of service.

This scenario includes the same state funding for railroad branchline rehabilitation, for the southeast Florida rail corridor, and for high speed rail as was included in the previous scenario. It is assumed that this state funding will continue over the 20-year forecast period. In addition, this scenario includes needs for intermodal rail access that are well beyond the level included in the previous scenario. This increase in intermodal rail access needs represents the difference between the current level of funding and the rail access needs identified in *A Five-Year Plan to Accomplish the Mission of Florida's Seaports.*

As shown in Table 2-23, under the maintain conditions scenario rail needs for the first ten years of the 20-year period total $2.1 billion in 1992 dollars and $2.5 billion in inflated dollars. Needs for the entire 20-year period total $4.7 billion in 1992 dollars and $6.6 billion in inflated dollars.

Table 2-23
RAIL TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
10 Year 1992 Dollars	$948	$2,125	$2,221	$2,332
10 Year Inflated Dollars	$1,102	$2,473	$2,596	$2,734
20 Year 1992 Dollars	$2,016	$4,676	$4,914	$5,271
20 Year Inflated Dollars	$2,805	$6,565	$6,909	$7,487

Maintain Conditions with Maximum Lane Policy Scenario. Under this scenario, needs are the same as in the previous scenario with the addition of needs that have shifted from highways to rail due to the imposition of a maximum lane policy. As shown in Table 2-23, under this scenario rail needs for the first 10 years of the 20-year period total $2.2 billion in 1992 dollars and $2.6 billion in inflated dollars. Needs for the entire 20-year period total $4.9 billion in 1992 dollars and $6.9 billion in inflated dollars.

Improve Conditions Scenario. As well as addressing commuter rail needs from a demand-driven perspective, as in the previous scenarios, needs were examined from a policy-driven perspective. Given the lane restrictions placed on highways, commuter rail, like transit service, will in the future need to absorb some of the expected increase in travel, leading to an increased mode split for rail. The expected growth in commuter rail supply due to this modal shift was estimated based on a methodology similar to that used in the "Improve Conditions" scenario for transit. It was assumed that Tri-Rail would increase its capacity sufficiently to allow its mode split to increase by 100 percent by 1997, to a total capacity of approximately 20,000 daily trips. The additional potential ridership resulting from this modal trade-off was added to the ridership estimated in the "Maintain Conditions" scenario above to estimate the total ridership under this scenario. The annual increase in total

Table 2-24
RAIL TEN YEAR REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$948	$2,125	$2,221	$2,332
Available Revenue	$948	$975	$987	$1,002
State Shortfall	$0	$1,113	$1,197	$1,256
Local Shortfall	$0	$37	$37	$74
Total Shortfall	$0	$1,150	$1,234	$1,330
Inflated Dollars				
Total Needs	$1,102	$2,473	$2,596	$2,734
Available Revenue	$1,102	$1,136	$1,152	$1,169
State Shortfall	$0	$1,288	$1,395	$1,467
Local Shortfall	$0	$49	$49	$98
Total Shortfall	$0	$1,337	$1,444	$1,565

ridership once the mode split target is reached in 1997 was estimated based on a 3.0 percent annual increase, as in scenarios two and three above. The costs associated with operating the service and with the additional vehicles needed were estimated by applying unit cost measures to the expected demand for commuter rail service.

This scenario includes the same needs for railroad branchline rehabilitation, the southeast Florida rail corridor, high speed rail, and intermodal rail access as were included in scenarios two and three above.

As shown in Table 2-23, under the "Improve Conditions" scenario, rail needs for the first 10 years of the 20-year period total $2.3 billion in 1992 dollars and $2.7 billion in inflated dollars. Needs for the entire 20-year period total $5.3 billion in 1992 dollars and $7.5 billion in inflated dollars. (If the target mode split increase were 50 percent rather than 100 percent, the 20-year totals would be $5.0 billion in 1992 dollars and $7.1 billion in inflated dollars.)

Ten- and Twenty-Year Revenue Shortfalls. After estimating total needs under each scenario, the expected revenue shortfalls for each scenario were forecasted. Several assumptions were made to estimate these shortfalls. There is no expected revenue shortfall in the "Maintain Funding" scenario because under that scenario expenditures would equal the available revenue. For scenarios two, three, and four, it is assumed that system revenue will provide the same percentage of total

Table 2-25
RAIL TWENTY YEAR REVENUE SHORTFALLS
(millions of dollars)

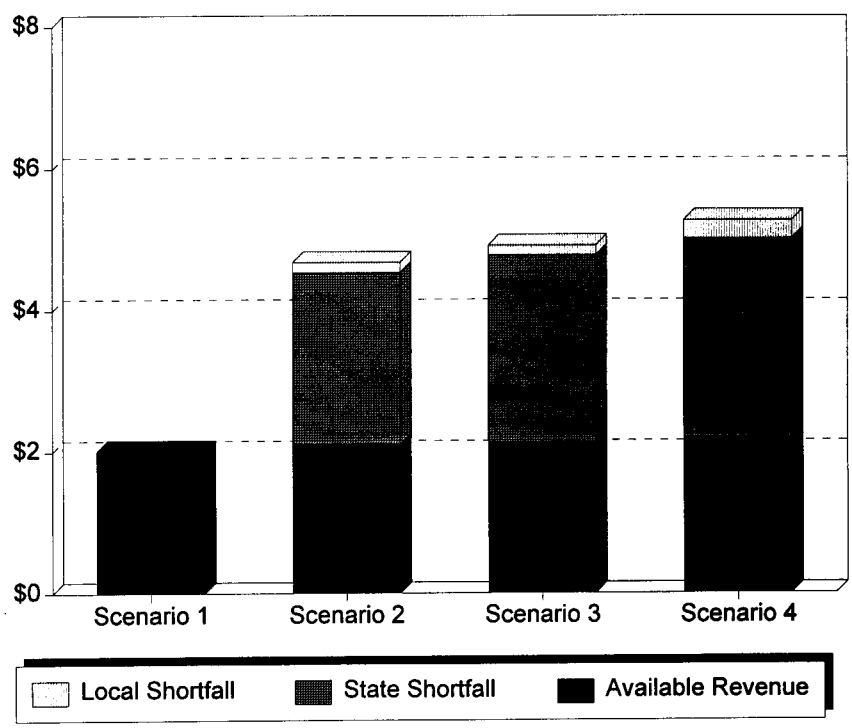
Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$2,016	$4,676	$4,914	$5,271
Available Revenue	$2,016	$2,104	$2,135	$2,180
State Shortfall	$0	$2,432	$2,639	$2,830
Local Shortfall	$0	$140	$140	$261
Total Shortfall	$0	$2,572	$2,779	$3,091
Inflated Dollars				
Total Needs	$2,805	$6,565	$6,909	$7,487
Available Revenue	$2,805	$2,943	$2,988	$3,062
State Shortfall	$0	$3,394	$3,693	$4,005
Local Shortfall	$0	$228	$228	$420
Total Shortfall	$0	$3,622	$3,921	$4,425

revenue as in scenario one. It is assumed that the federal revenue for commuter rail estimated in the first scenario represents the maximum amount of revenue available from that source. In all scenarios, the programmed level of state funding for branchline rehabilitation, purchase of the southeast Florida rail corridor, high speed rail, and intermodal rail access are assumed to continue. It is assumed that the state and local funding for commuter rail estimated in the first scenario represents the maximum amount of revenue that can be raised from those sources given the currently authorized level of taxes and fees.

Table 2-24 shows the 10-year state revenue shortfalls for rail under the different scenarios. As discussed in the preceding paragraph, there is no expected revenue shortfall in the "Maintain Funding" scenario. For the second scenario, there is a forecasted 10-year state shortfall of $1,113 million and a forecasted 10-year local shortfall of $37 million, for a total 10-year shortfall of $1,150 million. For the third scenario, there is a forecasted 10-year state shortfall of $1,197 million and a forecasted 10-year local shortfall of $37 million (the same as in scenario two), for a total 10-year shortfall of $1,234 million. For the fourth scenario, the state 10-year shortfall is forecasted at $1,256 million and the local 10-year shortfall at $74 million, for a total 10-year shortfall of $1,330 million.

Table 2-25 shows the 20-year state revenue shortfalls for rail under the different scenarios. As in the 10-year forecasts, there is no expected shortfall in the "maintain funding" scenario. For the second scenario, there is a forecasted 20-year state shortfall of $2,432 million and a forecasted 20-year local shortfall of $140 million, for a total 20-year shortfall of $2,572 million. For the third scenario, there is a forecasted 20-year state shortfall of $2,639 million and a forecasted 20-year local shortfall of $140 million (the same as in scenario two), for a total 20-year shortfall of $2,779 million. For the fourth scenario, the state 20-year

Figure 2-16
TWENTY-YEAR NEEDS FOR RAIL
(billions of 1992 dollars)



shortfall is forecasted at $2,830 million and the local 20-year shortfall at $261 million, for a total 20-year shortfall of $3,091 million. Figure 2-16 graphically illustrates the relationship between total needs and state and local shortfalls for rail.

Airports

Aviation is an integral part of Florida's transportation system. According to a study by the Partnership for Improved Air Travel, aviation is responsible for generating over $46 billion in economic activity, and over 765,000 jobs in 1989.

As shown in Table 2-26, the public aviation system in Florida consists of 20 commercial passenger service airports, 23 relievers airports, and 60 general aviation airports. The state is divided into nine geographical activity centers described as either regional or metropolitan areas. Each office representing the activity center provides financial and technical assistance for airport development, safety and capacity enhancement, land acquisition, and planning.

Planning for the state's public aviation system is conducted through the Continuing Florida Aviation System Planning Process (CFASPP). Developed by FDOT in conjunction with the Federal Aviation Administration (FAA), CFASPP is responsible for evaluating critical aviation issues and developing system plans that detail aviation needs, local goals, and objectives. It is the responsibility of CFASPP to develop the *Florida Aviation System Plan,* (FASP) as well as to recommend the allocation of public funds for the state's growing airport needs.

Table 2-26
1992 FLORIDA AIRPORTS BY SERVICE FUNCTION

Service Function	*Number*
Commercial Service Airports	20
Reliever Airports	23
General Aviation Airports	60
Total	103

Source: The Florida Aviation System Plan.

Conditions and Performance

According to the FASP, Florida has experienced tremendous growth in air traffic demand over recent years, with over 60 percent of the airports in the state at or near threshold capacity. Forty-three million passengers used Florida's commercial airports in 1991. In 2010, the number of passengers is forecasted to reach 98 million. This growth in aviation activity is being fueled by increases in tourism and international trade, two strategic markets for the state of Florida.

Tourism is a significant contributor to the economy of Florida. According to the FASP, over 50 percent of the 41 million visitors in 1990 arrived by air. The total number of visitors is projected to increase by 78 percent to 73 million visitors by 2010. The impacts of tourism are not limited just to aviation revenues, of course; tourists travelling by air were responsible for $17.6 billion in total expenditures in 1989.

Another significant element of Florida's economy is international trade, which ranks above all other economic activities, according to the Florida Department of Commerce. The recent passage of the North American Free Trade Agreement and the expansion of other international markets will place additional demands on the aviation system. Miami International Airport's air cargo operations ranks second in the U.S. in international shipments and is the gateway to international commerce in the Caribbean Basin and Latin America. Florida's international air cargo activities are forecasted to increase almost 100 percent by 2010 to 1.3 million tons.

Calculation of Needs

The estimation of airport facility needs at the state level is accomplished by aggregating, by district, local aviation master plans. Individual communities develop the master plans to provide guidelines for future

airport development. Needs estimates contained in the master plan can be based on one of the following methodologies: service standards, investment analysis, policy-driven directives or any other means established in the planning process. The project schedules from each master plan along with their accompanying cost estimates are aggregated, analyzed, and prioritized before becoming part of the FASP. These needs estimates are reconciled across districts to accommodate consistency in planning through out the statewide aviation system. The following provides aviation needs assessments under the three separate scenarios assuming no initial capacity deficiencies. It is recognized, however, that many airports are quickly approaching capacity limitations.

The needs under each of the following scenarios include only funds generated by the state or funds that pass through the state. It is assumed that the state will continue to fund 20 percent of the needs for airports under each of the following scenarios. To estimate inflated costs through the 20-year period, the rate of inflation is assumed to be 2.4 percent annually.[13]

Maintain Funding Scenario. Under this scenario, needs are restricted to current funding under existing sources. Future revenue from these existing sources was obtained from FDOT's Program and Resource Plan which lists annual expenditures on capital improvements, planning, and administration through the year 2020.

As shown in Table 2-27, current funding for the first 10 years of the 20-year period total $835 million in 1992 dollars and $950 million in inflated dollars. Needs for the entire 20-year period total $1,850 million in 1992 dollars and $2,428 million in inflated dollars.

Maintain Conditions Scenario. Needs under this scenario include improvements to maintain the current level of service and physical conditions of the present system without introducing capacity deficiencies. These improvements ameliorate the growing congestion problem by acquiring land for future development, by constructing or extending runways and taxiways, by building new passenger terminals and parking, and by improving airport access and security.

For this scenario, airport facility needs were determined by aggregating, by airport, annual maintenance, preservation, and increased capacity improvements as contained within the FASP report. This report

Table 2-27
AIRPORTS TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Period	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
10 Year 1992 Dollars	$835	$1,161	$1,161	$1,161
10 Year Inflated Dollars	$950	$1,326	$1,326	$1,326
20 Year 1992 Dollars	$1,850	$2,337	$2,337	$2,337
20 Year Inflated Dollars	$2,428	$3,028	$3,028	$3,028

covers the annual needs for 10 years. The second 10-year period in the 20-year needs forecast was derived from an annualized average of the first 10 years. Twenty percent of the total needs was then determined to be state needs based on historical expenditures by the state.

As shown in Table 2-27, under the "Maintain Conditions" scenarios, state airport needs for the first 10 years of the 20-year period total $1,161 million in 1992 dollars and $1,326 million in inflated dollars. For the entire 20-year period, state airport needs total $2,337 million in 1992 dollars and $3,028 million in inflated dollars.

Improve Conditions Scenario. Under this scenario, the assessment of airport facility needs are identical to "Maintain Conditions" due to the assumption that there are no current capacity deficiencies.

Ten- and Twenty-Year Revenue Shortfalls. After estimating total state needs under each scenario, the expected state revenue shortfalls for each scenario were forecasted. These shortfalls were derived by subtracting current revenue from needs in each of the scenarios. Current revenue in inflated dollars, as previously stated, was obtained from FDOT's Program and Resource Plan. Revenue in 1992 dollars was derived by deflating inflated revenue by at an annual rate of 2.4.

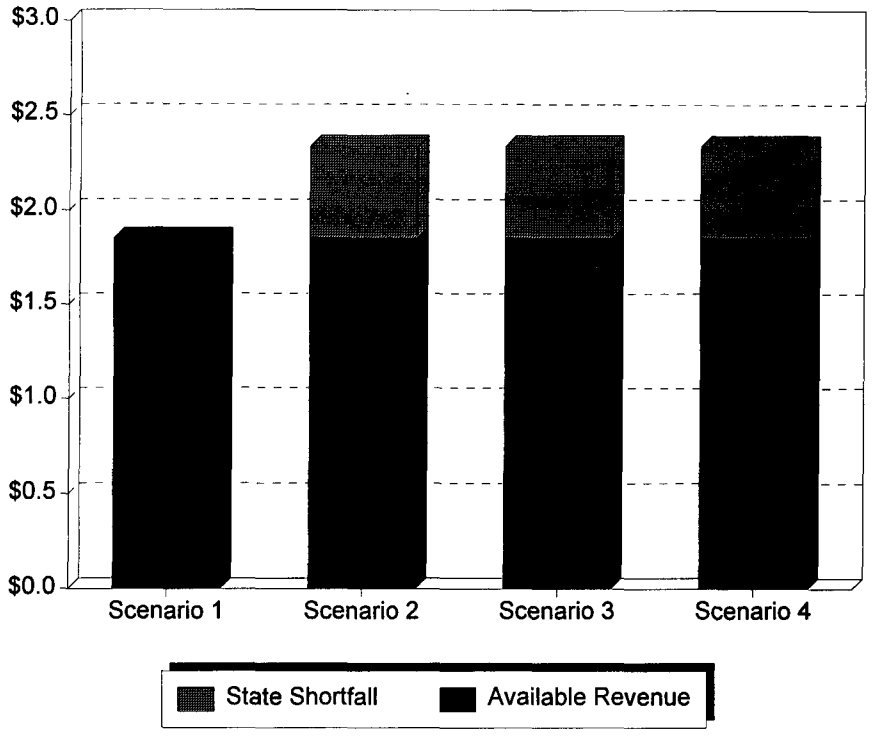
Table 2-28 shows the 10-year state revenue shortfalls for airports under the different scenarios. For the first scenario, "Maintain Funding" there is no expected revenue shortfall. For the second, third, and fourth scenarios, there is a forecasted 10-year state shortfall of $326 million in 1992 dollars. The table also shows these shortfalls in inflated dollars.

Table 2-29 shows the 20-year state revenue shortfalls for airports under the different scenarios. For the first scenario, "Maintain Funding," there is no expected revenue shortfall. For the second, third, and fourth

Table 2-28
AIRPORTS TEN YEAR STATE REVENUE SHORTFALLS
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
1992 Dollars				
Total Needs	$835	$1,161	$1,161	$1,161
Available Revenue	$835	$835	$835	$835
State Shortfall	$0	$326	$326	$326
Inflated Dollars				
Total Needs	$950	$1,326	$1,326	$1,326
Available Revenue	$950	$950	$950	$950
State Shortfall	$0	$376	$376	$376

Figure 2-17
TWENTY-YEAR NEEDS FOR AIRPORTS
(billions of 1992 dollars)



scenarios, there is a forecasted 20-year state shortfall of $487 million in 1992 dollars. The table also shows these shortfalls in inflated dollars. Figure 2-17 graphically illustrates the relationship between total needs and state shortfalls for airports.

Seaports

As shown in Table 2-30, Florida has 14 deep-water seaports, eight on the Atlantic coast (including the Port of Key West) and six on the Gulf coast. According to data from the Florida Department of Commerce, the total value of waterborne foreign trade handled by these 14 seaports in 1992 was $25.8 billion. Foreign exports accounted for $13.4 billion (52 percent) of the total, and foreign imports for $12.4 billion (48 percent). According to data from the individual seaports, in 1992 foreign exports weighed 25.7 million tons and foreign imports weighed 19.9 million tons. In addition to this foreign trade, Florida's ports handle a significant amount of domestic trade. According to data from the individual seaports, the total weight of domestic trade handled by Florida's seaports in 1992 was 54.1 million tons.

In addition to trade activity, six of Florida's 14 deep-water seaports are important to tourism due to cruise activity. These activities include transatlantic crossings, multi-day Caribbean cruises, weekend cruises to the Bahamas, and one- and two-day "cruises to nowhere." According to data from the individual seaports, 6.9 million passenger embarkations and disembarkations occurred at the six seaports in 1992. This was approximately 78 percent of the

total 8.8 million 1992 passenger embarkations and disembarkations in the United States.

Conditions and Performance

Seaport facilities are competing with facilities within the same state as well as out of state. New facilities often are constructed to attract demand rather than to accommodate existing demand or to eliminate current deficiencies. Therefore, there are no current demand deficiencies at Florida's seaports. However, to continue to attract goods and passengers the state must maintain or increase investment in seaports.

Table 2-29
AIRPORTS TWENTY YEAR STATE REVENUE SHORTFALLS
(millions of dollars)

Needs	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
1992 Dollars				
Total Needs	$1,850	$2,337	$2,337	$2,337
Available Revenue	$1,850	$1,850	$1,850	$1,850
State Shortfall	$0	$487	$487	$487
Inflated Dollars				
Total Needs	$2,428	$3,028	$3,028	$3,028
Available Revenue	$2,428	$2,428	$2,428	$2,428
State Shortfall	$0	$600	$600	$600

Table 2-30
1992 FLORIDA SEAPORT CHARACTERISTICS

Characteristic	*Number*
Number of Seaports	14
Value of Exports	$13.4 Billion
Value of Imports	$12.4 Billion
Tons of Exports	25.7 Million
Tons of Imports	19.9 Million
Tons of Domestic Trade	54.1 Million
Passenger Embarkations and Disembarkations	6.9 Million

Source: Florida Department of Commerce, Individual Ports.

Calculation of Needs

For each of the following scenarios, estimates of needs include the state's responsibility only. Local governments responsibility is not included in this analysis because of the complexity of local funding sources. All seaports in Florida receive different mixes of funding such as rent, user fees, and ad valorem taxes. In addition, these methods of payment often are used in the retirement of bonds or the repayment on bank debts. Therefore, it is difficult to determine an annual stream of local expenditures and revenues. As with airports, a 2.4 percent annual rate is used to inflate costs.[14]

Maintain Funding Scenario. Under this scenario, state expenditures were determined from FDOT Program and Resource Plan which lists annual expenditures through 2020. This funding includes expenditures for capital improvements, planning and administration.

As shown in Table 2-31, current funding for the first 10 years of the 20-year period total $79 million in 1992 dollars and $90 million in inflated dollars. For the entire 20-year period, state seaport needs total $159 million in 1992 dollars and $205 million in inflated dollars.

Maintain Conditions Scenario. Under this scenario, annual state expenditures are assumed to be $25 million over the 20-year time period in addition to current expenditures. This annual expenditure corresponds with the assumption that state funding of seaports will increase by $25 million annually and be maintained at that level over the 20-year time period. The Florida Legislature recently enlarged the pool of funds available to seaports for distribution through Florida's Seaport Transportation and Economic Development Council. However, a new revenue source will need to be identified for this additional funding. The assumption used in this scenario is that an appropriate revenue source will be found and maintained over the 20-year time period.

As shown in Table 2-31, under the "Maintain Conditions" scenarios, state seaport needs for the first 10 years of the 20-year period total $312 million in 1992 dollars and $354 million in inflated dollars. For the entire 20-year period, state seaport needs total $589 million in 1992 dollars and $739 million in inflated dollars.

Improve Conditions Scenario. Needs under this scenario are identical to the previous scenario.

Ten- and Twenty-Year Revenue Shortfalls. After estimating total state needs under each scenario, the expected state revenue shortfalls were forecasted. The expected revenue is identical for all three scenarios based on the assumption that revenue for seaports will remain at the current fixed level with the addition of revenue for planning and administration. Revenue in inflated dollars was taken from planned expenditures in FDOT Program and Resource Plan.

Table 2-32 shows the 10-year state revenue shortfalls for seaports under the different scenarios. For scenario one, "Maintain

Table 2-31
SEAPORTS TEN AND TWENTY YEAR NEEDS ESTIMATES
(millions of dollars)

Period	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
10 Year 1992 Dollars	$79	$312	$312	$312
10 Year Inflated Dollars	$90	$354	$354	$354
20 Year 1992 Dollars	$159	$589	$589	$589
20 Year Inflated Dollars	$205	$739	$739	$739

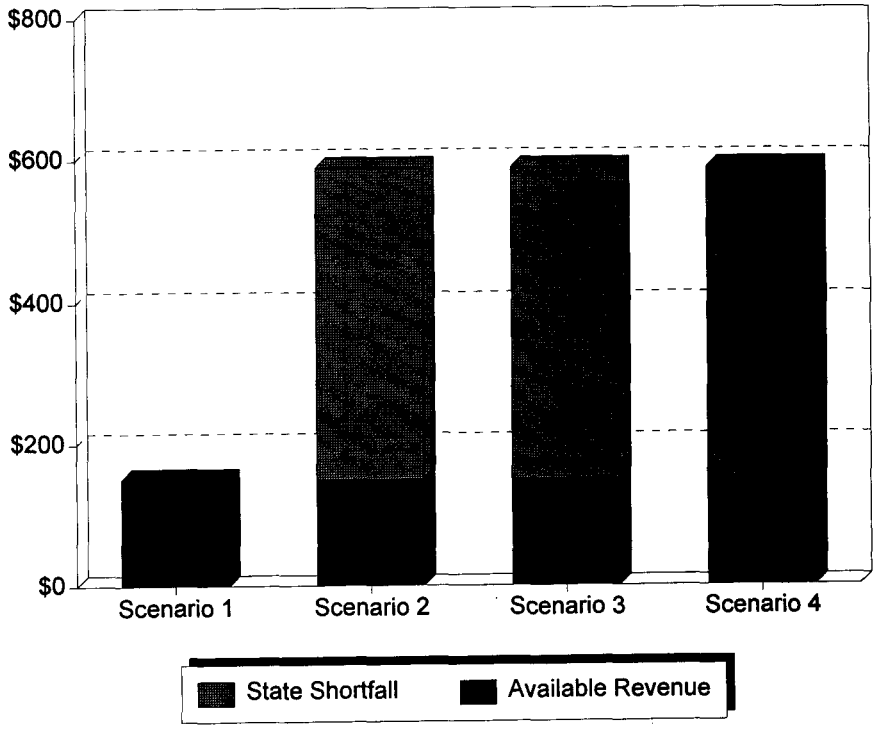
Funding" there is no expected state revenue shortfall. For scenarios two, three, and four there is a forecasted 10-year state revenue shortfall of $233 million in 1992 dollars. This shortfall is made up of the difference between current revenue and the expected state share of needs in the future (based on an additional $25 million annually). This table also shows these shortfalls in inflated dollars.

Table 2-33 shows the 20-year state revenue shortfalls for seaports under the different scenarios in both 1992 dollars and inflated dollars. For scenario one, "Maintain Funding," there is no expected state revenue shortfall. For scenarios two, three, and four there is a forecasted 20-year state revenue shortfall of $430 million in 1992 dollars. This shortfall is made up of the difference between current revenue and the expected state share of needs in the future (based on an additional $25 million annually). This table also shows these shortfalls in inflated dollars. Figure 2-18 graphically illustrates the relationship between total needs and state shortfalls for seaports.

Other Systems

In addition to the transportation expenditures discussed above, there are some systems that either are incorporated within other systems or fall outside the classification. These are bicycle/pedestrian, intermodal, and new starts for high speed rail, commuter rail, and fixed-guideway. The need for new starts does not fit clearly within one of the three scenarios and, perhaps, is best thought of as "add-ons" to the total needs estimate developed for each of the three scenarios. The estimated costs

Figure 2-18
TWENTY-YEAR NEEDS FOR SEAPORTS
(millions of 1992 dollars)



of these "add-ons" are taken from FDOT's 1992 Inventory of Plans and are in 1992 dollars. These are capital costs and are assumed to be non-recurring. No estimate of potential operating costs for these new systems is calculated here or in FDOT's Inventory of Plans.

Commuter Rail New Starts

Conditions and Performance. In addition to the Tri-Rail system discussed earlier, there are two other commuter rail authorities in the state of Florida. The Central Florida Commuter Rail Authority and the Tampa Bay Commuter Rail Authority have been organized to serve the Orlando and Tampa Bay areas, respectively, but do not operate any trains as yet.

Calculation of Needs. The estimated capital cost of adding commuter rail service is $26 million for Tampa-Lakeland system, and $78 million for an Orlando system for a total of $104 million in 1992 dollars for the entire 20-year period. These costs, taken from FDOT's 1992 Inventory of Plans, are assumed to be non-recurring, and no estimate of operating costs is calculated here or in the Inventory of Plans.

Ten- and Twenty-Year Revenue Shortfalls. The 10- and 20-year revenue shortfalls for commuter rail new starts are $104 million in 1992 dollars, as shown in Table 2-34. This shortfall is only included in the "Improve Conditions" scenario, because it is considered an "add-on." Furthermore, it is considered a state shortfall to remain consistent with FDOT's Inventory of Plans.

Fixed-Guideway New Starts

Conditions and Performance. Also included in FDOT's Inventory of Plans are new urban fixed-guideway systems for Hillsborough County, Pinellas County, and the Orlando urban area.

Calculation of Needs. The estimated capital cost, in 1992 dollars, of adding these fixed-guideway systems is $2.0 billion for Hillsborough County, $1.6 billion for Pinellas County, and $1.125 billion for

Table 2-32
SEAPORTS TEN YEAR STATE REVENUE SHORTFALLS
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
1992 Dollars				
Total Needs	$79	$312	$312	$312
Available Revenue	$79	$79	$79	$79
Total Shortfall	$0	$233	$233	$233
Inflated Dollars				
Total Needs	$90	$354	$354	$354
Available Revenue	$90	$90	$90	$90
State Shortfall	$0	$264	$264	$264

Orlando. Again, these costs are taken from FDOT's 1992 Inventory of Plans and are assumed to be non-recurring, and no estimate of operating costs is calculated here or in the Inventory of Plans.

Ten- and Twenty-Year Revenue Shortfalls. The 10- and 20-year revenue shortfalls for fixed-guideway new starts are $4.7 billion in 1992 dollars. These shortfalls are only included in the "Improve Conditions" scenario, because new starts are considered "add-ons." Of the total shortfalls, 25 percent is considered the state shortfall, 25 percent is the local shortfall, and the remaining 50 percent is the federal shortfall. These proportions are consistent with FDOT's Inventory of Plans.

Bicycle/Pedestrian

Conditions and Performance. Currently, few bicycle, pedestrian, and other non-motorized transportation facilities are available in most of Florida due to a historical lack of consideration of these modes of travel. However, since around 1980, there has been a concerted effort to encourage the provision of such facilities in the state. Since that time, the extent and quality of these facilities have improved due to requirements for non-motorized transportation facility planning and construction. In fact, current requirements in Florida go beyond requirements in most other states. Under current guidelines, most state-owned roadways that are functionally classified higher than "local" (excluding limited-access roadways) are expected to eventually have bicycle facilities (e.g., bicycle lanes, wide outside lanes, or paved shoulders). In addition, there is likely to be an increase in off-road paths for non-motorized transportation and in such amenities as bicycle lockers and shower facilities at major trip attractors. The provision of other non-motorized transportation facilities (e.g., new sidewalks, curb cuts on existing sidewalks, pedestrian overpasses, walk signals, and raised traffic islands) is also encouraged by state government.

Table 2-33
SEAPORTS TWENTY YEAR STATE REVENUE SHORTFALLS
(millions of dollars)

Needs	Needs Scenarios			
	1 Maintain Funding	2 Maintain Conditions	3 Maintain Conditions with Maximum Lane Policy	4 Improve Conditions
1992 Dollars				
Total Needs	$159	$589	$589	$589
Available Revenue	$159	$159	$159	$159
State Shortfall	$0	$430	$430	$430
Inflated Dollars				
Total Needs	$205	$739	$739	$739
Available Revenue	$205	$205	$205	$205
State Shortfall	$0	$534	$534	$534

Calculation of Needs. Bicycle/pedestrian needs are included in the calculations for highways. Current state expenditures for bicycle and pedestrian facilities consist mainly of improvements along state-owned roads. Under Florida Statute 335.065, bicycle and pedestrian facilities must be given full consideration in conjunction with the construction, reconstruction, or any other change to a state transportation facility (excluding limited-access roadways). Because these bicycle and pedestrian improvements are congruent with road improvements their costs are incorporated into the roadway improvements. Therefore, to quantify these improvements under this section would be a partial duplication of the highway section.

Intermodal

Conditions and Performance. "Florida's Intermodal Planning Process (Draft)," a report prepared for FDOT, defines intermodal planning as the process of looking at the linkages, interactions, and movements between transportation modes. Intermodal needs are needs for the facilities where mode changes occur. Intermodal facilities currently existing in Florida, according to the intermodal report, include 103 airports (20 commercial, 23 reliever, and 60 general aviation), 14 deep-water seaports, 32 passenger rail stations, 15 commuter rail stations, 42 rapid transit stations, 81 inter-city bus stations, 43 local bus terminals, 135 park-and-ride lots, 10 rail-highway terminals, and 39 bulk transfer facilities. In addition to these facilities, sidewalks and other non-motorized transportation facilities often serve as intermodal facilities.

Calculation of Needs. Intermodal needs generally can be included under other systems. For example, a sidewalk needed to provide pedestrian access to a local bus terminal can be included under bicycle/pedestrian needs. For this study, needs for intermodal facilities are included as needs for other systems, not as needs for intermodal facilities. Thus, intermodal facilities are not separately identified.

Table 2-34
COMMUTER RAIL NEW STARTS
(millions of dollars)

Needs	Improve Conditions*	
	Ten Years	Twenty Years
1992 Dollars		
Total Needs	$104	$104
Available Revenue	$0	$0
State Shortfall	$104	$104
Inflated Dollars		
Total Needs	$126	$126
Available Revenue	$0	$0
State Shortfall	$126	$126

* The other three scenarios are not included in this table because new starts are only considered in the "Improve Conditions" scenario.

Impact Analysis of Policy Scenarios

The HPMS analytical process analyzes highway conditions and performance and compares highway performance under various funding policies. In addition, HPMS also performs an impact analysis. This allows comparison of vehicle performance measures under various scenarios. The vehicle performance measures produced by HPMS include average overall travel speed, operating costs, fuel consumption, and accidents. The results of this analysis were used to determine the effects of the four policy scenarios on vehicle performance.

The impact analysis was used to estimate these vehicle performance measures. This was done by analyzing each sample section and aggregating the results to represent each functional system. Each vehicle type is "driven" by simulation over the highway section to determine the performance measures for that particular vehicle type on that section.

Target year conditions were evaluated as part of the funding period analysis used to measure needs. Results were compared to measure the effect that a proposed highway program will have on the vehicle performance measures. The relative effects that alternative scenarios will have on these measures–and hence, on the travelling public–can be judged by comparing the results.

Table 2-35
FIXED GUIDEWAY NEW STARTS
(millions of dollars)

Needs	*Improve Conditions**	
	Ten Years	*Twenty Years*
1992 Dollars		
Total Needs	$4,725	$4,725
Available Revenue	$0	$0
State Shortfall	$1,181	$1,181
Local Shortfall	$1,181	$1,181
Federal Shortfall	$2,363	$2,363
Total Shortfall	$4,725	$4,725
Inflated Dollars		
Total Needs	$5,705	$5,705
Available Revenue	$0	$0
State Shortfall	$1,426	$1,426
Local Shortfall	$1,426	$1,426
Federal Shortfall	$2,853	$2,853
Total Shortfall	$5,705	$5,705

* The other three scenarios are not included in this table because new starts are only considered in the "Improve Conditions" scenario.

Simulated vehicle operation is affected by a number of factors including horizontal and vertical alignment, pavement condition, and traffic congestion. Vehicle operation is simulated at several different levels of traffic congestion as it varies throughout the day. This is more realistic than using a single volume/capacity (V/C) ratio to represent the daily cycle of traffic flow conditions. Vehicle fleet characteristics are held constant over the analysis period. The characteristics affecting speed, fuel consumption, operating costs, and accidents are not varied over time.

Vehicle performance measures include the following:

- average overall travel speed
- vehicle operating cost
- fuel consumption
- accidents

The individual performance measures are discussed below. All are calculated by functional system for rural and urban areas. Accident data are stated as aggregate values for all vehicle types. The other measures are reported separately for each vehicle type.

Average overall travel speed (Miles Per Hour) is the sum of distances traveled by a specific vehicle type or types, divided by the sum of overall travel times, including all traffic delays.

Vehicle operating cost (Dollars Per 1,000 Vehicle Miles of Travel) is the sum of the costs of fuel, lubricating oil, tires, maintenance and repairs, and use-related depreciation.

Fuel consumption (Gallons Per 1,000 Vehicle Miles of Travel) is the quantity of fuel consumed in the simulation.

Accidents (Number Per 100 Million Vehicle Miles of Travel) are the numbers of property damage accidents, fatal accidents, and nonfatal injury accidents. This data is output only for the total of all vehicles, not by vehicle type as are the other measures.

The impact analysis is performed for seven vehicle types:

- small automobile (less than 3,000 lbs.)
- large automobile (equal to or greater than 3,000 lbs.)
- pickups and vans
- truck, single unit, two-axle, six-tire
- truck, single unit, three-axle or more
- truck, combination, four-axle or less
- truck, combination five-axle or more

The distribution of the vehicle fleet is fixed within the model but varies by functional system, and rural/urban locale.

Dollar Value of Impacts

The common denominator among speed, vehicle operating cost, and accidents is dollar cost. For the purpose of this analysis, the dollar costs of emissions were not considered.

Running speed was converted to aggregate hours of travel by converting aggregate daily VMT into an annual figure and then dividing by average running speed. Hours were converted into dollar costs by rural/urban locale by applying values of time per vehicle hour supplied by the FDOT Project Development Office. These values, $13.27 for rural and $11.78 for urban locales, were given in 1988 dollars. They were updated to 1992 dollars with U.S. Bureau of Labor Statistics Consumer Price Index. The 1988 to 1992 update factor used was 1.193.

Both vehicle operating costs and fuel consumption are determined in the same way, by using tables of values for each. Initial values are obtained based on speed and grade, and adjustments are made for the effects of curves, speed change and stop cycles, pavement condition, and idling time. The speed used to enter these tables is the initial running speed adjusted for curvature and pavement condition. Additional procedures are applied for trucks that are slowed by grades.

The cost values used in the HPMS calculations are based on 1980 prices. The price

per gallon for gasoline is $1.0985 and for diesel fuel is $0.977. This does not include state and federal fuel tax. Vehicle depreciation and maintenance costs are likewise based on 1980 prices. These figures were updated to 1992 dollars through the use of U.S. Department of Commerce price indices. The 1980 to 1992 update factor used was 1.380.

The rates for three accident types–property damage, personal injury, and fatal (all stated as accidents per 100 million vehicle miles)–are estimated by the impact model. The calculations are based on work done by the FHWA for the Highway User Investment Study. It shows typical accident rates based on facility type and ADT range. This methodology does not develop accident rates for individual vehicle types, only for the entire fleet.

The dollar values of accidents (the preferred term is "crashes") by type were obtained from FHWA:

- $2,723,000 for fatal crashes
- $229,000 for incapacitating injury crashes
- $48,000 for non-incapacitating injury crashes
- $4,500 for property damage only crashes

These values are based on 1988 dollars. They were updated to 1992 dollars with U.S. Bureau of Labor Statistics Consumer Price Index. The 1988 to 1992 update factor used was 1.193.

User Benefit Analysis

User benefits are the dollar savings in the costs of owning and operating vehicles on the highway system when the system is improved. Calculations are made over the 1992-2012 analysis horizon. Future savings are discounted back to the present through the use of a four percent discount rate. FDOT currently uses a higher seven percent rate for its analysis activities. The lower rate was selected for this analysis to maintain consistency with FHWA's accident costs, which were calculated with a four percent rate. Mixing the four and seven percent discount rates could produce erroneous results.

The "Maintain Funding" scenario is taken as the baseline for all measurements. In this context, user benefits associated with maintaining or improving conditions reflect the value of savings realized by the travelling public under the alternative funding scenarios. Analysis shows that the "Maintain Conditions" scenario saves the public $47 billion over 20 years relative to the "Maintain Funding" scenario. The "Improve Conditions" scenario saves the public almost twice as much: $95 billion. Benefits from productivity gains and investments in the modes other than highways were not calculated in this study, but would likely be of a similar order of magnitude. Table 2-36 shows the composition of user benefits.

Table 2-36
HIGHWAY USER BENEFITS
(billions of 1992 dollars)

Scenario	*Operating Cost Savings*	*Time Cost Savings*	*Accident Cost Savings*	*Total Cost Savings*
Maintain Conditions	$29.1	$17.3	$0.6	$46.9
Improve Conditions	$44.3	$46.8	$4.3	$95.3

Chapter 3*

Funding

Overview

At current tax and fee rates levied in the state, the transportation infrastructure needs of the state of Florida over the next several years will likely outstrip the resources available to finance projects that will merely keep the infrastructure at its current level (i.e., the "Maintain Conditions" scenarios from the previous chapter). Additional enhancements to or improvements in the overall infrastructure (i.e., the "Improve Conditions" scenario from the previous chapter) will require still further increases in rates. How much will these rates and fees need to increase to match the various needs scenarios of the state? What will be the personal tax cost to taxpayers to maintain or improve the current transportation infrastructure? Will the increases in infrastructure require tax and fee levels that put Florida out of line with other states?

The intent of this chapter is to provide an estimate of the existing and potential future revenue-raising capacity in Florida for the finance of transportation infrastructure. To perform this analysis, an assessment is made of the likely future levels of population and economic activity in the state, which enables the projection of tax revenues.

These projections of potential revenue have been formulated in order to identify shortfalls in funding under a number of infrastructure development scenarios. The state can then alter the system of financing to cover these shortfalls. This projection exercise provides benchmarks, or "rules-of-thumb," that show how much revenue can be raised from each alternative available revenue option. The most important data resulting from this study are the estimates of revenue-sensitivities of the taxes. Once the sensitivity of total revenues has been measured relative to standardized increases in tax rates or fee levels, analysts can piece together "packages" of revenue-raising alternatives. They can then use these sensitivity measurements to match revenues with needs. However, "revenue adequacy" is not the only factor that goes into the determination of the appropriateness of an optional tax structure. As indicated, the degree to which an option puts the state out of line with other states is an important factor. The equity implications of each source are also important factors.

This chapter will address each of these elements. The structure of the remainder of the chapter is as follows. In the second section, the process of financing transportation in Florida is discussed along with comparisons to how other states finance transportation. The third section describes the methodology used to project potential revenue from all sources of transportation finance in Florida and estimates those potential revenues. The fourth section presents a brief overview of the principles of good and appropriate taxation. Armed with the information on the existing structure of finance in Florida and elsewhere, with information on the revenue raising potential of available sources, and given the background on the principles of efficient and equitable taxation, the analyst can create a "recipe" for providing funding for the state's transportation needs.

**This chapter was authored by the Center for Economic and Management Research (CEMR) at the University of South Florida.*

How Transportation Infrastructure is Financed in Florida

An Overview of State Transportation Finance

Funds for financing Florida's infrastructure are available from federal, state, and local sources. Depending on the mode of transportation and the specific program to be funded, federal funding may provide nearly 100 percent of the revenues required for a project or, as is usually the case, some smaller level of revenues that require state and/or local matching funds. These federal funds may be provided directly to local governments to fund local projects or to the state for state and federal projects, or they may pass through the state to be distributed to local governments.

As shown in Table 3-1, a variety of taxes generate revenue at the federal, state, and local levels to provide for Florida's transportation needs.

The federal government provides grant funds to all states for highway construction, largely through the Federal Highway Administration. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA), which defines and authorizes federal highway and transit programs and sets new guidelines for funding of those programs. The purpose of this Act is to give state and local governments greater flexibility in the use of federal funding for transportation systems. Since federal sources are beyond the legislative initiatives of the state of Florida, the availability of these funds, while extremely important to virtually every transportation mode, is somewhat beyond the control of the state.

According to the Florida Department of Revenue, the State Transportation Trust Fund (STTF) would receive $1 billion in federal funds in 1994, the bulk of it coming from the highway account. The remainder of this federal funding would come from the mass transit account and the Federal Aviation Administration.

Most of the state-imposed taxes earmarked for transportation uses also pass some of the revenues raised into "other uses." Those uses range from administrative fees and general revenue service charges to contributions to a variety of non-transportation-related trust funds. For example, according to the January 1994 *Florida's Transportation Tax Sources: A Primer*, for fiscal year 1993-94, the state fuel sales tax raised $593 million in revenues, of which $526 million went to the STTF, and $67 million went to other uses, including $42 million in service charges, $10 million in miscellaneous transfers, and $15 million for miscellaneous credits and refunds, including shrinkage, farmers and fishermen, transit systems, and local government. In the same year, of the $116 million raised by the rental car surcharge, $81 million went to the STTF, and $35 million went to other uses, including $8 million for service charges, $5 million to the general fund, and $17 and $5 million, respectively, to the Tourism Promotion and International Trade Promotion Trust Funds. For the state of Florida in fiscal year 1993-94, of $3,439 million in total state tax-generated revenue for transportation, $3,130 actually went to transportation uses and the remaining $309 million–about one dollar out of every eleven raised–went to other uses.

Of the $309 million leaking into other uses, only about $28 million were paid for administration of the agencies using the taxes or covered costs of collecting the revenues, leaving some $281 million that "could" have been contributed to the STTF, or 8.17 percent of total transportation tax revenues. This $281 million leakage, when added to the $3,130 million "effective" tax revenues (the STTF portion of the total), represents an increase in that number of 8.89 percent in fiscal year 1993/94. The largest portion of the leakage is the general revenue service charge, which is a leakage of

Table 3-1
FLORIDA'S TRANSPORTATION TAX SOURCES, 1994*

Fund/Tax Source	*Rates*	*Amount (in millions)*
Federal		
Highway Trust Fund (Highway Account)	Gasoline . . . 10¢/gal Gasohol . . . 40¢/gal Diesel . . . . 16¢/gal	$755
Federal Aviation Administration Airport and Airway Trust Fund	Avgas . . . . . 15¢/gal Jet Fuel . . 17.5¢/gal Ticket Tax . . . 10% Waybill Tax . . 6.25%	$107
Highway Trust Fund (Mass Transit Account)	All Fuels . . . 1.5¢/gal	$133
Federal Rail Administration	n/a	$2
State - For State Use		
Fuel Sales Tax	All Fuels . . . 8.1¢/gal Diesel . . . . 4.5¢/gal	$526
SCETS Tax	Gasoline . . 0-4.5¢/gal Diesel . . . . 4.5¢/gal	$286
Aviation Fuel Tax	All Fuels . . . 6.9¢/gal	$46
Fuel Use Tax & Fee	Decals . . . . . $4/yr Fuel . . Current Rate	$6
Motor Vehicle License Fee	Based on Veh. Weight	$299
Initial Registration Fee	One-Time . . $100.00	$166
Rental Car Surcharge	Daily $2.00	$81
Incremental Title Fee	per Transfer . $21.00	$72
State - For Local Use		
Fuel Excise Taxes	All Fuels . . . . 4¢/gal	$267
Local		
Ninth-cent Gas Tax	Gasoline . . . 0-1¢/gal Diesel . . . . . 1¢/gal	$27
Local Option Gas Tax	Gasoline . . 0-11¢/gal Diesel . . . . . 6¢/gal	$429

*Does not include some local sources (e.g., local impact fees, property taxes, or toll revenues).

Source: FDOT, *Florida's Transportation Tax Sources: A Primer, 1994.*

$132 million into the state's general revenue fund during the 1993/94 fiscal year. If those revenues alone were not diverted, but instead placed into the STTF, the effective transportation tax revenues would increase by 4.22 percent.

At the state level, the primary source of revenue is taxes placed on motor fuels. The revenues from the motor fuels taxes and the SCETS (state comprehensive enhanced transportation system) tax are over $800 million annually. The state also raises a sizable amount of revenue from motor vehicle fees and registration fees, which account for over $460 million annually. The state also permits the imposition of a number of unique fees to raise revenue for transportation finance. For example, the state levies a $100 initial registration fee for all autos that enter the state or for new autos purchased by residents.

In the state of Florida, there are also a number of funding sources available to local governments. Each county government has the ability to levy up to $0.11 in local motor fuels taxes. In addition, each county government has the capacity to levy a sales tax surcharge of up to 1 percent to finance infrastructure development. Finally, Florida is also one of a very few states that rely heavily on impact fees for transportation finance. These impact fees are levies placed on new real estate development to cover the costs of additional transportation (and other) infrastructure required by the new development. Transportation impact fees are used quite heavily by local governments in the state of Florida. Florida local governments can levy transportation impact fees, a levy placed on new development in the region to pay for the infrastructure requirements brought on by the new development. In 1991, the last year for which comprehensive estimates are available, local governments in the state raised $153 million from this source.

Florida Relative to Other States

Highway Finance. The next several tables compare Florida's state transportation financing with some of the other states. The states that were chosen for comparison are states that are geographically near to Florida (Georgia, Alabama, Mississippi, Kentucky, Tennessee, and South Carolina) or are similar in that they are experiencing, or have experienced, the pressures in transportation due to fast growth (Arizona, North Carolina, Texas, and California).

It should be kept in mind that the numbers provided in this comparison table for the state of Florida differ somewhat from those presented in the previous table. First of all, the years differ. The data in these tables are for the earlier year of 1991. This lag is needed in order to obtain information from all states for comparison purposes. The information in Table 3-1 is more current; however, it is not possible to make the kinds of comparisons that are of interest to policymakers. Second, in Table 3-1, a greater portion of all revenues made available by the state are included, such as those funds raised and used by local governments. This includes revenues raised through piggyback taxes that the state has authorized, such as the optional local motor fuels excise taxes. However, strictly local government revenues, such as impact fees and local property taxes, are not included.

As shown in Table 3-2, with respect to the relative importance of federal funds, it appears that Florida receives a significantly lower proportion (19.2 percent) of total receipts from these sources in comparison to both the national average (27.3 percent) and to the levels of other states such as Alabama (31.9 percent), California (28.2), Georgia (24.5 percent), North Carolina (20.1 percent), South Carolina (34.0 percent), and Texas (28.3 percent).

Table 3-2
SOURCES OF REVENUES FOR STATE ROADS IN SELECTED STATES, 1991

State	State								Federal		Local
	Motor Fuel Taxes	Motor Veh. and Motor Carrier Taxes	Road and Crossing Tolls	Approp. From General Funds	Other State Imposts	Misc.	Bond Orig. Issues	Bond Refund Issues	FHWA	Other Federal	Local Gov't.
Florida	31.81%	19.36%	10.03%	0.00%	5.93%	4.94%	5.71%	1.58%	19.21%	0.59%	0.86%
Alabama	48.82%	16.10%	0.00%	0.00%	0.44%	2.50%	0.00%	0.00%	31.85%	0.30%	0.00%
Arizona	26.64%	13.65%	0.00%	0.18%	7.19%	3.46%	19.70%	5.62%	12.89%	0.67%	10.00%
California	38.10%	20.46%	1.95%	3.22%	0.00%	5.56%	0.00%	0.00%	28.20%	0.64%	1.88%
Georgia	23.79%	4.08%	0.09%	21.96%	8.28%	3.18%	12.12%	0.74%	24.50%	0.21%	1.05%
Kentucky	33.64%	35.66%	1.26%	3.11%	0.14%	7.94%	0.00%	0.00%	17.72%	0.22%	0.30%
Mississippi	45.31%	12.74%	0.00%	1.62%	6.89%	3.06%	0.00%	0.00%	28.84%	1.22%	0.32%
N. Carolina	52.49%	16.34%	0.09%	0.00%	4.04%	5.77%	0.00%	0.00%	20.11%	0.23%	0.93%
S. Carolina	52.44%	11.34%	0.00%	0.00%	0.00%	1.30%	0.00%	0.00%	34.02%	0.82%	0.08%
Tennessee	37.65%	10.26%	0.00%	25.30%	2.85%	0.54%	0.00%	0.00%	21.98%	0.20%	1.21%
Texas	43.93%	21.96%	1.38%	0.00%	0.60%	2.34%	0.00%	0.00%	28.30%	0.25%	1.22%
U.S. Avg.	36.99%	18.40%	5.34%	2.79%	2.59%	4.64%	0.00%	0.00%	27.32%	0.70%	1.23%

Source: Federal Highway Administration, *Highway Statistics, 1992*

The largest single source of revenues for highways is the motor fuels taxes. Florida appears to have a somewhat low reliance on this tax, bringing in 31.8 percent of all highway revenues, versus 37.0 percent for the average state. For the peer comparison group of 10 states, only two states (Arizona and Georgia) rely less on the motor fuels excise taxes. However, in this group of states, both Arizona and Georgia relied heavily on bonds as a source of revenue for the year 1992. Bonds are not truly a long-run source of revenue, since the bonds are redeemed with "real" revenues. Including one year's bond issuance in a comparison of the revenue structure across states may not give a clear picture of the relative structure of financing in the state. Looking at the percentage of revenue raised from non-bond sources, the picture of Florida as a state with a low reliance on motor fuels taxes at the state level becomes even clearer. Although not shown in the table, the proportion of "non-bond" revenue drawn from this source is lower than any state in the group but Georgia.

Receipts from road and crossing tolls made up a markedly higher percentage of total receipts in Florida during 1992 than in most other states, particularly compared to the peer states. These fees were approximately twice the national average and well above the one to two percent levels exhibited by comparable states. While the Florida state transportation system receives no funding from general state revenues, most of the other comparable states receive little as well. Both Georgia and Tennessee, however, collect over 20 percent of their funding from state general revenues.

In summation, Florida is a state that receives less than the average share of funds from the federal government. With regard to state funds, Florida appears to rely less on motor fuels excise taxes and more on motor vehicle taxes and fees as a source of transportation finance revenue.

On the local side of transportation funding, Florida's use of local motor fuel taxes puts it at the top of the scale in reliance on this source. In Table 3-3, derived from 1991 data found in the *FHWA Highway Statistics*, Florida's 23.3 percent rate of contribution from local highway user taxes places the state well above the national average of approximately 2.9 percent and well above each of the comparable states except for Alabama, which received 20 percent. This result is not surprising since both Alabama and Florida have legislated the use of local option fuel taxes. Funding from local general appropriations was substantially lower in Florida (11.8 percent) than both the national average (29.2 percent) and rates for California (20.1 percent), Georgia (60.3 percent), North Carolina (52.7 percent), and Texas (35.6 percent).

The reliance upon local ad valorem taxes as a source of local transportation funding was lower in Florida (8.9 percent) than the national average (13.8 percent) and notably lower than that of Alabama (16.9 percent), Mississippi (22.8 percent), and Texas (32.3 percent). Local receipts from state highway user imposts were notably lower for Florida local governments (15.8 percent) than the national average (26.4 percent) and were also low in comparison to most of the other comparable states except for Georgia (1.7 percent) and Texas (3.6 percent).

One issue is the degree to which local governments have access to motor fuels taxes. In this presentation by FHWA, there are two separate columns providing information on motor fuels tax revenues used by local governments: those imposed directly by local governments at their discretion ("highway user revenue"), and "highway user imposts" at the state level that are dedicated to local government use. Florida's share of total local highway funding from the first source is very high, while from the second source it is somewhat lower than the national average.

Table 3-3
SOURCES OF REVENUES FOR LOCAL ROADS IN SELECTED STATES, 1991

State	Local								State		Federal	
	Highway User Revenue	Road and Crossing Tolls	Approp. From General Funds	Property Taxes & Special Assmnts	Other Local Imposts	Misc.	Bond Orig. Issues	Bond Refund Issues	Highway User Imposts	Other State & Local	FHWA	Other Federal
Florida	23.32%	0.87%	11.79%	8.96%	0.00%	9.53%	10.01%	4.53%	15.79%	14.74%	0.16%	0.30%
Alabama	20.12%	0.00%	15.03%	16.90%	0.00%	1.54%	5.66%	0.00%	39.40%	0.71%	0.00%	0.63%
Arizona	0.07%	0.00%	13.44%	0.77%	13.61%	4.00%	25.58%	0.00%	40.53%	1.14%	0.00%	0.87%
California	0.00%	0.36%	20.10%	3.90%	2.83%	20.66%	3.22%	0.00%	43.18%	0.00%	4.12%	1.63%
Georgia	1.08%	0.00%	60.32%	0.23%	27.41%	3.70%	5.00%	0.00%	1.66%	0.20%	0.00%	0.41%
Kentucky	0.58%	0.00%	30.31%	1.12%	0.00%	2.64%	4.95%	0.00%	47.43%	10.77%	0.00%	2.20%
Mississippi	1.17%	0.00%	31.89%	22.86%	0.00%	2.14%	17.69%	0.00%	19.72%	1.02%	0.00%	3.51%
N. Carolina	2.27%	0.00%	57.16%	0.75%	1.36%	4.25%	12.33%	0.00%	21.64%	0.00%	0.00%	0.25%
S. Carolina	0.00%	0.00%	65.47%	7.54%	3.20%	1.81%	0.06%	0.00%	13.90%	6.78%	0.00%	1.25%
Tennessee	6.44%	0.00%	15.76%	12.37%	0.00%	0.90%	0.00%	0.00%	63.30%	0.80%	0.00%	0.44%
Texas	1.75%	2.71%	35.62%	32.32%	0.00%	12.23%	11.37%	0.00%	3.57%	0.00%	0.00%	0.43%
U.S. Avg.	2.89%	1.11%	29.20%	13.78%	2.80%	8.00%	9.68%	0.44%	26.37%	3.00%	1.40%	1.33%

Source: Federal Highway Administration, *Highway Statistics, 1992.*

Mass Transit Finance. The federal government provides funds to mass transit operators, the bulk of these funds being used to subsidize operations. However, in some cases, large amount of revenue have been made available for infrastructure development or for capital improvements. Similarly, the state provides funds for both capital operations and for operations assistance, while local governments provide subsidies to mass transit operating facilities. In addition, some local transit system authorities have their own taxing authority. The bulk of these funds are derived from local ad valorem property taxes.

In Table 3-4, the percentage distribution of funds received by transit operators, by state, are reported for Florida and its peer group of states. In terms of total revenue raising, the picture in Florida is much like it is for highway financing in that the state relies relatively heavily on local government sources of revenue. Nationally, 34.3 percent of all revenue is derived from local sources, while in the state of Florida 43.5 percent comes from local sources. The state, on the other hand, contributes an amount lower that the national average. However, when compared to just the peer group of states, Florida does not look so low. Only one of the 10 states in this subgroup of states (Tennessee) contributes more to transit operators. The percentage of total revenue provided by transit operator receipts (fares) is just slightly below the national average. The importance of this source of revenue among the peer states is "all over the board," ranging from a high of 65.6 percent in South Carolina to a low of 8.3 percent in Arizona.

Table 3-4
SOURCES OF TRANSIT CAPITAL AND OPERATING FUNDING, 1991

State	System Revenue	Federal Funds	State Funds	Local Funds
Florida	20.7%	27.7%	8.1%	43.5%
Alabama	13.1%	57.5%	0.2%	29.3%
Arizona	8.3%	27.4%	7.3%	57.1%
California	24.2%	19.5%	5.0%	51.4%
Georgia	30.5%	36.8%	0.3%	32.3%
Kentucky	14.8%	21.3%	3.3%	60.6%
Mississippi	28.1%	38.7%	0.0%	33.2%
N. Carolina	15.0%	43.6%	5.7%	35.7%
S. Carolina	65.6%	27.8%	2.6%	4.0%
Tennessee	18.4%	35.7%	12.2%	33.7%
Texas	53.8%	37.3%	1.3%	7.5%
U.S. Avg.	21.7%	21.3%	22.7%	34.4%

Source: Federal Highway Administration, *Highway Statistics, 1992.*

In terms of financing mass transit capital outlays, the picture is a bit different, as can be seen in Table 3-5. Although relying heavily on local revenues for operating subsidies, in terms of support for capital outlays the state's reliance on local sources is low. The low level of capital support provided by local government is made up, in part, by a higher level of contribution by the state. Although just about the average for the U.S., it represents a high level of state participation relative to its contribution for operating subsidies.

Florida gets a high proportion of transit capital outlay support from the federal government, 76.3 percent in Florida versus just 50.4 percent for the U.S. average. However, seven of the 10 states in the peer group rely more heavily on federal funds than does Florida.

When these two are combined, local governments in Florida are seen to have a high reliance on motor fuels, obtaining 42.1 percent of their revenues from this source versus 29.3 percent for the national average.

Florida's Transportation Tax and Fee Rates Compared to Other States. Perhaps a

more important question, from the standpoint of public policy, is not what the proportionate breakdown of revenue by source is, but rather what the rate of taxation of the level of fees may be in one state relative to another. The actual level of collections (and thus the proportionate breakdown in collections), would be influenced by things like purchases of motor fuels by out-of-state residents, the condition of the economy, etc. But what are the actual levels of these imposts on Florida residents?

A comparison of the full burden of transportation finance on Florida residents would require a detailed analysis of the flows of funds to transportation in each state. As a partial cut at this larger issue, rates of taxation on two of the major common sources of transportation finance: the motor fuels tax rate and the motor vehicle registration fee levels will be reviewed.

Is the Florida motor fuels tax rate out of line with other states? Table 3-6 shows the weighted average effective motor fuels tax rate per gallon imposed on all motor fuels (gasoline, diesel, and gasohol) for each state in 1992, where the weights are equal to the proportion of total motor fuels sales in the state accounted for by each type of fuel. The weighted average state rate per gallon in the U.S. is 18.1 cents. In Florida, it is only 12.5 cents per gallon, ranking it 47th among the 50 states and the District of Columbia.

However, as shown, Florida relies very heavily on local motor fuels taxes compared to many states. To take these local tax rates into account in a comprehensive manner to show the full burden of gasoline taxation of Florida motorists, the effective total state and local rates have to be estimated. This measure is derived by multiplying the statutory state tax rate by the ratio of total state and local motor fuels tax collections to total state collections for each state.

When this measure is used, the average effective Florida rate relative to the U.S. increases. The U.S. average is 18.9 cents per gallon for state and local motor fuels taxes (versus 18.1 for state taxes) while for Florida it is 18.1 cents (versus 12.5 cents for State taxes). This is closer to the national average but still a bit below the norm. On this more comprehensive basis, Florida ranks 35th among all states in total effective state and local motor fuels tax rates.

The other major source of traditional funding for transportation is automobile registration fees, which raised nearly $300 million for the state in 1994–nearly 40 percent of the amount raised by the motor fuels tax. How does the average automobile registration fee in the state compare to that for the nation? Table 3-7 presents the average automobile registration fees for all states for the year 1992. (Please note here that it is difficult to make strict compari-

Table 3-5
SOURCES OF TRANSIT CAPITAL FUNDING, 1991

State	System Revenue	Federal Funds	State Funds	Local Funds
Florida	0.0%	76.3%	10.5%	13.2%
Alabama	5.6%	28.8%	0.0%	65.6%
Arizona	0.0%	77.8%	0.0%	22.2%
California	16.0%	52.7%	7.8%	23.4%
Georgia	45.4%	48.3%	0.5%	5.8%
Kentucky	0.0%	76.8%	27.7%	-4.6%
Mississippi	0.0%	79.9%	0.0%	20.1%
N. Carolina	0.1%	80.0%	10.2%	9.8%
S. Carolina	4.8%	82.2%	3.6%	9.4%
Tennessee	1.3%	79.4%	9.0%	10.3%
Texas	7.8%	77.3%	2.1%	12.8%
U.S. Avg.	12.0%	50.4%	11.6%	25.9%

Source: Federal Highway Administration, *Highway Statistics, 1992.*

Table 3-6
RELATIVE MOTOR FUELS TAX BURDEN: EFFECTIVE PER-GALLON TAX RATE, 1992*

State	Effective State Motor Fuel Tax Rate (¢/Gal.)	Rank	Effective State & Local Motor Fuel Tax Rate (¢/Gal.)	Rank
Alabama	18.2	31	21.5	14
Alaska	8.0	50	9.5	49
Arizona	18.0	33	18.0	36
Arkansas	18.7	28	18.7	31
California**	16.0	42	16.0	42
Colorado	21.8	12	21.8	13
Connecticut	25.1	2	25.1	3
Delaware	19.0	27	19.0	29
Dist. of Columbia	20.0	21	20.0	26
Florida	12.5	47	18.1	35
Georgia**	7.5	51	7.6	51
Hawaii**	16.0	40	20.7	19
Idaho	21.0	14	21.0	16
Illinois**	19.4	23	23.1	7
Indiana**	15.2	43	15.9	44
Iowa	20.2	18	20.2	24
Kansas	18.4	30	18.4	34
Kentucky	14.8	45	14.9	46
Louisiana	20.0	19	20.0	27
Maine	19.2	25	19.2	28
Maryland	22.9	7	22.9	8
Massachusetts	21.0	15	21.0	18
Michigan	15.0	44	15.0	45
Minnesota	20.0	22	20.0	25
Mississippi	18.2	32	18.4	33
Missouri	13.0	46	13.2	47
Montana	21.4	13	21.4	15
Nebraska	23.8	4	24.7	4
Nevada	24.5	3	28.2	1
New Hampshire	18.6	29	18.6	32
New Jersey	10.8	48	10.8	48
New Mexico	17.0	36	17.3	38
New York**	23.1	5	23.7	5
North Carolina	21.9	11	22.1	12
North Dakota	17.0	37	17.0	39
Ohio	21.0	16	21.0	17
Oklahoma	16.4	38	16.4	40
Oregon	22.0	10	22.6	10
Pennsylvania	22.4	8	22.8	9
Rhode Island	26.0	1	26.0	2
South Carolina	16.0	41	16.0	43
South Dakota	17.4	34	17.6	37
Tennessee	19.4	24	20.3	23
Texas	20.0	20	20.7	20
Utah	19.0	26	19.0	30
Vermont**	16.1	39	16.1	41
Virginia**	17.3	35	20.3	22
Washington**	22.9	6	23.3	6
West Virginia	20.4	17	20.4	21
Wisconsin	22.2	9	22.2	11
Wyoming	8.7	49	8.7	50
Weighted Avg.	18.1	n/a	18.9	n/a

*Calculated as a weighted average rate of tax on gasoline, gasohol, and special fuel.
**State also imposes an additional sales tax on motor fuels.

Source: Federal Highway Administration, *Highway Statistics 1992.*

sons across states since many states, including Florida, impose registration fees that vary by the weight of the automobile or, in some cases, its purchase price, subject to maximums and minimums. For those states that charge based upon weight, the information reported in Table 3-7 is the midpoint of the highest and lowest rates.)

Using this information for comparison, it can be seen that, unlike the motor fuels excise tax, registration fees in Florida are slightly above the U.S. average at $30.60 per vehicle, compared to $28.32 per vehicle nationally. The state currently ranks 18th among the 47 states that can be ranked.[15] There are no local motor vehicle registration fees.

Information from the State Work Program Components

Although this information gives a better notion of the composition of transportation finance in the state of Florida and also can provide some comparative information on how Florida finances transportation relative to other states, it cannot directly draw the link between the sources of revenues and the specific purposes for which these funds are used. For example, much of the revenue used for highway programs is used for operating purposes or maintenance, and not dedicated to infrastructure development.

In short, some of this information, while valuable for an analysis of the overall structure of transportation finance in the state or for a comparison of tax rates or fee levels relative to other states, does not provide any information on how new capital projects and their operations and maintenance have been, or are likely to be, funded.

Florida's Five-Year Work Program is a useful data source for this information. The information from the five-year plan will differ from the information provided earlier for three reasons: first, as indicated, the budgeting is done purely for infrastructure development projects. Second, the time horizon is different, extending from 1994 through 1999. Finally, the plan represents an initial projection of how each project would be funded and may differ notably from actual funding, particularly in later years.

Within this data set is a full description of each scheduled project encompassing all work program components for those projects in which the Florida Department of Transportation will contribute some level of funding. It should be noted that this information is in no way a complete and accurate description of the total project funding picture for all projects carried out by state and local agencies, as it does not capture any local projects that receive no state funding. Of particular importance in this data is the ability to track the funding types for each project, thus providing a base to determine the expected distribution of funding over federal, state and local sources. All data contained in this section is based solely upon those capital projects that fall under the FDOT Product category.

From this data source, project funding information has been broken out by work program component showing the percentage contribution from 11 aggregated revenue sources:

OFA	=	Other Federal Aid
IIM	=	Federal Interstate and Interstate Maintenance
NH	=	National Highway System
100% Federal	=	Purely Federally Financed Projects
100% State	=	Purely State Financed Projects
State Match	=	State Matching Funds
Bonds	=	State Issued Transportation Bonds
Toll	=	State Toll Imposts
Turnpike	=	Purely State Turnpike Imposts
Local	=	Local Contributing Funds
Local Match	=	Local Matching Funds

Table 3-7
AUTOMOBILE REGISTRATION FEE BY STATE, 1992

State	Fee	Rank	State	Fee	Rank
Alabama	$23.00	29	Montana	$12.75	41
Alaska	$35.00	10	Nebraska	$17.50	37
Arizona	$8.00	46	Nevada	$33.00	15
Arkansas	$23.50	28	New Hampshire	$31.20	16
California	$27.00	23	New Jersey	$34.50	12
Colorado	$12.55	42	New Mexico	$31.00	17
Connecticut	$62.00	3	New York	% rates, by weight	*
Delaware	$20.00	31	North Carolina	$20.00	32
Dist. of Col	$67.50	2	North Dakota	$137.50	1
Florida	$30.60	18	Ohio	$20.00	34
Georgia	$8.00	47	Oklahoma	$17.75	36
Hawaii	$20.00	35	Oregon	$30.00	20
Idaho	$26.28	25	Pennsylvania	$24.00	27
Illinois	$48.00	6	Rhode Island	$30.00	21
Indiana	$12.75	40	South Carolina	$12.00	44
Iowa	$20.00	33	South Dakota	$60.00	4
Kansas	$30.00	19	Tennessee	$26.25	26
Kentucky	$12.00	43	Texas	$49.50	5
Louisiana	price based	*	Utah	$12.00	45
Maine	$22.00	30	Vermont	$42.00	7
Maryland	$33.75	13	Virginia	$28.50	22
Massachusetts	$40.00	9	Washington	$26.90	24
Michigan	price based	*	West Virginia	$33.00	14
Minnesota	$10+1.25% of price	*	Wisconsin	$40.00	8
Mississippi	$15.00	39	Wyoming	$15.00	38
Missouri	$34.50	11	**U.S. Average**	$28.32	n/a

*Not included in ranking.

Source: Advisory Commission on Intergovernmental Relations, *Significant Features of Fiscal Federalism - 1993.*

Each of the funding sources listed above is composed of a host of various direct funding types. For instance, the 100% State category is the sum of funds committed from such sources as unrestricted state primary, state primary for consultants, state primary highways and PTO, district dedicated revenues (SCETS), etc. This level of aggregation was chosen because of its current use by the Florida Department of Transportation in their revenue forecasting process.

Given below are descriptions of the expected funding proportions for each of the sources over the various work components. Each description gives the fund type and percentage of total budgeted expenditures within the work program. The current distribution of these funds in the state program is described by Table 3-8.

State Highway System: Florida's state highway system is funded predominantly by 100 percent state (46 percent) and other federal aid (37 percent) funding. A full 83 percent of funding for this component comes from these two sources. The next highest contributing sources are state matching funds and bond issuance, comprises an additional 14 percent of total funding. Contributions from local sources are expected to be only a minimal 2.5 percent over the current five-year program.

Off State Highway System: Approximately 71 percent of all funding for off state highway projects come from other federal aid. An additional 23 percent comes from 100 percent state and state matching funds. Local funding amounts to six percent of total project funding.

Interstate Highway System: Interstate system projects are funded predominantly through interstate and interstate maintenance, national highway system and state funding. Federal sources comprise 67 percent of total funding. State 100 percent and matching funds represent approximately 28 percent of funding needs, with the final five percent coming from bond, toll and local revenues.

State Turnpike: There are only two funding sources for Florida's turnpikes given in the current five-year work program. Almost all of the turnpike system improvements (99 percent) are funded by the actual turnpike generated revenues. The other source, local contributions, account for only one percent of the funds for actual product enhancement within the turnpike system.

Transit Development: The transit program includes assistance to Florida's transit, paratransit and ridesharing systems. Local transit development is funded primarily (48 percent) by locally generated funds. Project funds from federal sources (OFA and 100% Federal) contribute 35 percent. Total OFA funding is minimal (2.1 percent) while 100% Federal monies provide 32 percent of total component funds. State sources provide the remaining 17 percent. State participation in capital projects is limited to 50 percent of the non-federal share of total project costs. State public transit block grants are one source of state funding for transit projects.

Aviation Development: The state aviation program includes assistance to Florida's airports for development, improvement, land acquisition, and airport access and for economic enhancement projects. The FDOT may fund up to 50 percent of the non-federal share of any eligible project but may fund up to 75 percent of land acquisition projects. State aviation improvements are funded predominantly through 100 percent federal funds (45 percent) with local aviation authorities chipping in 35 percent of total funding and the state (100 percent state) contributing the final 20 percent. Local funding in this instance stems primarily from locally generated bond issuance carried out by regional aviation authorities.

Rail Development: The state rail program falls under the state intermodal transporta-

Table 3-8
SOURCES OF FUNDING FOR STATE WORK PROGRAM COMPONENTS

Component	Federal				State					Local	
	100% Federal	*OFA**	*IIM**	*NH**	*100% State*	*State Match*	*Bond*	*Toll*	*Turnpike*	*Local*	*Local Match*
State Highway System	0.743%	37.142%	0.000%	0.000%	45.617%	9.465%	4.477%	0.056%	0.000%	2.454%	0.045%
Off State Highway System	0.002%	70.695%	0.000%	0.000%	3.141%	19.821%	0.000%	0.000%	0.000%	3.052%	3.291%
Interstate Highway System	0.604%	2.053%	27.515%	36.776%	10.830%	16.971%	4.563%	0.000%	0.000%	0.688%	0.000%
State Highway System Turnpike	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	99.716%	0.284%	0.000%
Transit Development	32.620%	2.129%	0.000%	0.000%	16.857%	0.710%	0.000%	0.000%	0.000%	47.685%	0.000%
Transportation Disadvantaged	0.000%	0.000%	0.000%	0.000%	91.002%	0.000%	0.000%	0.000%	0.000%	8.998%	0.000%
Railroad Development	19.246%	2.943%	3.389%	0.000%	67.577%	1.422%	0.000%	0.000%	0.000%	5.395%	0.028%
Aviation Development	45.338%	0.000%	0.000%	0.000%	19.535%	0.000%	0.000%	0.000%	0.000%	35.127%	0.000%
Seaports	92.066%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	7.934%	0.000%

*Key: OFA = Other Federal Aid; IIM = Interstate and Interstate Maintenance; NH = National Highway System.

Source: FDOT, *Florida's Adopted Five-year Work Program, 1994.*

tion program. Projects under this program include rail safety inspections, rail/highway crossings, development of intercity rail passenger service, commuter rail service and access to airports and seaports. Expenditures on rail development stem primarily from 100 percent state funding (69 percent). Total federal funds from 100% Federal, IIM, and OFA sources comprise some 25 percent of total budgeted expenditures. Local payments are shown to be approximately six percent.

Seaport Development: Seaport programming, along with that for rail, is part of the state intermodal transportation program. The seaport program is by a wide margin the smallest component of the state work program. Total expected expenditures are currently only $60.4 million. Expected port improvements over the current five-year work program will be funded mainly from 100% State sources that will contribute 88 percent of the total budget. The remainder of funding will come from local sources.

Transportation Disadvantaged: Under the supervision of the Commission for the Transportation Disadvantaged, transportation projects are supported through the Transportation Disadvantaged Trust Fund (TDTF) and matching local funds. Grants are given out for both trip/equipment and planning expenditures. There is a 10 percent local match on the trip/equipment grants but none for planning grants. Revenues from the TDTF are expected to provide approximately 92 percent of the TD funding reported in the work program over the next five years and local funds will make up the remaining eight percent.

Projections of Future Revenues

The Forecast Process

The ultimate intent of this report is to identify the transportation infrastructure needs in the state and to evaluate the options for the finance of these needs. In the previous sections the existing methods of transportation finance have been described. The next step is to use this existing structure of revenue-raising as a baseline for a projection of available funds into the future. From this projection, comparisons can be made with current and future revenue needs. Having identified the level of future revenue needs, finance packages that will meet these needs can be designed.

Most taxes and fees are placed upon some type of market transaction or activity related to the economy. Whether the activity is the purchase of an item, such as motor fuels, automobiles, or taxable goods and services, or the holding of some asset, such as a home or an automobile, the level of taxation depends upon the amount and value of the market transaction. In some cases, the tax is imposed as a percentage of the market value, (e.g., sales tax or property tax), while in other cases it is placed on the quantity of the good or service sold (e.g., motor fuels tax or impact fee). In either case, whether the tax is placed on the value of the transaction or on the number of transactions, the tax base is dependent upon the level of market economic activity. The higher the level of economic activity, the greater the tax base. It is for this reason that all revenue forecast models are models that explain and forecast revenues based upon projected levels of economic activity.

Another important (and related) factor in determining both the level and the mix of economic activity is demographic factors. The higher the population and the faster the population growth, the greater the level of economic activity. Simultaneously, the level of activity helps determine the level and composition of the population as strong economic growth induces immigration. Over time, the concentrations of the population among young, middle-aged, and old will vary, with predictable consequences for the mix of economic activity. Given the dependence of the tax base on the level of economic activity and its relationship to the state's demography, our tax base projection models are driven by widely

accepted projections of economic activity and population in Florida.

Forecasted levels of revenue bases are, therefore, primarily driven by long term forecasts of population and economic activity for the state of Florida. These forecasts are principally obtained from the University of Florida's Bureau of Economic and Business Research (BEBR) publication, *Florida Long-Term Economic Forecast–1992.*[16] Since population projections are primarily economically driven, BEBR population and economic forecasts were used to ensure consistency with other information available to the state government with respect to the underlying assumptions concerning Florida's future growth. The remainder of this section describes the methods used for forecasting revenues and revenue sensitivity for each source of transportation funds in the state.

To make a forecast using economic and demographic variables, a precise quantification of the relationship between the economic variables (e.g., income, population of a certain age group) and the tax base was established. In the most sophisticated of these forecast models, statistical techniques are used that relate many economic variables to one tax base. This technique is referred to as regression analysis. For example, the sales of motor fuels is affected by changes in income, population, tourism, price of motor fuels, etc. Regression analysis of these variables yields forecasting parameters that are then used to produce projections.

In other cases, reasonably fixed relationships occur between "determining" and "explained" variables. It is then assumed that the ratios between these variables will be constant throughout the forecast period. For example, in forecasting the number of automobiles, it can be reasonably assumed that the ratio of registered automobiles to driving-age population is a relatively fixed value, or one for which there is little theoretical or empirical basis upon which to vary this assumption of fixity.

Given the forecast of the revenue bases, the total amount of revenue that could be raised from a specific tax or fee structure when applied to these bases can be calculated. The estimation of the revenue potential requires two steps: 1) the estimation of the current and potential future value of the tax or fee base; and, 2) an evaluation of the extent to which the full revenue-raising capacity of these available tax sources has been tapped. The methods of projecting these revenues on these bases are presented.

Federal, State, and Local Forecasts

Federal Revenue Sources. Obviously, the state of Florida does not have much control over the amount of federal funds that it receives. However, because federal funds are an important source of transportation revenues, the projections of needs and revenues must take this source into account. For the baseline, it is assumed that the amount of funds available from federal sources will grow at a rate of 1 percent per year. (This is the assumption used by the Florida Department of Transportation in their forecasts of Federal Revenue).

State Revenue Sources. Projections of the potential base for the motor fuels tax were obtained from a model of state motor fuels demand, developed by the Center for Economic and Management Research, which explains motor fuels consumption as a function of income, population, the demographic composition of the population, the level of tourism activity, and the price of gasoline. This equation is described in detail in the STPI publication, *Trends and Forecasts of Florida's Transportation Needs.* Forecasts of population and economic activity to drive this model were obtained from the BEBR *Long-Term Forecast,* while forecasts of the future price of gasoline were obtained from the DRI *Long-Term Forecast of Economic Activity for the United States.*

Using the STPI motor fuels demand model as a basis, both the total amount of revenue and the sensitivity of total revenues to changes in motor fuels tax rates can be estimated. Table 3-9 shows estimates of total revenues through 2012, including the fuel sales tax and the SCETS tax, and the impact of a one-cent per gallon change in motor fuels tax rates over the 20-year period of the study.[17]

The forecasts of passenger motor vehicle license fee revenues is driven primarily by forecasts of driving-age population. The assumption underlying these projections is that the ratio of new motor vehicle licenses to the population between the ages of 15 and 64 remains constant throughout the forecast period. It is, of course, possible that, as household income grows, the number of automobiles per driving-age person may increase as the proportion of households able to afford multiple autos increases. However, there are no existing quantitative estimates that show how such an increase might occur. Consequently, the ratio of automobile licenses to driving-age population is assumed to be constant throughout the 20-year forecast period. Table 3-10 provides estimates of the potential revenue from, and the marginal impact of, each additional one percent increase in the charge for motor vehicle licenses

The forecast of revenues from commercial vehicle registration fees is based upon the assumption that the ratio of commercial vehicle registrations to total employment remains constant over the forecast period. Since employment is expected to increase at a rate faster than the increase in population, the rate of increase in commercial

Table 3-9
PROJECTED STATE MOTOR FUELS TAX REVENUES AND IMPACT OF ONE CENT PER GALLON INCREASE
(thousands of dollars)

Year	*1992 Dollars*		*Inflated Dollars*	
	Revenues	*Impact*	*Revenues*	*Impact*
1997	$879,864	$77,281	$1,010,445	$88,750
2002	$916,342	$84,369	$1,251,054	$115,187
2007	$962,130	$92,731	$1,561,613	$150,509
2012	$1,024,523	$102,664	$1,976,891	$198,098
Cumulative Total Through 2012	$18,536,611	$1,723,035	$26,588,703	$2,491,754

Table 3-10
PROJECTED PASSENGER VEHICLE REGISTRATION FEE REVENUES AND IMPACT OF ONE PERCENT INCREASE
(thousands of dollars)

Year	*1992 Dollars*		*Inflated Dollars*	
	Revenues	*Impact*	*Revenues*	*Impact*
1997	$162,162	$1,622	$186,229	$1,862
2002	$149,456	$1,495	$204,048	$2,040
2007	$136,165	$1,362	$221,007	$2,210
2012	$129,439	$1,294	$249,763	$2,498
Cumulative Total Through 2012	$2,972,029	$29,761	$4,136,803	$41,368

vehicle registration revenues is expected to be higher than those for passenger vehicles. The potential revenues and increase in revenues from each one percent increase in commercial vehicle registrations is shown in Table 3-11.

Since 1984, there has been a state rental car surcharge of $2 per day, up to a maximum of $60, which applies to both rental cars and leased vehicles. The STTF receives $1.50 of this fee. The forecast of the rental car surcharge is driven by the forecast of the number of tourists in the state of Florida. While it is certainly the case that cars are also rented by non-tourists (i.e., by residents), and that some of the revenues generated by the surcharge are generated by those leasing vehicles, there is no available information on the composition of total rental surcharges that allows the data to be disaggregated and compared among these groups (tourist-renters, resident-renters, and lessors). Under the assumption that the relative proportion of the revenue coming from these three sources does not change over time, rental fee revenues are forecast using average revenue per tourist as the determining factor. In 1993, the estimated rental surcharge revenues per tourist were $2.51, $1.88 of which goes to STTF. The total amount of projected revenues from this source is the product of $1.88 times the forecast level of tourism.

The tourist forecast was obtained from the Florida Department of Commerce. This forecast is available only through the year 2005. For the later years of the study (through 2012), the percentage rate of growth in tourism for the period 2000 to 2005 was applied to the base from the year 2005.

Table 3-12 shows the potential (marginal) revenues generated by increasing rental surcharges by $1 per day. It can be seen that, over the 20-year period, $955 million (in 1992 dollars) in additional revenue could be raised through this source.

The state also obtains revenue from an initial registration fee placed on vehicles purchased elsewhere but brought into the state of Florida and on new vehicles when they are purchased in Florida and registered for the first time. The registration impact fee is currently set at a rate of $100 per vehicle, $70 of which is dedicated to the STTF. The base of this charge would be any increase in registered vehicles generated by an increase in the total number of cars owned by existing residents or by cars brought into the state. To forecast the potential amount of revenues obtained through this levy, projections of the change in vehicle registrations in the state were used. However, this forecast potentially underestimates the revenues derived from such fees because persons who out-migrate do not receive a rebate on their registration fee. For

Table 3-11
PROJECTED COMMERCIAL VEHICLE REGISTRATION FEE REVENUES AND IMPACT OF ONE PERCENT INCREASE
(thousands of dollars)

Year	*1992 Dollars*		*Inflated Dollars*	
	Revenues	*Impact*	*Revenues*	*Impact*
1997	$168,814	$1,688	$193,867	$1,939
2002	$158,948	$1,589	$217,006	$2,170
2007	$148,283	$1,483	$240,676	$2,407
2012	$138,388	$1,384	$267,030	$2,670
Cumulative Total Through 2012	$3,148,131	$31,523	$4,400,434	$44,004

example, if one auto was brought into Florida while another was taken out, net new registrations would be zero, yet an additional $100 would be payable to the state. Unfortunately, data are not available that tell us gross immigrants to Florida or the number of auto purchases by those who do not transfer their license tags from other vehicles. However, assuming that the ratio of vehicle out-migrations is constant and equal to the rate experienced in the base year of 1993 (where that rate is based upon data on gross initial registration fee revenues, and net increases in vehicle registration), we can project these revenues. Table 3-13 shows the total amount of revenue from this source and that which could be raised for each $1 increase in this initial registration fee.

The state imposes an incremental title fee of $24 for each title transfer made in the state. Until 1990, this fee was set at $3 and the revenues went primarily to the general fund. Effective 1991, this fee was increased to $24, and $21 of the fee is deposited in the State Transportation Trust Fund.

The projection of these revenues is based upon the estimated number of vehicles in the state. The assumption is made that the rate of turnover in the existing stock of automobiles will stay the same throughout the forecast period. The base period turnover rate is determined from information on estimated total collection in 1994. With this assumption, the growth rate in collections would equal the growth rate in the stock of vehicles. The projections and the sensitivities are shown on Table 3-14.

Aviation Fuels. The state levies a tax of 6.9 cents per gallon on aviation fuel in the state. The projection of future revenues

Table 3-12
PROJECTED RENTAL CAR SURCHARGE REVENUES AND IMPACT OF ONE DOLLAR PER DAY INCREASE
(thousands of dollars)

Year	1992 Dollars		Inflated Dollars	
	Revenues	Impact	Revenues	Impact
1997	$77,584	$51,722	$89,098	$59,398
2002	$73,741	$49,160	$100,676	$67,117
2007	$66,670	$44,447	$108,211	$72,140
2012	$59,954	$39,969	$115,685	$77,123
Cumulative Total Through 2012	$1,430,790	$955,114	$1,994,310	$1,329,540

Table 3-13
PROJECTED INITIAL REGISTRATION FEE REVENUES AND IMPACT OF ONE DOLLAR INCREASE
(thousands of dollars)

Year	1992 Dollars		Inflated Dollars	
	Revenues	Impact	Revenues	Impact
1997	$85,140	$1,216	$97,775	$1,397
2002	$77,995	$1,114	$106,484	$1,521
2007	$69,091	$987	$112,140	$1,602
2012	$61,721	$882	$119,095	$1,701
Cumulative Total Through 2012	$1,533,496	$21,938	$2,123,887	$30,341

from this source is based upon forecasts of future passengers in the state of Florida provided in the *Florida Aviation System Plan: Statewide Summary* (FASP).[18]

The rate of growth in aviation fuel tax revenues depends directly upon the rate of growth in aviation fuels usage. It is assumed that the demand for air-miles traveled will increase at the same rate as the number of passengers. Second, it is assumed that there is an annual increase in the fuel-efficiency of the airline fleet. The rate of growth in aviation fuel used would be the difference between the rate of growth in passengers and the rate of growth in airline fuel efficiency. From the FASP report, it is projected that airport enplanements would grow by 141 percent over the 20-year period from 1990-2010. The projections and the sensitivities are shown on Table 3-15.

The projected revenues from incremental increase in these taxes and fees are summarized in Table 3-16.

Local Government Revenue Sources. In Florida, local governments have a variety of options for raising revenue for the finance of transportation. As indicated in the earlier portion of this report, while Florida appears to have a very low state tax rate, the existence of these local option motor fuels taxes brings it much closer to the average when total state and local motor fuels tax revenues are considered.

Table 3-14
PROJECTED INCREMENTAL TITLE FEE STATE REVENUES AND IMPACT OF ONE DOLLAR INCREASE
(thousands of dollars)

Year	*1992 Dollars*		*Inflated Dollars*	
	Revenues	*Impact*	*Revenues*	*Impact*
1997	$66,114	$3,148	$75,926	$3,616
2002	$60,934	$2,902	$83,191	$3,961
2007	$55,515	$2,644	$90,105	$4,291
2012	$52,773	$2,513	$101,829	$4,849
Cumulative Total Through 2012	$1,211,707	$57,780	$1,686,588	$80,314

Table 3-15
PROJECTED AVIATION FUEL TAX REVENUES AND IMPACT OF ONE CENT PER GALLON INCREASE
(thousands of dollars)

Year	*1992 Dollars*		*Inflated Dollars*	
	Revenues	*Impact*	*Revenues*	*Impact*
1997	$44,349	$6,427	$50,931	$7,381
2002	$44,205	$6,407	$60,352	$8,747
2007	$44,061	$6,386	$71,515	$10,364
2012	$43,918	$6,365	$84,743	$12,282
Cumulative Total Through 2012	$884,282	$128,312	$1,252,877	$181,576

The local option gas tax is just one example of such a local levy. In addition, local governments in the state can impose local infrastructure sales taxes and can also impose impact fees for transportation. The options for local taxes and their use by local

governments in the state are shown in Table 3-17. One important point made in the table is that there is wide divergence between the available taxing authority and the actual imposition of these levels, whether because of differences in need at the local level or in the willingness to impose taxes or fees. While six counties are at or near their state-imposed limits with regard to their local option taxes, most of the remaining 61 counties could virtually double their levies on these taxes, but choose not to do so. The highly-taxed counties defy categorization, as they include counties in various parts of the state, as well as both rural and urban counties. Since there is such a wide variety of taxation for local transportation revenue generation in the counties, this poses a difficulty in estimating the revenues actually available at the local level when compared to local needs without projecting those needs (and revenues) on a county-by-county basis. Unfortunately, it is at the local level where the information on transportation needs and revenues is least available.

The state of Florida allows local governments to levy motor fuels taxes under several separate provisions.

The Ninth-Cent Gas Tax was first authorized by the state of Florida in 1972 (when the state's fuel excise taxes totaled 8 cents.) The tax is limited to one cent per gallon on highway fuels. Presently, 31 counties have implemented the Ninth-Cent Gas Tax as shown in Table 3-17.

Local governments are authorized to levy two incremental local option gasoline taxes. The original local option tax, first imposed in 1983, is a one- to six-cents per gallon tax on motor and special fuels sold at retail establishments. Revenues from this source generally are eligible only for transportation-related expenditures but, in small counties (population less than 50,000), proceeds may also be used for other types of infrastructure needs. During the 1993 legislative session, a second local option gas tax of one- to five-cents per gallon was added under a proposal from the ELMS III committee. This tax was established to help counties fund transportation-related expenditures necessary to meet the requirements of the capital improvements element of an adopted comprehensive plan. Transportation expenditures are defined as:

- public transportation operations and maintenance;

Table 3-16
SUMMARY OF PROJECTED STATE REVENUES FROM INCREMENTAL INCREASES IN TAXES AND FEES
(thousands of 1992 dollars)

Tax or Fee	*Increment*	*10-Year Revenues*	*20-Year Revenues*
Motor Fuels Tax	1¢/gal.	$784,368	$1,723,035
Motor Fuels Tax - Urban Counties Only	1¢/gal.	$706,628	$1,679,865
Passenger Vehicle Registration Fee	1%	$16,138	$29,761
Commercial Vehicle Registration Fee	1%	$16,791	$31,523
Rental Car Surcharge	$1/day	$514,857	$955,114
Initial Registration Fee	$1	$12,105	$21,938
Incremental Title Fee	$1	$31,332	$57,780
Aviation Fuel Tax	1¢/gal.	$64,476	$128,312

Table 3-17
LOCAL FUNDING MECHANISMS, 1994

County	Ninth Cent (¢/Gal.)	Original Local Option Gas (¢/Gal.)	Second Local Option Gas (¢/Gal.)	Total Local Gas (¢/Gal.)	SCETS Gas* (¢/Gal.)	Infrastructure Surtax (Percent)	Development Impact Fees
Alachua	1.0	6.0	0.0	7.0	4.5	0.0	No
Baker	1.0	6.0	0.0	7.0	4.5	0.0	No
Bay	0.0	6.0	0.0	6.0	4.5	0.5	Yes
Bradford	0.0	6.0	0.0	6.0	4.5	0.0	No
Brevard	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Broward	0.0	6.0	3.0	9.0	4.5	0.0	Yes
Calhoun	0.0	6.0	0.0	6.0	4.5	0.0	No
Charlotte	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Citrus	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Clay	1.0	6.0	0.0	7.0	4.5	1.0	No
Collier	1.0	6.0	5.0	12.0	4.5	0.0	Yes
Columbia	1.0	6.0	0.0	7.0	4.5	0.0	No
Dade	1.0	6.0	5.0	12.0	4.5	0.0	Yes
DeSoto	1.0	6.0	5.0	12.0	4.5	1.0	No
Dixie	0.0	6.0	0.0	6.0	4.5	1.0	No
Duval	0.0	6.0	0.0	6.0	4.5	0.0	No
Escambia	1.0	6.0	0.0	7.0	4.5	1.0	No
Flagler	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Franklin	0.0	0.0	0.0	0.0	0.0	0.0	No
Gadsden	0.0	6.0	0.0	6.0	4.5	1.0	No
Gilchrist	1.0	6.0	0.0	7.0	4.5	0.0	No
Glades	1.0	6.0	0.0	7.0	4.5	1.0	No
Gulf	0.0	6.0	0.0	6.0	4.5	0.0	No
Hamilton	0.0	3.0	0.0	3.0	2.2	1.0	No
Hardee	1.0	6.0	0.0	7.0	4.5	1.0	No
Hendry	1.0	4.0	0.0	5.0	3.6	1.0	No
Hernando	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Highlands	1.0	6.0	3.0	10.0	4.5	1.0	No
Hillsborough	1.0	6.0	0.0	7.0	4.5	0.0	Yes
Holmes	0.0	5.0	0.0	5.0	3.6	0.0	No
Indian River	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Jackson	1.0	5.0	0.0	5.0	4.5	0.0	No
Jefferson	1.0	4.0	0.0	5.0	4.5	1.0	No
Lafayette	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Lake	1.0	6.0	0.0	7.0	4.5	1.0	Yes
Lee	1.0	6.0	5.0	12.0	4.5	0.0	Yes
Leon	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Levy	0.0	6.0	0.0	6.0	4.5	0.0	No
Liberty	1.0	0.0	0.0	1.0	0.7	0.0	No
Madison	0.0	3.0	0.0	3.0	2.2	1.0	No
Manatee	1.0	6.0	0.0	7.0	4.5	0.0	Yes

- roadway and right-of-way maintenance and equipment and structures used primarily for the storage and maintenance of such equipment;
- roadway and right-of-way drainage;
- street lighting;
- traffic signs, traffic engineering, signalization, and pavement markings;
- bridge maintenance and operation; and
- debt service and current expenditures for transportation projects in the foregoing program areas, including construction or reconstruction of roads.[19]

The revenue potential of these local taxes is calculated under two scenarios. Because the tax is imposed as a "local option," not all counties in the state utilize the full existing taxing authority which the law provides. In 1993, only five counties used the full available 12 cents. For this reason, one scenario is chosen in which each county maintains rates at its current level and another under which each county is assumed to utilize its full taxing potential. The difference between the two scenarios is the unused tax potential. The simulation

Table 3-17 (CONTINUED)

County	Ninth Cent (¢/Gal.)	Original Local Option Gas (¢/Gal.)	Second Local Option Gas (¢/Gal.)	Total Local Gas (¢/Gal.)	SCETS Gas* (¢/Gal.)	Infrastructure Surtax (Percent)	Development Impact Fees
Marion	1.0	6.0	0.0	7.0	4.5	0.0	Yes
Martin	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Monroe	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Nassau	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Okaloosa	0.0	5.0	0.0	5.0	3.6	0.0	No
Okeechobee	1.0	6.0	0.0	7.0	4.5	0.0	No
Orange	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Osceola	1.0	6.0	0.0	7.0	4.5	1.0	Yes
Palm Beach	1.0	6.0	5.0	12.0	4.5	0.0	Yes
Pasco	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Pinellas	0.0	6.0	0.0	6.0	4.5	1.0	Yes
Polk	1.0	6.0	0.0	7.0	4.5	0.0	Yes
Putnam	0.0	6.0	0.0	6.0	4.5	0.0	No
St. Johns	0.0	6.0	0.0	6.0	4.5	0.0	Yes
St. Lucie	0.0	6.0	0.0	6.0	4.5	0.0	Yes
Santa Rosa	0.0	6.0	0.0	6.0	4.5	0.0	No
Sarasota	1.0	6.0	0.0	7.0	4.5	1.0	Yes
Seminole	1.0	6.0	0.0	7.0	4.5	1.0	Yes
Sumter	1.0	4.0	0.0	5.0	3.6	0.0	No
Suwannee	0.0	6.0	0.0	6.0	4.5	1.0	No
Taylor	0.0	4.0	0.0	4.0	2.9	1.0	No
Union	0.0	5.0	0.0	5.0	3.6	0.0	No
Volusia	1.0	6.0	0.0	7.0	4.5	0.0	Yes
Wakulla	1.0	4.0	0.0	5.0	3.6	0.0	Yes
Walton	0.0	5.0	0.0	5.0	3.6	1.0	No
Washington	1.0	6.0	0.0	7.0	4.5	0.0	No

* The State Comprehensive Enhanced Transportation System (SCETS) Tax for each county is derived from that county's Local Option Gas Tax, but the revenue is distributed to the STTF to be used within the contributing transportation district.
Source: Florida A.C.I.R., *Local Government Financial Information Handbook*, July 1994.

shows that there is a tremendous amount of unused tax potential among local governments in the state. The revenues that could be raised would be double or triple that which could be raised with an additional one cent increase in the state motor fuels tax.

The "full utilization" scenario is interesting in that is provides some perspective in the level of existing revenue potential. However, a local government will not choose to use its full potential unless the local need calls for such an increase. Since the expenditure needs forecasts have not been done on a county-by-county basis, it is impossible to match hypothetical local needs to the revenue-raising capacity of each individual local government. Nevertheless, the projections provide a wide band of potential revenues, within which the actual revenue-raising capacity of the taxes can be found. Table 3-18 shows the real potential revenues from the fixed nominal tax rate under the assumption of counties' fully utilizing their local tax options. Table 3-19 shows revenue information for the SCETS tax.

Under the "Local Government Infrastructure Commitment Act," Florida local governments are authorized to collect six various local option discretionary sales surtaxes. One of these discretionary sales surtaxes is a local government infrastructure surtax of up to one percent on discretionary sales of less than $5,000. Revenues from this source may be used to finance the planning and construction of roadway-related infrastructure.

The forecast of revenues is based upon the assumption that the ratio of taxable sales to personal income will remain constant throughout the forecast period. The personal income forecasts are obtained from BEBR's *Long Term Economic Forecast 1992.*

Potential revenue generation rates from this tax are very large. According to the Florida Advisory Council on Intergovernmental Relations (ACIR) *Local Government Financial Information Handbook,* total potential generation rates stood at approximately $1.4 billion for FY 1993-94. Table 3-20 shows projection of the existing infrastructure surtax revenues and the untapped potential revenue from this tax.

Although new revenue mechanisms are in high demand by the state's local governments, there have been strong political forces moving against higher taxes of any form.

The property tax is the primary source of funds for local governments in the state of Florida, as in most states. These funds are used for the finance of transportation infrastructure in three ways. First, local governments can, and have, used these funds to directly finance local roads. Second, local governments frequently use the property tax to subsidize mass transportation in their area. Other mass transit systems directly utilize property taxes to finance their operations. In 1993, four of the state's transit systems reported using local property taxes, which accounted for 15.3

Table 3-18
PROJECTED LOCAL MOTOR FUELS TAX REVENUES: ACTUAL REVENUES AND POTENTIAL IF FULLY UTILIZED
(thousands of inflated dollars)

Year	*Potential Revenues*	*Existing Revenues*	*Untapped Potential*
1997	$788,678	$486,374	$302,304
2002	$849,376	$530,533	$318,356
2007	$914,675	$571,319	$343,356
2012	$994,276	$621,040	$373,236
Cumulative Total Through 2012	$15,646,300	$9,772,909	$5,873,391

percent of capital funds and 43.1 percent of all funds used by mass transit. Finally, some of the seaports and airports in the state use property taxes to subsidize their operations and capital construction funding.

To forecast the property tax, the forecast of the growth in personal income in the state as the determining variable was used. The rate of growth in taxable property relative to the growth in personal income depends upon the income elasticity of property demand. The "elasticity" of demand is a measure of the percentage change in demand for property in response to a one-percentage-point growth in personal income. If the elasticity of demand is equal to 1.00, then the rate of growth in property is equal to the rate of growth in income. If elasticity is less than 1.00, the rate of property growth is less than that of personal income and, correspondingly, if the income elasticity of the demand for property is greater than 1.00, than the rate of property growth exceeds the rate of growth in personal income.

A wide array of research is available on the topic of the income elasticity of property demand. It has generally been found that the demand for residential property is not statistically different from 1.00. For this reason, in the projections of the value of taxable real value of property, it is assumed the value of the base to grow at the same rate as the growth in personal income.

Taxable property does not equal the total value of property because of exemptions, primarily the homestead exemption of $25,000 per owner-occupied residence. In this projection of the value of taxable property, the rate of growth in the exempt property is set to equal the rate of growth in the population. Since personal income grows more rapidly than population, the rate of growth in taxable property will exceed the rate of growth in real personal income, even though the rate of growth in total true property value will equal the rate of growth in personal income. This is the case since exempt property is not growing as rapidly as total true property value.

Table 3-19
PROJECTED SCETS TAX REVENUES:
ACTUAL REVENUES AND POTENTIAL IF FULLY UTILIZED
(thousands of inflated dollars)

Year	*Potential Revenues*	*Existing Revenues*	*Untapped Potential*
1997	$298,493	$291,567	$6,726
2002	$325,594	$318,039	$7,555
2007	$350,625	$342,489	$8,136
2012	$381,139	$372,295	$8,898
Cumulative Total Through 2012	$6,505,426	$6,405,492	$99,934

Note: The State Comprehensive Enhanced Transportation System (SCETS) Tax for each county is derived from that county's Local Option Gas Tax, but the revenue is distributed to the STTF to be used within the contributing transportation district.

Table 3-20
PROJECTED LOCAL INFRASTRUCTURE SURTAX REVENUES:
ACTUAL REVENUES AND POTENTIAL IF FULLY UTILIZED
(thousands of inflated dollars)

Year	*Potential Revenues*	*Existing Revenues*	*Untapped Potential*
1997	$1,570,004	$297,666	$1,272,338
2002	$1,810,123	$343,191	$1,466,932
2007	$2,525,991	$395,477	$2,130,514
2012	$2,334,184	$455,729	$1,878,925
Cumulative Total Through 2012	$34,334,089	$6,509,593	$27,824,496

In order to estimate the level of potential revenues that could be generated from this source, personal income forecasts from the *Florida Long-Term Forecast* were employed as the determinant of the taxable sales base with a ratio of aggregate taxable sales to nominal total personal income held constant.

With the increase in demand for governmental infrastructure and services, Florida's local governments have been expanding their use of transportation impact fees as a means of real estate development exaction. These fees usually are collected to provide for any future expenditures necessary to maintain roadway infrastructure concurrence with the level of service standards set out in the local government's comprehensive plan. According to a recent survey by the Florida ACIR (Sept. 1991), there are 28 county and 19 municipal governments in the state that levy transportation impact fees on new development. The local governments that employ this type of exaction are normally found in high-growth urban areas of the state, but some small, slow-growth areas also use this revenue mechanism. For the 1990-91 fiscal year, total Florida collections for transportation impact fees stood at $153.1 million, with the transportation portion accounting for approximately 54 percent of total impact fee collections in that year.

Although there is no existing enabling legislation in Florida that sets forth a definitive methodology for the computation of impact fees, most are calculated through the use of the formula given below. Within this formula are elements that capture both the expected direct cost of infrastructure provision as well as a credit for the present value of the expected future stream of gasoline tax revenues that will be generated over the lifetime of the unit of development. The levels of the parameters employed in the fee formula vary according to the particular type of land use in question.

Impact Fee = [((TGRxTL)/(LOS)) x Cost Per Lane Mile x percent Local Funding] - [((TGRxTLx182.5x0.14)/MPG)] x Present Value Factor (Annuity)

where

TGR = Trip generation rate (ITE Trip Generation)

TL = Average trip length (from NPTS, Traffic Engineering Handbook, Local Trans. Study)

Cost per Lane Mile = Construction and right of way cost per lane mile

LOS = Level of service (set by local standards within comprehensive plan)

% Local Funding = Accounting factor to discount any non-local project funding

Applicable Fuel Tax = Approximately $0.14 per gallon

MPG = Current fleet mileage (FHWA)

Present Value Factor = $(1-((1+r^n))/r$, where r = nominal interest and n = average life of improvement (30 years)

Information contained within the *ITE Trip Generation Manual*, the *Orlando Area Transportation Study* (OUATS), *ITE Traffic Engineering Handbook*, and information from the *Florida Statistical Abstract* were employed to obtain estimates of the relevant trip generation rates and trip lengths for three types of aggregate land uses (residential, commercial, and industrial). The rates were then used in the calculation of the "expected" impact fee. Although actual impact fee rates differ from jurisdiction to jurisdiction because of political compromises arising from concerns about the economic consequences of these fees, the given estimates represent a long-run standard for the hypothetically appropriate fee.

	Trip Generation Rate	*Average Trip Length*
Residential	8.3	6.4 per unit
Commercial	35.0	3.0 per 1,000 sq. ft.
Industrial	4.5	7.5 per 1,000 sq. ft.

Based in part on information contained within the FDOT *1993 Transportation Costs Manual*, an average construction and right of way cost of $800,000 per lane mile is employed in the computations. For the computation of transportation impact fees a representative LOS is chosen. Although most counties use the FDOT procedures for determining the capacity associated with the minimum LOS over the types of roadways in their region, the actual average LOS used in each particular county varies due to the composition of varying types of roadway. An average LOS of 8,000 trip ends per day is used in the determination of the average state fees based on a sample of current ordinances from around the state. Based on recent FHWA estimates, fleet mileage is estimated to be 21 miles per gallon. Anecdotal evidence gathered from FDOT officials led to the use of $0.14 for the expected applicable fuel tax rate for local capital improvement projects.

With an interest rate of 6 percent, the present value factor for future tax collections generated by development is approximately 13.76. Based on a sample of transportation fee ordinances from around the state, a figure of 85 percent is used as the percentage-of-local-funding parameter for each land use.

Substituting the above parameters into the transportation impact fee formula results in the impact fee levels of $1,369 per unit for residential, $2,705 per 1,000 square feet for commercial, and $1,869 per 1,000 square feet for industrial.

To estimate future potential impact fee revenues, two somewhat different approaches are used for two types of impact fees (i.e., residential, and commercial/industrial). To project residential impact fees, the forecasts of housing starts are the basis. Each unit built is hypothetically assessed the impact fee. For commercial and residential impact fee estimates, the basis is the industry forecasts of estimated construction needs. Each new employee is assumed to require a certain number of square feet of new construction, depending upon the industry in which the growth occurs. Given the forecasts of employment growth and the assumed space requirement for each employee, the total number of new square feet, multiplied by the hypothetical impact fee, yields an estimate of the potential impact fee revenues.

However, not all local governments impose impact fees to the full extent, and some do not levy impact fees at all. To account for less-than-full utilization, the base year 1991 actual collections are compared with the hypothetical potential to obtain a measure of impact fee "penetration." This penetration rate is found to be 52.7 percent. The projected revenue from local impact fees are shown in Table 3-21.

A summary of potential local revenues is shown in Table 3-22. This table shows the total amount of revenues that could be raised through the year 2012.

Potential New Revenue Sources

A survey of other states across the country was made to identify potential new revenue sources that have not been used in the state of Florida. It was found that Florida already employs most varieties of levies to finance its transportation infrastructure. In fact, there are revenue sources used in Florida that are not used in many states or are relied upon much less such as the initial registration fee and impact fees.

Currently, the state of Georgia imposes, in addition to other state and federal levies, a "sales tax" on motor fuels. This levy amounts to four percent of the price of gasoline at the pump prior to any other taxes affecting the at-pump price; that is, before federal levies and the state 7.5 cent per gallon motor fuels unit tax. For every four cents collected due to this sales tax, three cents go to fund state transportation projects, while the remaining cent goes into

the Georgia general fund and is not used for transportation funding.

Another potential levy is one currently under study by the state of Minnesota–a motor vehicle miles traveled (VMT) tax. Under such a levy, every automobile and other private passenger vehicle in the state is taxed once each year based on the actual miles turned on the vehicle's odometer. Such a tax is most easily collected at the time of annual vehicle registration, where odometer readings can be taken each year. A potential complication to this collection method concerns how and upon whom the tax would be levied when a vehicle is removed from the state's fleet of vehicles through accident or other retirement of the vehicle, or by the new owner of a vehicle already in the fleet.

In Minnesota, the VMT tax is being considered as the substitute for motor vehicle fuels and vehicle license taxes. The primary reason for such a substitution is to develop a tax that will not only charge highway users by miles traveled, but also would charge them based on the hours they drive in and during peak congestion. Such a tax could not be administered in the simple fashion described above, but could be collected in a manner similar to turnpike fees and other tolls, with the price differing in different areas and changing during various times of day. The Minnesota study is still in its preliminary stages, so there are no firm data on the effectiveness of such a levy.

Table 3-21
PROJECTED LOCAL IMPACT FEE REVENUES: ACTUAL REVENUES AND POTENTIAL IF FULLY UTILIZED
(thousands of inflated dollars)

Year	*Potential Revenues*	*Existing Revenues*	*Untapped Potential*
1997	$605,692	$319,200	$286,492
2002	$625,851	$329,824	$296,027
2007	$662,554	$349,160	$313,374
2012	$692,683	$362,966	$329,717
Cumulative Total Through 2012	$12,602,969	$6,641,765	$5,961,204

Table 3-22
SUMMARY OF PROJECTED LOCAL REVENUES: CUMULATIVE TOTALS THROUGH 2012
(thousands of inflated dollars)

Tax or Fee	*Potential Revenues*	*Existing Revenues*	*Untapped Potential*
Motor Fuels Tax	$15,646,300	$9,772,909	$5,873,391
SCETS Tax	$6,227,702	$6,132,034	$95,688
Infrastructure Surtax	$34,334,089	$6,509,593	$27,824,496
Impact Fee	$12,602,969	$6,641,765	$5,961,204

One potential charge that has been suggested as a source of revenue for the finance of bikeway construction, which is currently in use in the state of Oregon, is a surcharge on the sale of bicycles. To project the potential revenues from this as-yet-unused revenue source, information on the numbers of new bicycles sold in the state of Florida is required. Since there is no existing source of data which reports any such estimate, data from the Bicycle Manufacturers Association on the total numbers of bicycles sold in the U.S. is used as a basis. Estimates of national sales to the state of Florida are "shared down" based upon the proportion of the national population below the age of 45

located in the state. In 1991, it is estimated that 4.76 percent of the U.S. population within that age group reside in Florida (versus 5.23 percent of the total population). Using the long-term projections of population, estimates of the potential sales of bicycles are obtained by multiplying the ratio of bicycle sales to the relevant population in the base year of 1993 by the population projections for that age group. Table 3-23 shows the potential revenues from a $1 bicycle surcharge.

Potential Revenue Collections From Auto Related Taxable Sales

The state of Florida currently imposes a 6 percent excise tax on the sales of all discretionary goods within its borders. One component of the kinds (categories) accounted for in the Florida Department of Revenue tax accounts is "kind" code 23. This account is composed of new and used motor vehicle sales, sales of recreational vehicles and mobile homes, as well as rentals of all motor vehicles. In 1992, the annual level of taxable sales in this group was approximately $18.5 billion and produced net revenues of $1.1 billion.

In order to estimate the potential future revenue collections from this state revenue source, the average ratio of taxable sales to total nominal personal income over the most recent 10 years (0.079) was applied to the expected level of total personal income over the course of the projection period. This produces an estimate of the annual level of taxable sales, which are then multiplied by 6.0 percent (gross revenues) and reduced by 5.0 percent (administrative fees) to arrive at the annual net collection estimates.

Employing an annual average rate of growth for statewide nominal personal income of 6.5 percent, the resulting cumulative revenue projections from this source are $16.9 billion over the first 10 years of the forecast period and $48.8 billion over the entire 20-year horizon.

Appropriateness of Revenue Sources

Equity Considerations

The myriad of taxes, user fees, and other revenue sources through which transportation is funded in Florida creates problems for the economic analyst who attempts to determine the appropriateness of such funding sources with respect to their desired goals. Since any taxes or user fees imposed by federal, state, or local governments on Florida's residents necessarily reduce the consumption and/or saving of households in the state, it is important to make some determination of how that burden is shared among the state's households. The manner in which the burden of a tax is divided among Florida's households is called the incidence of the tax. Measurements of tax incidence reflect how a particular tax affects households in different income groups relative to each other. Once a household's tax payments are measured as a proportion of its income, that information is aggregated with other households in the same income group, and then are compared to those of other income groups. For example, if the average tax rate for lower-income households is two percent, while the rate for a higher-income group of households is 1.5 percent, the tax is said to be regressive. Even though the higher-income household may be paying more taxes, it is using a smaller proportion of its income to pay the tax. Stated another way, if a higher-income

Table 3-23
POTENTIAL REVENUES FROM ONE-DOLLAR BICYCLE SURCHARGE
(thousands of inflated dollars)

Year	*Potential Revenues*
1997	$708
2002	$772
2007	$833
2012	$891
Cumulative Total Through 2012	$15,523

household pays a lower percentage of its income in taxes than a lower-income household, the higher-income household is left with a greater share of spendable income than is the lower-income household. Determination of whether a tax is regressive, proportional, or progressive, and by what degree, is the basis of incidence studies. There is virtually universal agreement that regressive taxes are inequitable since the poor suffer a greater tax burden than do the rich. Though there is no general agreement on the specific desired tax incidence, it is generally agreed that, for a tax to be equitable, it should either be proportional or, perhaps, possess some degree of progressiveness.

Tax incidence, however, is often measured without consideration of an important point, known as the incidence of expenditure or benefits. If tax revenues are collected to pay for particular services, then the ability of a household to consume those services is enhanced and removes the burden of the tax, assuming that the household benefits from consumption of those services. So, for example, if a taxpayer pays motor vehicle fuel taxes that help fund a new highway that reduces the cost of his drive to work, the taxpayer is receiving benefits. Even if he pays more taxes than someone who does not use the services, he may bear a smaller overall burden. So, both the way taxes are levied and the way they are used are important to the determination of tax incidence.

In spite of the broad array of revenue sources, a few generalizations can be made with respect to their "appropriateness." With a few exceptions, at the state level, Florida's transportation revenues come from appropriate sources. State highway fuels sales taxes and the SCETS tax together comprise nearly two-thirds of all contributions to the State Transportation Trust Fund (STTF). Since these are per-gallon gasoline user fees, they are, in effect, user fees that contribute to highway maintenance and construction, or to other transportation modes that remove congestion on the state's highways. These fees, then, are paid only by those who use the benefits that the fees generate. Though several studies have shown that these taxes are likely to be at least somewhat regressive, it is important to note that the motor vehicle fuels tax is divided evenly among state and local uses, while the SCETS tax must be used within the district where it was collected. This earmarking of revenues for considerable local use ensures that taxpayers will generally have the opportunity to benefit directly from the fuel taxes they pay, thus removing much of the regressiveness. Since the motor vehicle fuels tax has a legislated minimum level, and since the use of motor fuels has tended to increase each year because of Florida's growth in population and tourism, these taxes tend to provide greater revenue each year.

A second group of fees that contribute a substantial amount of revenues to the STTF are annual motor vehicle license fees, initial registration, and incremental title fees. These fees constitute a considerably more regressive tax on Florida's residents since they are substantially flat fees unrelated to household income. For example, the $100 initial registration fee places a larger tax burden on a family earning $10,000 than that same fee on a family earning $100,000.

The motor vehicle license fee, because it is based on size (read this to mean cost) of vehicle, its cost to households is at least somewhat related to their income and is not particularly regressive, though it is probably at least slightly so. The $100 initial registration fee is the very definition of a regressive tax and is therefore inequitable to the residents of the state, as is the incremental title fee. These fees, essentially flat and unrelated to a household's income, constitute a considerably more regressive tax on Florida's citizens than do the motor vehicle fuels and SCETS taxes. For example,

the $100 initial title fee places a larger tax burden on a family earning $10,000 than that same fee on a family earning $100,000. Again, as in the cases of the fuels and SCETS taxes, most of the revenues from these fees are contributed to the STTF to be used to provide transportation benefits, thereby mitigating some of the regressiveness. However, there is general agreement that, even after benefits are considered, these taxes are still very regressive.

If it is assumed that most of the Florida aviation fuel tax is passed on to the airlines' passengers, then it can be assumed that the tax is effectively a users' fee for air travel. Therefore, only those who benefit from air travel pay the tax, so the tax is equitable. Again, the stability of the tax depends to a large extent on the amount of tourism Florida generates. However, forecasts are for strong growth in Florida's air travel industry over the next 20 years, so there should be reason to believe that the aviation fuel tax will remain a stable source of revenue.

Much the same can be said of the $2 rental car surcharge. While it is primarily driven by tourism and thus potentially unstable, there is no reason to believe that it will be so for the foreseeable future. Further, a large portion of the revenues from rental car surcharges, because they are paid by tourists, are in effect "exported" to residents of other areas. The surcharge also applies to the first 30 days of an automobile lease. No information is available on the incomes of those who lease automobiles but, since the fee is a flat fee (potentially equalling $60) it is evident that the tax is regressive among those who lease automobiles. Since persons paying the surcharge are deriving benefits, however, the rental car surcharge does not seem to pose any major problems with regard to equity.

The Florida fuel excise tax (the constitutional, county, and municipal gas tax) is similar to the SCETS and state motor vehicle fuels tax, except that all of the proceeds go to local use. Tolls that provide revenue from users of Florida's Turnpike and other tollways fit this same description. The equity considerations for the excise tax and tolls should be virtually identical to the SCETS and motor fuels taxes.

A more controversial issue occurs within the area of locally imposed transportation taxes and fees. While some should not pose any great problems with regard to equity or stability of their revenue-raising potential, others seem to violate these principles. Both the local option gas tax and ninth-cent gas tax vary from county to county, creating some inequities among residents of high-tax counties relative to residents of low-tax counties. Still, these taxes are basically users' fees and therefore contribute toward benefits for the users. The ad valorem property tax also varies among counties, and is generally a less regressive tax than the gas taxes. However, since it is not known how the benefits derived from this tax's revenue generation relate to incomes, the incidence of the ad valorem property tax is unclear.

Perhaps the most controversial of all the revenue sources for transportation in terms of equity is the impact fee. Since such fees are levied as a fixed dollar amount, varying among counties, these taxes are regressive. There has been some effort by Florida counties to lessen this regressiveness with a movement towards fees based on household size (i.e., number of bedrooms). Since these taxes tend to drive up prices for both new and existing housing, they discourage real estate activity in general. It should also be noted that, because of their impact on housing prices, they also are likely to affect the base upon which ad valorem property taxes are levied. There is, of course, a trade-off with respect to this tax. Many argue that economic agents internalize the cost of impact fees under the expectation of enhanced public sector infrastructure and services.

Revenue Stability and Inflation Sensitivity

A consideration to be made with regard to revenue sources is that any revenues collected from those sources remain stable in times of economic fluctuation. If variation in Florida or U.S. economic activity cause upheavals in Florida's transportation revenues, any long-run planning that requires a forecast of revenues cannot be very useful. So, some consideration of the stability of revenue sources is in order.

In general, the cyclical sensitivity of the transportation finance system in the state of Florida is favorable. A good share of the revenues raised in the state are derived from charges on the stock of goods–in particular, the stock of vehicles, both passenger and commercial. Unlike a tax that is based on purchases, which is directly and quickly affected by economic fluctuations, fixed levy on the stock of vehicles is stable since individuals do not get rid of their vehicles because of short term fluctuations in their income. Therefore, this source of revenue is very stable.

Even the mainstay of state finance, the motor fuels taxes, is a stable source of revenue compared to other transactions taxes. Research has shown that the income sensitivity of motor fuels purchases is quite low, meaning that the flow of revenue will not vary substantially over the short term in response to cyclical variability.

Some of the revenue sources, however, have the potential to be quite cyclically sensitive. For example, it is well known that tourism and migration into Florida are sensitive to the business cycle. The rental car surcharge and the initial registration fee are two sources of revenue that would add some instability to the transportation finance system in the state.

Overall, however, the system of transportation finance in Florida appears to be quite stable, with a large share of revenue drawn from sources that do not vary much with the business cycle.

Another way in which to evaluate the appropriateness of a revenue source is its ability to respond to inflation. Although currently inflation is not as serious a problem with regard to the real revenue raising capacity of the transportation tax system, the lessons of the 1970s remain with us. In those periods of time during which prices are rising very rapidly, it is important to have a revenue system that responds to inflation automatically. Some of the revenue sources have the ability to respond to inflation, while others do not.

In general, those revenue sources that are based on a percentage of the nominal price, such as a sales-type tax, which is collected as a percentage of the final price of a good respond well to inflation. On the other hand, those levies that are based upon quantities, such as a per-unit levy, do not.

With regard to the sources of transportation finance, the per-unit levels, such as the registration fees, do not respond to inflation at all. A specific decision to increase the nominal rate is required to recapture the losses in purchasing power to inflation. Such a difficulty also exists with regard to the federal revenue sources, which are primarily stated in terms of fixed nominal amounts per gallon.

For the major state revenue sources, most states have expressed their levies in terms of cents-per-gallon, just like the federal government. In Florida, however, since 1991 the motor fuels tax rate is indexed to the rate of change in the consumer price index for urban consumers, all components. The SCETS tax is also indexed to the rate of inflation.

On the other hand, the local motor fuels tax rates are set in nominal terms to be a certain amount per gallon. The higher the rate of inflation, the lower amount of revenue in real terms these taxes are capable

of raising. The revenue-raising capacity of these levies could be increased, but only with the explicit efforts of the legislature. While there is some evidence that legislators will eventually change these levies in line with inflation, these changes will likely occur with some political difficulty and certainly with some costly lag.

A summary measure of the inflation sensitivity of the revenue raising system (taking into account the degree to which a tax automatically will change when prices increase) can be created. This measure is created by determining the percentage of the revenue sources that automatically respond to inflation. For example, as was shown in Table 3-1 previously, $2.13 billion was raised by the state for state uses. Of the sources, only the fuel sales tax and the SCETS tax are indexed to inflation. They account for 38.1 percent of these revenues. This means that, for each percentage point increase in the price level, only 38.1 percent is made up automatically.

In terms of 1994 expenditures, the inflation sensitivity of the revenue-raising system implies that, in 1994, each percentage point increase in inflation drains $13.2 million in spending power from the revenue raising system from this source only.

As for the local revenue sources, most of the major sources are insensitive to inflation, particularly given that the motor fuels tax rates, a major source of revenues, is fixed in the cents-per-gallon. Impact fees are not specifically indexed to inflation but, given the use of the common formula identified earlier in the paper, the fees could automatically increase along with the cost of building a highway. However, this will not occur automatically, and to the extent it does occur, it would only occur with a substantial lag.

In this chapter, long-term projections of the revenue raising capacity of the transportation finance system were presented. Along with these projections, the sensitivity of the finance system to changes in rates were also analyzed. These sensitivities can be used to identify alternative ways to finance hypothetical improvements to the state's transportation infrastructure.

Conclusion

This chapter has presented an overview of transportation infrastructure finance in Florida. In addition to describing the current structure of infrastructure finance, Florida is compared to nearby states and to other rapidly growing states.

In general, it appears that the state of Florida does not have high rates placed on the traditional sources of revenue, motor fuels taxes and registration fees. There are two things that make the state of Florida transportation infrastructure finance unique: the breadth of the types of fees that are dedicated to transportation and the reliance of the state's transportation finance on local sources. Local governments in Florida impose high local motor fuels taxes, subsidize mass transportation from local sources, allow a dedicated infrastructure finance sales tax surcharge, and utilize local transportation impact fees.

Chapter 4

Options and Recommendations

The 10- and 20-year shortfalls in state and local funding are calculated for each mode and each scenario in Chapter 2. These shortfalls are presented in Tables 4-1 and 4-2. There is no shortfall for scenario one since–by definition–available revenues equal current expenditures. In the other scenarios, there is a substantial shortfall between the projected funding and the projected needs. The total 20-year shortfall is $26.7

Table 4-1
TEN-YEAR STATE AND LOCAL REVENUE SHORTFALLS
(millions of 1992 dollars)

Mode	*Current Funding*	*Shortfalls For Each Scenario*		
		2 Maintain Conditions	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State-Owned Roads and Bridges	$24,217	$4,776	$1,401	$7,986
Locally-Owned Roads and Bridges	$11,620	$3,709	$3,709	$7,069
Transit - State Share	$4,100	$71	$3,362	$506
Transit - Local Share	- *	$389	$389	$2,787
Paratransit - State Share	$1,506*	$20	$20	$741
Paratransit - Local Share	- *	$7	$7	$267
Rail - State Share	$948*	$1,113	$1,197	$1,256
Rail - Local Share	- *	$37	$37	$74
New Starts - Fixed Guideway - State Share	$0	$0	$0	$1,181
New Starts - Fixed Guideway - Local Share	$0	$0	$0	$1,181
New Starts - Commuter Rail - All State	$0	$0	$0	$104
Airports - State Share	$835	$326	$326	$326
Seaports - State Share	$79	$233	$233	$233
Total	$43,305	$10,681	$10,681	$23,711

*Local, state, and federal funding are included in state funding.

billion for scenario two, $26.7 billion for scenario three, and $58.1 billion for scenario four. Table 4-3 presents a summary of revenue shortfalls.

These shortfalls include the one-time capital costs of new rail starts discussed in Chapter 2. These costs are $104 million for commuter rail and $4,725 million for fixed guideway. Also included is a $70 million per year state contribution to high speed rail. Operating costs for the new starts are not included. They would add to the shortfalls shown here.

These shortfalls are in constant 1992 dollars. Future inflation will affect both total needs and total revenues. The net affect on shortfalls will depend on the extent to which inflation rates differ for costs versus revenues and the extent to which the state motor fuels tax is relied upon as a revenue source. This is due in part to the fact that the state motor fuel tax

Table 4-2
TWENTY-YEAR STATE AND LOCAL REVENUE SHORTFALLS
(millions of 1992 dollars)

Mode	*Current Funding*	*Shortfalls For Each Scenario*		
		2 Maintain Conditions	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State-Owned Roads and Bridges	$45,607	$12,574	$5,594	$25,360
Locally-Owned Roads and Bridges	$23,240	$8,822	$8,822	$15,400
Transit - State Share	$7,900*	$272	$7,045	$1,336
Transit - Local Share	- *	$1,456	$1,456	$7,140
Paratransit -State Share	$3,007*	$96	$96	$1,798
Paratransit - Local Share	- *	$32	$32	$599
Rail - State Share	$2,016*	$2,432	$2,639	$2,830
Rail - Local Share	- *	$140	$140	$261
New Starts - Fixed Guideway - State Share	$0	$0	$0	$1,181
New Starts - Fixed Guideway - Local Share	$0	$0	$0	$1,181
New Starts - Commuter Rail - All State	$0	$0	$0	$104
Airports - State Share	$1,850	$487	$487	$487
Seaports - State Share	$159	$430	$430	$430
Total	$83,779	$26,741	$26,741	$58,107

*Local, state, and federal funding are included in state funding.

is indexed to the consumer price index. For instance, if agency costs increase at approximately the same rate as the consumer price index and if new revenues are raised entirely through the state motor fuels tax, the effects of inflation would be neutral. There would be no net impact on the shortfalls. However, most revenue sources are not tied to an inflation index. Therefore, it is likely that inflation will widen the gap between needs and revenue over time. In that case, the timing of projects can have a significant impact on the shortfalls. For instance, the cost in current (or inflated) dollars of a fixed-guideway project will be substantially more if it is undertaken 20 years from now compared to 10 years from now.

There are an infinite number of tax and fee combinations that could be used to make up these shortfalls. The revenue forecasts presented in Chapter 3 allow policymakers to mix and match changes in tax and fee rates to develop customized funding packages to meet the projected shortfalls. For illustrative purposes, two different ways of making up the revenue shortfalls are presented in the following tables. It is important to note that the amounts shown of new fees and taxes required to make up the shortfalls are based on the full increases being made at the beginning of the forecast period and continuing for the duration of the 10- or 20-year periods. If, instead, the increases were phased in over time, the final amounts of increase would have to be higher to make up for the lower revenues at the beginning of the forecast period.

Table 4-4 shows the amount of motor fuels tax increase that would be required if the state relied entirely on the motor fuels tax (aviation fuel tax for aviation shortfall) to make up the 10-year shortfalls. For this and all subsequent illustrations, the revenue yield of the inflation-indexed state motor fuel tax is used. If a non-indexed excise tax

Table 4-3
SUMMARY OF STATE AND LOCAL REVENUE SHORTFALLS
(millions of 1992 dollars)

Jurisdiction /Period	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State				
10 Years	$0	$6,539	$6,539	$12,333
20 Years	$0	$16,291	$16,291	$33,526
Local				
10 Years	$0	$4,142	$4,142	$11,378
20 Years	$0	$10,450	$10,450	$24,581
Total				
10 Years	$0	$10,681	$10,681	$23,711
20 Years	$0	$26,741	$26,741	$58,107

Table 4-4
MOTOR FUELS TAX REQUIRED TO MAKE UP TEN-YEAR SHORTFALLS
(cents per gallon)

Mode	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State-Owned Roads and Bridges	0¢	6.09¢	1.79¢	10.18¢
Locally-Owned Roads and Bridges	0¢	4.73¢	4.73¢	9.01¢
Transit - State Share	0¢	0.09¢	4.29¢	0.65¢
Transit - Local Share*	0¢	0.65¢	0.65¢	3.94¢
Paratransit -State Share	0¢	0.03¢	0.03¢	0.94¢
Paratransit - Local Share	0¢	0.01¢	0.01	0.34¢
Rail - State Share	0¢	1.42¢	1.53¢	1.60¢
Rail - Local Share	0¢	**	**	**
New Starts - Fixed Guideway - State Share	0¢	0¢	0¢	1.51¢
New Starts - Fixed Guideway - Local Share	0¢	0¢	0¢	***
New Starts - Commuter Rail - All State	0¢	0¢	0¢	0.13¢
Airports (Aviation Fuel Tax) - State Share	0¢	5.06¢	5.06¢	5.06¢
Seaports - State Share	0¢	0.30¢	0.30¢	0.30¢
Total Motor Fuels Tax**				
State	0¢	7.92¢	7.92¢	15.31¢
Local Areas Without Transit	0¢	4.74¢	4.74¢	9.35¢
Local Areas With Transit	0¢	5.39¢	5.39¢	13.29¢

*Average increase that would be required in counties forecasted to have transit service.
**For Tri-Rail. Applicable only in Dade, Broward, and Palm Beach counties.
***Applicable only in selected counties.
****Totals do not include the aviation fuel tax for airports.

Table 4-5
MOTOR FUELS TAX REQUIRED TO MAKE UP TWENTY-YEAR SHORTFALLS
(cents per gallon)

Mode	*Needs Scenarios*			
	1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
State-Owned Roads and Bridges	0¢	7.30¢	3.25¢	14.72¢
Locally-Owned Roads and Bridges	0¢	5.12¢	5.12¢	8.94¢
Transit - State Share	0¢	0.16¢	4.09¢	0.78¢
Transit - Local Share*	0¢	1.10¢	1.10¢	4.60¢
Paratransit - State Share	0¢	0.06¢	0.06¢	1.04¢
Paratransit - Local Share	0¢	0.02¢	0.02¢	0.35¢
Rail - State Share	0¢	1.41¢	1.53¢	1.64¢
Rail - Local Share	0¢	**	**	**
New Starts - Fixed Guideway - State Share	0¢	0¢	0¢	0.69¢
New Starts - Fixed Guideway - Local Share	0¢	0¢	0¢	***
New Starts - Commuter Rail - All State	0¢	0¢	0¢	0.06¢
Airports (Aviation Fuel Tax) - State Share	0¢	3.80¢	3.80¢	3.80¢
Seaports - State Share	0¢	0.25¢	0.25¢	0.25¢
Total Motor Fuels Tax**				
State	0¢	9.17¢	9.17¢	19.17¢
Local Areas Without Transit	0¢	5.14¢	5.14¢	9.29¢
Local Areas With Transit	0¢	6.24¢	6.24¢	13.89¢

* Average increase that would be required in counties forecasted to have transit service.
**For Tri-Rail. Applicable only in Dade, Broward, and Palm Beach counties.
***Applicable only in selected counties.
****Totals do not include the aviation fuel tax for airports.

is used, a slightly higher tax rate must be applied to raise the same amount of revenue. The increase shown for "Transit - Local Share" is for a tax applied only in the counties forecasted to have transit service. The additional motor fuels tax that would be required to meet the state shortfall is 7.9 cents per gallon for scenarios two and three and 15.3 cents per gallon for scenario four. The additional aviation fuel tax that would be required is 5.1 cents per gallon for each of those scenarios. The additional motor fuels tax that would be required to meet the local shortfall is either 4.7 or 5.4 cents per gallon for scenarios two and three and either 9.4 or 13.3 cents per gallon for scenario four. The additional motor fuels tax that would be required to meet the total shortfall is either 12.7 or 13.3 cents per gallon for scenarios two and three and either 24.7 or 28.6 cents per gallon for scenario four.

Table 4-5 shows the amount of motor fuels tax increase that would be required if the

Table 4-6
INCREASES IN TAXES AND FEES REQUIRED TO MAKE UP TEN-YEAR STATE AND LOCAL SHORTFALLS

Tax or Fee	*1994 Typical Charge*	*Increase Needed For Each Scenario*			
		1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
STATE SHORTFALLS					
Motor Fuels Taxes (per gallon)	12.6¢[a]	0	4.5¢	4.5¢	8.2¢
Aviation Fuel Tax (per gallon)	6.9¢	0	5.1¢	5.1¢	5.1¢
Motor Vehicle License Fee	$35.10[b]	0	$12.44	$12.44	$22.87
Initial Registration Fee	$100.00	0	$35.44	$35.44	$65.15
Rental Car Surcharge (per day)	$2.00	0	$0.71	$0.71	$1.30
Incremental Title Fee	$24.00	0	$8.51	$8.51	$15.64
Tolls (from new facilities)	$294 mill./yr.	0	38%[c]	38%[c]	68%[c]
LOCAL SHORTFALLS					
Motor Fuels Taxes (per gallon)	10¢[d]	0	3.1¢[e]	2.9¢[e]	7.2¢[e]
Other Local Sources	variable	0	31%[e]	29%[e]	72%[e]

[a]Varies by county between 8.1¢ and 12.6¢. Most counties are at 12.6¢.

[b]Varies by weight of vehicle and other factors. Range is $5 to $975, with a few exceptions. Automobile license fees vary from $27.10 to $45.10. For a medium weight car (2,500 to 3,500 pounds) the fee is $35.10.

[c]Increase needed to keep toll revenue at current proportion (17%) of total revenue.

[d]Varies by county between 4¢ and 16¢. Most common is 10¢.

[e]This statewide average will vary among counties. It does not include Tri-Rail and fixed-guideway new starts that are applicable only in selected counties. The scenario 3 average increase needed is less than scenario 2 because of additional revenue from expanded transit service.

20-year shortfalls were made up entirely by the gas tax (aviation fuel tax for aviation shortfall). The additional motor fuels tax that would be required to meet the state shortfall is 9.2 cents per gallon for scenarios two and three and 19.2 cents per gallon for scenario four. The additional aviation fuel tax that would be required is 3.8 cents per gallon for each of those scenarios. The additional motor fuels tax that would be required to meet the local shortfall are either 5.1 or 6.2 cents per gallon for scenarios two and three and either 9.3 or 13.9 cents per gallon for scenario four. The additional motor fuels tax that would be required to meet the total shortfall is either 14.3 or 15.4 cents per gallon for scenarios two and three and either 28.5 or 33.1 for scenario four.

Another approach would be to use toll financing for new state highways and bridges to the same extent as used in the past (i.e., institute tolls on new facilities sufficiently to keep toll revenues at 17

Table 4-7
INCREASES IN TAXES AND FEES REQUIRED TO MAKE UP TWENTY-YEAR STATE AND LOCAL SHORTFALLS

Tax or Fee	*1994 Typical Charge*	*Increase Needed For Each Scenario*			
		1 Maintain Funding	*2 Maintain Conditions*	*3 Maintain Conditions with Maximum Lane Policy*	*4 Improve Conditions*
STATE SHORTFALLS					
Motor Fuels Taxes (per gallon)	12.6¢[a]	0	5.7¢	5.7¢	11.9¢
Aviation Fuel Tax (per gallon)	6.9¢	0	3.8¢	3.8¢	3.8¢
Motor Vehicle License Fee	$35.10[b]	0	$15.87	$15.87	$33.28
Initial Registration Fee	$100.00	0	$45.21	$45.21	$94.82
Rental Car Surcharge (per day)	$2.00	0	$0.90	$0.90	$1.90
Incremental Title Fee	$24.00	0	$10.85	$10.85	$22.76
Tolls (from new facilities)	$294 mill./yr.	0	47%[c]	47%[c]	97%[c]
LOCAL SHORTFALLS					
Motor Fuels Taxes (per gallon)	10¢[d]	0	3.9¢[e]	3.6¢[e]	8.1¢[e]
Other Local Sources	variable	0	39%[e]	36%[e]	81%[e]

[a]Varies by county between 8.1¢ and 12.6¢. Most counties are at 12.6¢.

[b]Varies by weight of vehicle and other factors. Range is $5 to $975, with a few exceptions. Automobile license fees vary from $27.10 to $45.10. For a medium weight car (2,500 to 3,500 pounds) the fee is $35.10.

[c]Increase needed to keep toll revenue at current proportion (17%) of total revenue.

[d]Varies by county between 4¢ and 16¢. Most common is 10¢.

[e]This statewide average will vary among counties. It does not include Tri-Rail and fixed-guideway new starts that are applicable only in selected counties. The scenario 3 average increase needed is less than scenario 2 because of additional revenue from expanded transit service.

percent of total state transportation revenues) and to finance the remainder of the shortfall by increasing existing taxes and fees by an equal percentage. If the state aviation shortfalls are made up exclusively by an increase in the aviation fuel tax and the remaining 10-year state shortfalls are made up by equal percentage increases in other transportation taxes and fees, the increases shown in Table 4-6 would be required. The increases required to made up the 20-year state and local shortfalls in this approach are shown in Table 4-7.

If a sufficient portion of the new facilities required in scenarios two, three, and four were constructed as toll facilities to maintain tolls at 17 percent of total revenues, the 10-year increase in toll revenues would be $1,112 million for scenarios two and three, and $2,097 million for scenario four. For 20 years the increase would be $2,769 million for scenarios two and three and $5,699 million for scenario four. If these toll revenue increases did not occur, the state increases in the motor fuels tax shown in Table 4-7, for example, would have to be increased by 1.6 cents per gallon for scenarios two and three and 3.3 cents per gallon for scenario four.

Special local shortfalls, such as for Tri-Rail, that are applicable only in a limited number of counties are not included in tables 4-6 and 4-7. Because of the great variation among local areas in revenue sources and rates, local increases are shown just for motor fuels taxes and "other" revenue sources.

In addition, completely new revenue sources could be considered, as has been done in a few other states. As noted in Chapter 3, Oregon is using a surcharge on the sale of bicycles to help finance bikeways. In Florida, a one-dollar bicycle surcharge would provide approximately $14.2 million over 20 years. Another approach described in Chapter 3 is the VMT tax currently being considered in Minnesota. In Florida, a one-cent per mile VMT tax on residents would provide approximately $31 billion over 20 years, which is equivalent to 18 cents per gallon of motor fuel tax.

Recommendations

Described below are actions recommended to be taken by the legislature and/or by state agencies involved in funding transportation services.

Encourage informed discussion on transportation funding issues by increasing public awareness of the consequences of the different needs and funding scenarios described in the report.

Two of the scenarios in this report present the extremes of (a) making no changes in current transportation funding and (b) correcting all deficiencies and increasing services. In between are two scenarios based on maintaining levels of service. The consequences of not addressing Florida's transportation needs will be severe, but the public may not yet be adequately informed of those consequences. Some forum or process–possibly statewide referenda–should be provided that permits substantial public involvement and a thorough discussion and understanding of the issues and consequences.

Index more transportation fees and taxes.

The funding shortfalls forecasted in this report would be substantially worse if the motor fuels tax were not indexed to the consumer price index. The motor fuels tax, however, accounts for only about a third of the state's transportation revenues. If more transportation funding sources were indexed to inflation the relationship of costs and revenues would be better balanced over time.

Increase transportation revenues.

Under most definitions of transportation needs, Florida's needs over the next twenty years will exceed available revenues. Index-

ing will help, but tax and fee rate increases also are necessary. The extent of the rate increases will depend, in part, on the definition of needs that develops out of informed public discussion. The source of additional revenues also is a subject for public discussion, but a reasonable approach may be to increase a wide variety of existing transportation taxes and fees by some proportion and to use toll financing for some portion of new or expanded highway and bridge facilities. Such an approach would spread the tax burden and limit the amount of individual tax and fee increases.

Seek continuance of federal funding participation.

Federal sources currently account for approximately 35 percent of the funding for Florida's State Highway System and are projected to decline to approximately 27 percent by 2012. The decline is due to the eroding effects of inflation. Unlike Florida's motor fuels tax, none of the federal transportation revenue sources is indexed. The federal share of transit funding in Florida is projected to decline from the current 28 percent to 18 percent by 2012. The state should encourage the federal government to take the necessary steps to continue or increase its current level of participation in transportation funding in Florida as the state attempts to correct current deficiencies and deal with increasing congestion.

Recognize that some transportation investments should be policy driven rather than demand driven.

Transportation investment decisions can be and often are made with the intention of achieving policy objectives other than simply meeting the demand for transportation. Traditional demand analysis, therefore, may not always suggest the most appropriate levels of investment in the various transportation modes. In the case of transit, for instance, there are a number of policy issues, such as air quality, transit dependency, and growth management, to consider when determining the appropriate level of supply. To illustrate this, one of the scenarios in this report is a case where, as a matter of policy, highway widenings are limited and cost savings are shifted to transit.

Explore other funding options.

Other options that have merit and that the state should explore include privatizing transportation facilities, as is being done in California and elsewhere; reducing the diversion of transportation user fees to non-transportation uses; and increasing the use of revenue bonds. The state also should continue to pursue greater equity in the distribution of federal transportation funding. Florida historically has been a donor state (receiving an average of 80 cents out of every dollar it has paid into the Federal Highway Trust Fund) due to the fact that federal apportionment factors are in large part based on Decennial Census of Population figures, which, by virtue of Florida's rapid growth rate, are already out of date when published.

Appendix

List of Assumptions

Road/Bridge Assumptions

General Assumptions

- Road/Bridge needs include product, product support, operations and maintenance, and administration needs.
- Product support, operations and maintenance, and administration are calculated as a percentage of product.
- Road/bridge funding includes federal, state, and local government assistance, and toll revenue.
- FDOT's long term construction cost forecast is used to estimate inflated expenditures through the 20-year period for construction, the rate of inflation varies from a low of 0.3 percent to a high of 3.7 percent.
- Right of Way is assumed to inflate at a rate of 5 percent per year.
- Each scenario contains intermodal road access expenditures.

Scenario One Assumptions

- The FDOT Program and Resource Plan is used to estimate inflated road/bridge expenditures.
- Local road/bridge expenditures are determined from local transportation improvement programs and statistics reported in Federal Highway Administration's *Highway Statistics*.
- The federal share of revenue for roads and bridges is forecasted to increase one percent per year for the next 20 years.
- The state share of revenue for roads and bridges is forecasted to increase four percent per year for the next 20 years.
- Local revenue sources are assumed to grow at a rate of 3.1 percent per year.
- Federal, state, and local revenues represent the maximum available revenue given current authorized level of taxes and fees.
- All sources of revenue will continue at current tax and fee rates; all growth in revenue is caused by growth in the tax base, or through indexation (where applicable).

Scenario Two Assumptions

- The Highway Performance Monitoring System (HPMS) analytical process was used for the calculation of needs on interstates, arterials, and collectors.
- Local road/bridge expenditures are determined from local transportation improvement programs and statistics reported in Federal Highway Administration's *Highway Statistics*.
- The sample of roadways used in the HPMS analysis is representative of the entire state road system.
- FDOT design standards and construction costs are used.
- Maintaining conditions for roads assumes a maintenance, over the 20-year period, of the weighted composite index over the 20-year period, which includes indices for condition, safety, and service.

Scenario Three Assumptions

- Same as Scenario Two with the exception of a maximum lane policy assumption that is based on FDOT's proposed policy of lane restrictions for each functional classification of the state roadway system.

FDOT currently has lane standards only on the interstate system.

Scenario Four Assumptions

- The Highway Performance Monitoring System (HPMS) analytical process was used for the calculation of needs on interstates, arterials, and collectors.
- Local road/bridge expenditures are determined from local transportation improvement programs and statistics reported in Federal Highway Administration's *Highway Statistics*.
- The sample of roadways used in the HPMS analysis is representative of the entire state and local roadway system.
- This scenario eliminates, over the 20-year period, the backlog of deficiencies as defined by FDOT's thresholds for conditions and performance of roads and bridges.
- FDOT's design standards and construction costs are used.

Revenue Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that expenditures would not exceed revenues for the 20-year forecast period.
- For scenarios two, three, and four, it is assumed that available revenue is what is reported in scenario one. No additional federal funds will be available for state or local roads. Therefore, the revenue shortfall for state roads and bridges is borne by the state, and the revenue shortfall for locally-owned roads and bridges is borne by local governments.

Transit Assumptions

General Assumptions

- Transit needs include both operating and capital needs.
- Transit funding includes federal, state, and local government assistance, and system revenue (e.g., farebox, advertising).
- System revenue will continue to supply the same percentage of total funding that it did in 1992.
- Transit per-unit-of-service costs will remain the same (in 1992 dollars) as the weighted average for the five-year period from 1988 to 1992.
- To estimate inflated transit costs through the 20-year period, the rate of inflation is assumed to be 3.4 percent annually, which is based on the Data Resources, Incorporated Long-Term Forecast of Economic Activity for the United States, January 1994. The precise measure is the average annual rate of grown in "PG," the Implicit Price Deflator for all Government Purchases of goods and services from 1989 to 2004.
- The currently-programmed level of FDOT intermodal development-rail guideway funding will continue over the 20-year forecast period in all scenarios.
- To estimate inflated intermodal development-rail guideway costs through the 20-year period, FDOT's recommended construction cost inflation forecasts are used as the rate of inflation.

Scenario Two Assumptions

- The supply of transit service will grow at 1.7 percent annually based on data provided by CUTR's "Five-Year Statewide Transit Development Plan: Technical Memorandum No. 3, Alternative Transit Scenarios (Draft)."
- This level of growth in supply will be sufficient to keep pace with increases in demand.

Scenario Three Assumptions

- Same as scenario two, with the addition of needs transferred from the difference between the "maintain conditions" scenario and "maintain conditions (with maximum lane policy)" scenario in the highway needs.

Scenario Four Assumptions

- Transit's mode split will increase by 100 percent by 1997. This would move the overall mode share for transit back to its 1970 level of two percent of all trips.
- After the increase in mode split is achieved, the supply of transit service will grow at 1.7 percent annually.

Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that under that scenario expenditures will equal revenues.
- For scenarios two, three, and four, it is assumed that system revenue will continue to provide the same relative proportion of total revenue as in scenario one.
- It is assumed that scenario one federal, state, and local funding represent the maximum amount of revenue currently available from those sources, and that the state and local responsibility for transit expenses will maintain the same proportion relative to each other as in scenario one.

Paratransit Assumptions

General Assumptions

- Paratransit needs include both operating and capital needs.
- Paratransit funding includes federal, state, and local government assistance, and system revenue (e.g., farebox, advertising).
- System revenue will continue to supply the same percentage of total funding that it did in 1993.
- Paratransit per-unit-of-service costs will remain the same (in 1992 dollars) as in 1993.
- Paratransit unit costs inflate at 3.4 percent per year, the same as transit costs.

Scenario Two Assumptions

- The rate of growth in the supply of service was assumed to equal the rate of growth in the TD population.

Scenario Three Assumptions

- Same as scenario two.

Scenario Four Assumptions

- All of the demand for general trips that is currently unmet will be supplied.

Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that under that scenario expenditures would equal revenues.
- For scenarios two, three, and four, it is assumed that system revenue will continue to provide the same relative proportion of total revenue as in scenario one.
- It is assumed that the social service agencies that supply funding for program trips will continue to provide sufficient revenue to cover the expense of providing program trips as the supply of these trips increases. Thus, under all scenarios there is no expected revenue shortfall for program trips.
- Revenue shortfalls are expected in scenarios two, three, and four for general trips, which are funded primarily by traditional transportation revenue sources.
- It is assumed that scenario one federal, state, and local funding for general trips represent the maximum amount of revenue currently available from those sources, and that the state and local responsibility for general trip expenses will maintain the same proportion relative to each other as in scenario one.

Rail Assumptions

General Assumptions

- Tri-County Commuter Rail Authority (Tri-Rail) needs include both operating and capital needs.
- Tri-Rail funding includes federal, state, and local government assistance, and system revenue (e.g., farebox, advertising).
- System revenue will continue to supply the same percentage of total Tri-Rail funding that it did in 1992.
- Tri-Rail per-unit-of-service costs will remain the same (in 1992 dollars) as nationwide average commuter rail per-unit-of-service costs in 1992.
- Unit costs inflate at 3.4 percent per year, the same as transit and paratransit costs.
- To estimate inflated intermodal development-rail costs through the 20-year period, FDOT's recommended construction cost inflation forecasts are used as the rate of inflation.
- The currently-programmed level of FDOT intermodal development-rail funding will continue over the 20-year forecast period.

Scenario Two Assumptions

- Tri-Rail service supply will increase to 15,000 trips per day by 2000 (to meet latent demand) and will grow at 3 percent annually from 2000 to 2012 (to keep pace with population growth).
- This level of growth in supply will be sufficient to keep pace with increases in demand.

Scenario Three Assumptions

- Same as scenario two, with the addition of needs transferred from the difference between the "maintain conditions" scenario and "maintain conditions (with maximum lane policy)" scenario in the highway needs.

Scenario Four Assumptions

- Tri-Rail's mode split will increase by 100 percent by 1997, moving overall daily ridership to approximately 20,000 trips per day.
- After the increase in mode split is achieved, the supply of Tri-Rail service will grow at 3.0 percent annually (to keep pace with population growth).

Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that under that scenario expenditures would equal revenues.
- For scenarios two, three, and four, it is assumed that system revenue will continue to provide the same relative proportion of total revenue that it provided in scenario one.
- In all scenarios it is assumed that over the 20-year forecast period local government is responsible for 50 percent of Tri-Rail's net operating costs (i.e., total operating costs minus federal funds and system revenue). This local responsibility is due to the state mandate that counties must pay for 25 percent of total operating costs.

Airport Assumptions

General Assumptions

- Airport needs include only capital needs.
- There are no current capacity deficiencies at Florida's airports.
- Needs include only the state's portion of needs and assumes that their percentage of total needs will remain constant over the 20-year period.
- The rate of inflation used for airport costs is 2.4 percent annually, which is based on the Data Resources Incorporated Long Term Forecast of Economic Activity for the United States, January 1994. The precise measure is the

average annual rate of growth in "PGSLIC" the Implicit Price Deflator for state and local government public construction put in place.

Scenario One Assumptions

- The FDOT Program and Resource Plan is used to estimate inflated airport expenditures.
- The state share of revenue for airports is forecasted to increase four percent per year for the next twenty years according to FDOT revenue forecasts.

Scenario Two Assumptions

- The state percentage of needs listed in the Florida Aviation System Plan was used for this scenario.
- The state percentage of airport needs is based on a historical rate of contribution to aviation needs.

Scenario Three Assumptions

- Same as scenario two.

Scenario Four Assumptions

- Same as scenario two.

Revenue Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that expenditures would not exceed revenues for the 20-year forecast period.
- For scenarios two, three, and four, it is assumed that available revenue is what is reported in scenario one.
- All shortfalls in scenarios two, three, and four are reported as state shortfalls because it is assumed that the state will continue to fund 20 percent of needs.

Seaport Assumptions

General Assumptions

- Seaport needs include capital needs plus FDOT central office spending for administration and planning.
- Needs include only the state's portion of needs and assumes that their percentage of total needs will remain constant over the 20-year period.
- The rate of inflation used for airport costs is 2.4 percent annually, which is based on the Data Resources Incorporated Long Term Forecast of Economic Activity for the United States, January 1994. The precise measure is the average annual rate of growth in "PGSLIC" the Implicit Price Deflator for state and local government public construction put in place.

Scenario One Assumptions

- Needs for this scenario are equal to the current fixed dollar amount that the state contributes to seaports.

Scenario Two Assumptions

- Assumes a need equal to the proposed state spending of $25 million per year plus current expenditures that include FDOT central office spending for administration and planning.

Scenario Three Assumptions

- Same as scenario two.

Scenario Four Assumptions

- Same as scenario two.

Revenue Shortfall Assumptions

- There is no expected revenue shortfall in scenario one because it is assumed that expenditures would not exceed revenues for the 20-year forecast period.
- All shortfalls in scenarios two, three, and four are reported as state shortfalls because the analysis only addresses state needs.

Impact Analysis Assumption

- The average value of time is derived from values supplied by the FDOT Project Development Office. These values, $13.27 for rural and $11.78 for urban locales, were given in 1988 dollars.
- The value of time was updated to 1992 dollars with the U.S. Bureau of Labor

Statistics Consumer Price Index. The 1988 to 192 update factor used was 1.193.

- The cost values for fuel, vehicle depreciation, and vehicle maintenance used in the HPMS calculations are based on 1980 prices.
- The price per gallon for gasoline is $1.0985 and for diesel fuel is $0.977, excluding taxes.
- Vehicle operating cost figures were updated to 1992 dollars through the use of U.S. Department of Commerce price indices for Consumer Expenditures on Motor Vehicles and Parts, Fuel, and Transportation Services. The 1980 to 1992 update factor used was 1.380.
- The 1988 dollar values of accidents (the preferred term is "crashes") by type were obtained from FHWA:
  - $2,723,000 for fatal crashes
  - $229,000 for incapacitating injury crashes
  - $48,000 for no-incapacitating injury crashes
  - $4,500 for property damage only crashes
- The dollar values of crashes were updated to 192 dollars with the U.S. Bureau of Labor Statistics Consumer Price Index.
- The discount rate used in the analysis was four percent per year. FDOT currently uses a higher seven percent rate for its analysis activities. The lower rate was selected for this analysis to maintain consistency with FHWA's accident costs, which were calculated with a four percent rate. Mixing the four and seven percent discount rates could produce erroneous results.

Endnotes

[1] Florida Department of Transportation, *Appendix D of the 1991 State Transportation Needs Assessment Summary Report.*

[2] Variations on the assumption of VMT growth can be coded into the HPMS analytical process, thereby overriding the FDOT assumption of a three percent annual increase. In fact, an exercise was conducted to test the sensitivity of changing this assumption. FDOT's 3 percent annual growth rate for VMT was split into urban and rural states based on the urban and rural distribution of travel. This implies a 3.4 percent urban and a 2.3 percent rural VMT growth rate, respectively. The result of this exercise showed that total rural needs decreased by nearly 8 percent, while urban needs increased by approximately 19 percent. Overall, with no change in average VMT, total needs increased by nearly 11 percent.

[3] Plan 30 Year, version 11, FDOT, OMB, March 24,1994.

[4] Center for Urban Transportation Research, *NPTS Demographics and Travel Behavior: A Comparison of Florida and the United States,* January 1993, 3.

[5] *Ibid.*, 25.

[6] Data Resources Incorporated Long Term Forecast of Economic Activity for the United States, January 1994, annual average rate of growth of the Implicit Price Deflator for Government Purchase of Goods and Services, 1989-2004.

[7] Federal Highway Administration, "Traveler Response to Transportation System Changes," July 1981, 1787-182.

[8] Center for Urban Transportation Research, "Five-Year Statewide Transit Development Plan: Technical Memorandum No. 3, Alternative Transit Scenarios (Draft)," July 1994, A-25.

[9] *Ibid.*, 43-61.

[10] Center for Urban Transportation Research, "Statewide Operations Report: Fiscal Year 1992/93," January 1994, 5.

[11] Data Resources Incorporated Long Term Forecast of Economic Activity for the United States, January 1994, annual average rate of growth of the Implicit Price Deflator for Government Purchase of Goods and Services, 1989-2004.

[12] *Ibid.*

[13] Data Resources Incorporated Long Term Forecast of Economic Activity for the United States, January 1994, annual average rate of growth for state and local government construction put in place.

[14] *Ibid.*

[15] Some states, such as New York, do not have fixed maximum or minimum fees and midpoints could not be identified.

[16] These projections were chosen since BEBR is the agency charged with the responsibility of providing population forecasts for the state government.

[17] Center for Urban Transportation Research, *State Transportation Policy Initiative: Trends and Forecasts of Florida's Transportation Needs* (Tampa: University of South Florida, 1994).

[18] Florida Department of Transportation, *The Florida Aviation System Plan: Statewide Summary, 1992-2010.*

[19] Source: *Local Government Financial Information Handbook* (July 1994), Florida ACIR, p. 126.

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