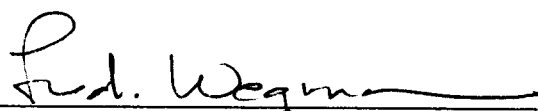
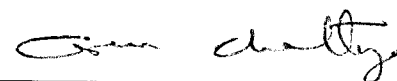
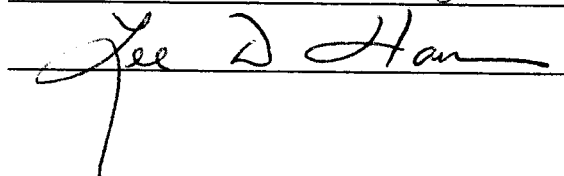


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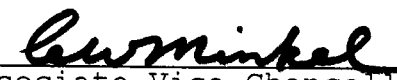
I am submitting a thesis written by David Newman McFarlin entitled "2020 Highway Fiscal Forecast for Tennessee". I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Civil Engineering.


Fred Wegmann, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:


Associate Vice Chancellor and
Dean of the Graduate School

2020 Highway Fiscal Forecast for Tennessee

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

David Newman McFarlin
May 1997

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Abstract

In this thesis, the revenues and expenditures for Tennessee maintained highways are forecasted to the year 2020. The revenues and expenditures were forecasted using existing data collected from Highway Statistics. A linear regression was then performed on the data and produce a straight line trend. Also, two percent and four percent growth rates were projected. The data was collected from Highway Statistics for the years between 1970 and 1994 using the various editions of that publication. There is a strong chance that the expenditures will outpace the revenues during the time period between 1996 and 2020. The State of Tennessee might have to investigate ways to increase the revenues, either by raising taxes or by utilizing additional revenue streams.

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CHAPTER 1

INTRODUCTION

Transportation is essential to any nation's economy. The United States is no exception. Every country strives to maintain an efficient transportation system in order to create a strong economy. The shift toward a global economy has increased the importance of an efficient transportation system. For the United States to remain competitive in the global market, it is imperative that we have a transportation system that is capable of moving goods and people safely and efficiently. It is necessary that this be accomplished even though the costs of maintenance and capital improvements are increasing along with the increased demand for travel. For Tennessee to continue to receive a share of the economic growth, Tennessee must continue to provide a transportation system with the ability to provide for the anticipated growth in demand on the transportation system. The most important aspect of a state's transportation system is its highway system. Tennessee had responsibility for 1,062 miles of interstate

highway and 12,519 miles of other state highways in 1992 (16).

In order to maximize the potential of the funding that the State of Tennessee receives for highways, the State must develop an effective financial plan that considers both future revenue and future needs. This will allow the State to estimate what future roadway deficiencies will be, where they will occur, and how expensive they will be to rectify. The State can propose to initiate a timely maintenance and capital improvement program to preempt some of the problems that may occur.

In order to make accurate forecasts, the financial planning must be based on accurate projections of future travel, revenues, and expenses. Additionally, they must be aware of what mode of transportation the public is using most frequently. For instance, more people are using private vehicles today than in the past. In 1980, two and one half percent of workers in Tennessee used public transportation to get to work. By 1990, that percentage had dropped to one and three tenths percent. Additionally, carpooling in Tennessee has declined from

twenty-three and two tenths percent in 1980 to fourteen and one half percent in 1990 (21). This information alerts planners to the fact that more people are driving their own cars to work. In 1980, sixty-eight and two tenths percent of workers drove alone to work in Tennessee. That number increased to seventy-eight and seven tenths percent in 1990 (21), increasing the demand on the highways. The vehicle miles of travel in Tennessee are, in general, also increasing. In 1980 there were 38,729,000 vehicle miles of travel and by 1994 that number had increased to 59,602,000 vehicle miles of travel (Figure 1.1).

The cost of maintaining the State's highway system is increasing along with the lane miles of highways and will continue to increase due to inflation of construction costs. Delaying improvements to the transportation system due to funding deficiencies can incur additional financial consequences in the long term and can also add as much as forty percent per mile to the cost of operating a vehicle (12). In addition, deferring needed improvement can cause an increase in maintenance costs for the next several years due to the increased damage to the road and road bed which

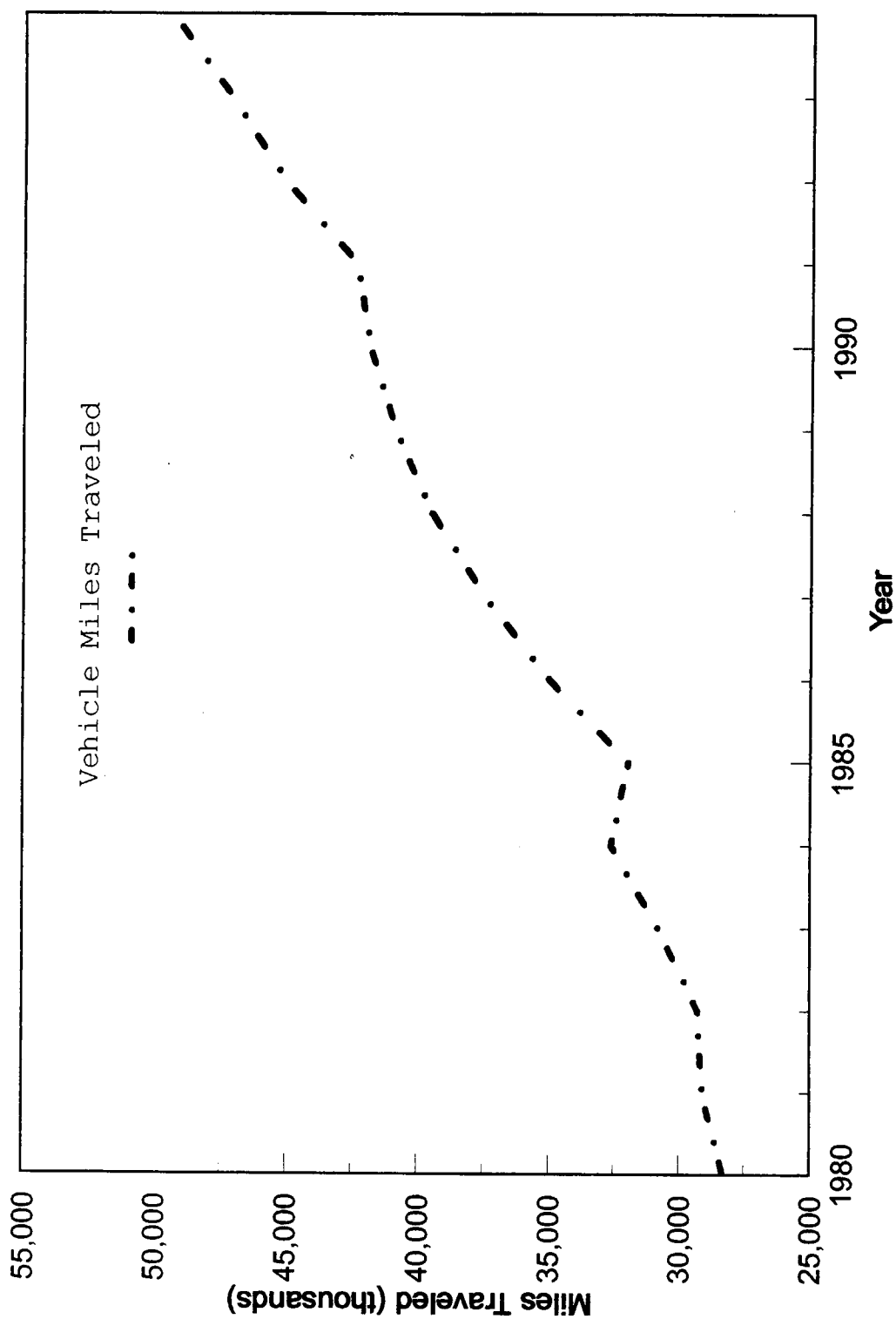


Figure 1.1. Vehicle Miles Traveled on

Tennessee State Maintained Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

could make the future maintenance very expensive. "Deferring \$1 in highway resurfacing can impose up to \$4 in additional reconstruction costs in just two years" (12). In addition, delaying improvements can cause traffic accidents as well as delays.

It is also necessary that the costs for capital improvements be forecasted and compared with the future funding which is expected to be available for financing the improvements. Upon completion of a comparison, the improvements must be prioritized to insure that the projects with the most substantial benefits are completed first. The funding percentage available for capital improvements is diminishing due to the increase in maintenance costs and the commitment to preserving the existing system before adding capacity or modernization. This is forcing the planners to look toward innovative financing options in order to fund future transportation needs.

The future revenues will ultimately determine what can be done to both maintain and improve the transportation system. Analyses conducted in the States of Oregon (5) and

Florida (22) indicated that it will be necessary to call upon nontraditional revenue sources if the States are to continue to implement capital improvements.

Due to the rising costs of maintenance and new construction in the transportation sector, both the State and the Nation are looking at alternative ways to finance transportation infrastructure improvements. Such alternatives are termed "innovative financing". It is no longer realistic to rely solely on traditional funding sources such as highway user fees and fuel taxes because these sources can only produce a limited amount of growth in revenue generated. Neither can the State rely solely on the strategy of Federal grant reimbursements. The objectives of this paper are to forecast future transportation revenue, to estimate future maintenance and capital improvement expenses for the Tennessee highway system, and to discuss the role of alternative revenue sources for Tennessee.

CHAPTER 2

LITERATURE REVIEW

Historically, the government has been responsible for the construction and maintenance of the highways in the United States. Each level of government, from local to Federal, has assumed the responsibility of maintaining and building the highways at different points in history. The present financing system has evolved from that structure.

In the United States, the earliest road work was to be performed by every able-bodied male citizen. The states passed laws requiring the men to work a specified number of days on a road or pay for someone to do the work in their place. However, this system was not very efficient. Often young boys were sent out to do the work and they accomplished little, turning the work into a social gathering. Additionally, the farmers of the day benefited from the condition of the roads because they usually made extra money pulling disabled cars out of the mud (3).

Many of the roads of this time ended inconveniently at county lines or even in the middle of a field. Realization

of this encouraged state governments to get involved. Initially, the state highway system was financed by loans and property taxes which pushed the states toward financial disaster. The borrowing had to be curbed for the states to remain solvent (3). Property taxes were soon to become completely inadequate as a source of funding for the fledgling highway system. Also, the property taxes were unpopular with the citizens, since both the state and local governments were utilizing the same source for the revenue.

The states began looking for another source of revenue to keep pace with the demand for the highway system. "In 1901 New York State imposed the first registration fee on motor vehicles" (3), setting an example that other states soon emulated. Originally this was a one time fee used for identification purposes. However, "by the 1920's [it became] a most important fixture in the state highway tax structure" (3). In 1919, Oregon introduced the gasoline tax. The people seemed willing to pay for the highways through the gasoline tax because only the users of the highway system paid for it through this system. "By the late 1930's it constituted almost fifty percent" (3) of all

state highway revenue. The states felt that they had hit upon a gold mine.

The State of Tennessee levied its first gasoline tax of two cents in 1923. This was increased to three cents by 1925. However, the revenue was still not sufficient to pay for the highways that the people were demanding, so a bond was issued.

The 1925 Legislature authorized a \$5 million issue, the 1927 Legislature a \$10 million issue, the 1929 regular session a \$25 million issue and a special session the same year provided \$10 million more for a total of \$50 million in bond issues during the late 20's (8).

The State increased the gasoline tax to support the bond issue and apportioned the tax revenue to different levels of government.

In 1806, the Federal Government authorized the construction of the National Pike (Cumberland Road), marking the first time the Federal Government had entered the field of highway construction. This highway was 800 miles long at a cost of \$7 million (20). Road construction declined during the rest of the nineteenth century, due to the popularity of the locomotive, until about 1900 when

farmers started to demand better farm-to-market roads. There was an additional demand for roads connecting metropolitan areas, so the pace of road building increased. The Federal Road Act of 1916 authorized the expenditure of \$75 million over a five year period. "The funds apportioned under this act were apportioned to the individual states on the basis of area, population, and mileage of rural roads" (20). With this act, the Federal Government initiated the idea of matching funds, requiring states to match the federal funds they receive on a 50-50 basis, with a sliding scale for states in the west with Federal Land holdings. In 1921, Congress passed an additional act which "extended the principle of federal aid in highway construction" (20). The Federal Government required the states to designate a connected system of interstate and intrastate routes not to exceed seven percent of the rural mileage in each state (20). The act also required each state to take on the responsibility of maintaining these highways. For the next several years, the Federal Government increased the apportionment for the Federal-aid systems.

In 1932, Congress levied a one cent per gallon tax on gasoline. Additionally, the Federal Government levied a tax on diesel fuel for the first time in 1951. The Congress of the United States also imposed an excise tax on new motor vehicles beginning during the Depression. In 1956 the Federal Government established the Highway Trust Fund and established a program to build approximately 45,500 miles of roads connecting ninety percent of U.S. cities over 50,000 in population (20). Multi-lane roads were to be built with access control. The funding for the interstate system was increased from \$25 million obligated from the General Fund in 1955 to \$1,175 million from the Highway Trust Fund in 1957 (8). Additionally, this act established the Highway Trust Fund and a "pay-as-you-go" policy for highway construction. Funds placed into the trust fund came not only from gasoline but also from "1/2 [of] the 10% excise tax on trucks, buses and trailers, the excise tax on tires, tubes and retread rubber and an annual assessment of \$1.50 per thousand pounds on vehicles weighing more than 26,000 lb." (15) After passing a sequence of acts funding the highway system Congress

approved the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, which changed the way the Nation funded the highway system. Throughout the previous twenty years the federal-aid program "had been directed primarily toward the construction and improvement of four Federal-aid systems --Interstate, Primary, Secondary and Urban" (13). ISTEA called for the establishment of the National Highway System (NHS) with 155,000 miles of highways and dropped the Primary, Secondary, and Urban highway classifications (20). In their place were established, two Federal-aid systems, the National Highway System and the Interstate System. Interstate completion, Interstate Substitute highway projects, and an Interstate Maintenance program would be funded under ISTEA along with NHS. ISTEA also stated a national transportation policy. The policy intended to:

...develop a National Intermodal Transportation System that is economically efficient, environmentally sound, provides the foundation for the nation to compete in the global economy, and will move people and goods in an energy efficient manner (13).

This set the tone for the bill.

Congress recognized "the complimentary and interdependent relationships between different modes of transportation" (14) and they encouraged the use of Intermodalism to help move people and goods. The Congress also realized that a growing economy is dependent upon a sound transportation system, noting that "the interstate is a national asset" (18). The interstate system is not only beneficial for defense, it is an excellent tool of commerce.

ISTEA also requires that states working in concert with the Metropolitan Planning Organizations (MPO's) "prepare a 3-year State Transportation Improvement Plan (STIP)" (6), that "must be financially constrained" (6). These financial plans must exhibit that the money will be available or can reasonably be expected to be available for future use.

ISTEA is essentially a bill that appropriates federal funds for the transportation system for seven years, providing \$151 billion in total program funding over the seven years, although not all of the funding has been obligated. This includes \$119.5 billion in funding for the

highways and \$31.5 billion in funding for the transit systems. An important part of this bill allows up to fifty percent of the National Highway System funds to be transferred to other road programs or to transit. However, "if the Secretary approves, 100% may be transferred" (13). This provides the states with greater flexibility.

The major source of revenue for the Federal Government is the gasoline tax, which is currently eighteen and three tenths cents per gallon. The tax is broken down into the following groups:

- 4.3 cents go toward deficit reduction
- 12.0 cents go toward the Highway Account and
- 2.0 cents go toward the Mass Transit

Account (12).

Federal-aid highway program funds are distributed to each state according to a prescribed formula. However, the total apportionments are not always given to the states. The limit, or obligational ceiling, is established by the Federal Government. The difference in the total apportionment and the obligational ceiling for Tennessee is shown in Table 2.1. In 1994, the cumulative difference from 1981 between appropriations and obligations for Tennessee was \$592.9 million (16). If Tennessee could find

Table 2.1
Trends in Federal-aid Highway Program Funds
for Tennessee
(dollars)

Fiscal Year	Total Apportionment (in millions)	Obligational Ceiling (in millions)	Difference	Cumulative Difference
1978	185.2	*	0	0
1979	176.1	*	0	0
1980	291.4	*	0	0
1981	233.4	178.1	55.3	55.3
1982	196	152.9	43.1	98.4
1983	296.1	274.8	21.3	119.7
1984	287.8	266.2	21.6	141.3
1985	333.3	274.3	59	200.3
1986	282.4	245	37.4	237.7
1987	274.8	243.7	31.1	268.8
1988	250.2	201.1	49.1	317.9
1989	307.3	237.4	69.9	387.8
1990	290.7	255.1	35.6	423.4
1991	245.3	255.1	-9.8	413.6
1992	334.2	295.6	38.6	457.2
1993	366.8	283.7	83.1	535.3
1994	378.1	320.5**	57.6	592.9

State of Tennessee, State Transportation Plan. (1994, September). Department of Transportation.

* No Ceilings these years

** Current as of 08-10-94

a way to receive the remainder of these funds, it would be a tremendous financial boost.

The states are searching for additional ways to fund highways in order to cover the rising costs. It is expected that traditional funding will not continue to be adequate in the near future. The public will not support a substantial increase in fuel tax, therefore, many states are looking toward "innovative financing" to help cope with the funding problems.

There are several innovative financing tools that are being experimented with at this time. They are classified into two separate categories: timing tools and leveraging tools. Some timing tools include:

- Advance Construction
- Partial Conversion and
- Phased Funding.

Some of the leveraging tools include:

- Bonds and Debt
- Flexible Match
- Section 1044 Toll Credit
- Section 1012 Loans and
- Income Generation
- (7).

ISTEA allows for these experiments to be conducted. Under the TE-045 demonstration programs, some example demonstration states are presented.

Ohio is experimenting with Advance Construction on the Butler County Highway. Advance Construction "allows projects to start without obligating Federal funds" (7). They can raise the funding needed to pay for the initial construction and still retain the ability to obtain Federal funding. The States must receive approval from the FHWA before an Advance Construction project begins. However, the State determines when to use the Federal funding for the project. California has been routinely using Advance Construction to finance their highway projects.

States can also utilize Partial Conversion, a variation of Advance Construction. Partial Conversion "allows increased flexibility in obligating Advance Construction projects" (7), because the states do not have to wait until they can obligate the entire Federal share, but can instead use varying amounts of Federal funding over a period of time. Pennsylvania has applied for approval for this method on interstate maintenance projects on I-90,

I-78, and I-70. Also, Maryland is using this technique on the Baltimore Beltway HOV Lane.

Phased Funding allows the states to phase their Federal obligations over several years.

Phased Funding allows priority new construction and maintenance projects whose cost would otherwise escalate dramatically, as is often seen in many bridge reconstruction projects, to phase obligations and federal reimbursement over multiple years (4).

There are two states using this technique. North Carolina is experimenting with this method on the Neuse River New Bridge, and Idaho is utilizing this on the I-84 reconstruction project (7).

The Flexible Match Program is being experimented with by both Michigan and Maine. The Flexible Match Program "allows non-state match to substitute for state funds" (7). It also accepts non-cash contributions from private or public sources. This can include right-of-way donations as well as construction material. This again frees up state funds for additional projects. Michigan is using this method on the Romulus I-94 interchange, while Maine is using this on the Fairfield Intermodal Facility (7).

Another program is the Section 1044 Toll Credits, allowing for Toll capital spending to be used as part of the state matching funds. A maintenance of effort determination must be conducted before this program can be implemented. Michigan and Maryland have each submitted a prospective measure of effort (7).

Section 1012 loans "[allow] Federal reimbursement of state loans to other entities" (7). This allows the states to loan federal-aid money to Toll projects or other Title 23 U.S. transportation projects expected to generate a revenue stream. The loan can be made to either public or private companies. The repayments can be reserved for future use and to fund revolving loans or "seed" state banks. Ohio is attempting this on the Stark County Intermodal Facility and Texas is trying this on the Laredo Bridge (7).

The State of Arizona is using Income Generation on the Freeway Management System. Income Generation provides income from non-traditional sources, which could originate from a variety of areas including private contributions or nontraditional tax sources. An example of a

non-traditional tax would be a special benefit assessment district, which is "a tax or charge levied on property within a well defined area which directly benefits from a public improvement" (11). Essentially, anyone who has property within an area that has high quality roads, or any roads, could be charged more for that benefit. Another example is traffic impact fees. If a new development is constructed, then the developer must pay for the improvements in the highway system that will be necessary to accommodate the additional traffic generated by the construction (1). Such revenue can come from many different revenue sources, which can include, but are not limited to: congestion pricing, vehicle miles traveled fee, and general sales tax (14). The private sector also provides some direct funding for the highways. However, that is still a small contribution and will probably remain that way. This has been utilized in several places in Texas. Houston benefits from this through the construction of several projects funded in this way (2).

Another financing tool, the State Infrastructure Bank, is being encouraged by the Federal government. A ten state

pilot program was approved by Congress and is now in implementation. State Infrastructure Banks "are infrastructure investment funds which would be created at the state or regional (multi-state) level" (16). Essentially this is another type of loan program. They would be created with Federal Capitalization Grants (seed money), and would offer loans and lines of credit to the state or states, and give the state(s) greater flexibility in financing projects.

Several states have developed statewide transportation plans. Florida developed a transportation plan which forecasted the revenue to the year 2020. This plan made certain assumptions. These included the assumption that the Federal Highway Administration highway account would continue in its current form until 1997. Additionally, after fiscal year 2002-03, an annual growth rate of one percent was assumed. The state funding sources had growth assumptions ranging from one and eight tenths percent to five and five tenths percent. Also, the plan had a fuel tax growth assumption of five and five tenths percent while vehicle-related taxes are assumed to grow at a rate of one

and eight tenths percent (22). An Oregon study considered thirteen scenarios ranging from no significant growth to close to seven percent annual average rate of growth during a twenty year period. Additionally, an Ohio funding study for transit assumed an inflation rate of four percent for its projection (17).

The State of Tennessee presently funds the construction and maintenance of its highway system in essentially the same way as most other states. However, the state is currently investigating the benefits of innovative financing. They applied for a State Infrastructure Bank, but were denied the opportunity to utilize this alternative financing method. Although the State of Tennessee is actively exploring the possibilities that are offered by the various innovative financing techniques, it still relies primarily on traditional revenue sources.

CHAPTER 3

EXISTING REVENUE SOURCES, EXPENDITURES

AND TRENDS IN TENNESSEE

Historical data needs to be collected before projections can be made. The existing trend data was obtained from *Highway Statistics*, which is summarized annually by the Federal Highway Administration to provide consistent data on all revenues and expenditures. The revenues and expenditures do not include funds for transit or other transportation sources.

Revenues

There are a variety of revenue sources for highways in the State of Tennessee. These sources include the fuel tax, vehicle registration, weight distance tax, bonds, tolls, funds from local governments and funds from the Federal Government. In 1970, the fuel tax provided forty-three percent of the funding. By 1994, the fuel tax provided fifty-four percent of the funding for Tennessee highways (Figure 3.1). The Federal funds for the Tennessee



1994

1970

☐ Fuel Tax
 ☐ Veh. Reg.
 ☐ Local, Toll, & Misc.
 ☐ Other St. Imposts
 ☐ Federal Funds

Figure 3.1. Percentage of Highway Revenue from the Different Sources

Source: Highway Statistics 1994. Department of Transportation, Federal Highway Administration.

highways accounted for thirty-nine percent of the highway funding in 1970, but dropped to twenty-six percent of the funding in 1994. Another tax that provides substantial funding for Tennessee highways is vehicle registration. In 1970, seventeen percent of funding for Tennessee highways came from vehicle registration. Twenty-four years later fourteen percent of funding came from vehicle registration. The remainder of the revenue streams provided only one and six tenths percent of the revenues in 1970 while in 1994, these revenue streams provided five and six tenths percent of the total revenues. Additionally, three and eight tenths percent of the funding in 1994 was from other state imposts.

The fuel tax is composed of taxes on the various vehicle fuels. These fuels include gasoline, diesel, methanol, ethanol, and liquid petroleum gas. The gasoline use that is taxed increased from 2,385,707,000 gallons to 2,627,829,000 gallons during the ten year period from 1984 to 1994. In addition, the diesel use increased from 510,624 gallons to 678,423 gallons during the same ten year period. The total fuel usage increases are shown in Figure

3.2. As can be seen in the figure, the fuel usage growth rate slowed from 1978 to 1991 and then increased from 1991 until 1994.

The gasoline tax increased from seven cents in 1980 to seventeen cents just nine years later. The state fuel tax is currently twenty cents per gallon. While the diesel tax is seventeen cents per gallon. From April to July 1989, it was sixteen cents per gallon. Liquid Petroleum Gas is taxed at the rate of fourteen cents per equivalent gallon and gasohol is taxed at the same rate as gasoline. The revenue rose by two hundred percent during the twenty years between 1974 and 1994. After adjustment for inflation, the fuel revenue has essentially remained steady throughout the twenty years between 1974 and 1994 with the exception of a large decrease in the late 1970's and early 1980's. From 1970 to 1994 the inflation adjusted revenue rose only twenty-one percent.

The State initiated the Vehicle Registration Tax in 1906. The initial tax was a perennial tax. The State converted the tax to an annual tax in 1914. The State vehicle registration is presently \$23 per passenger

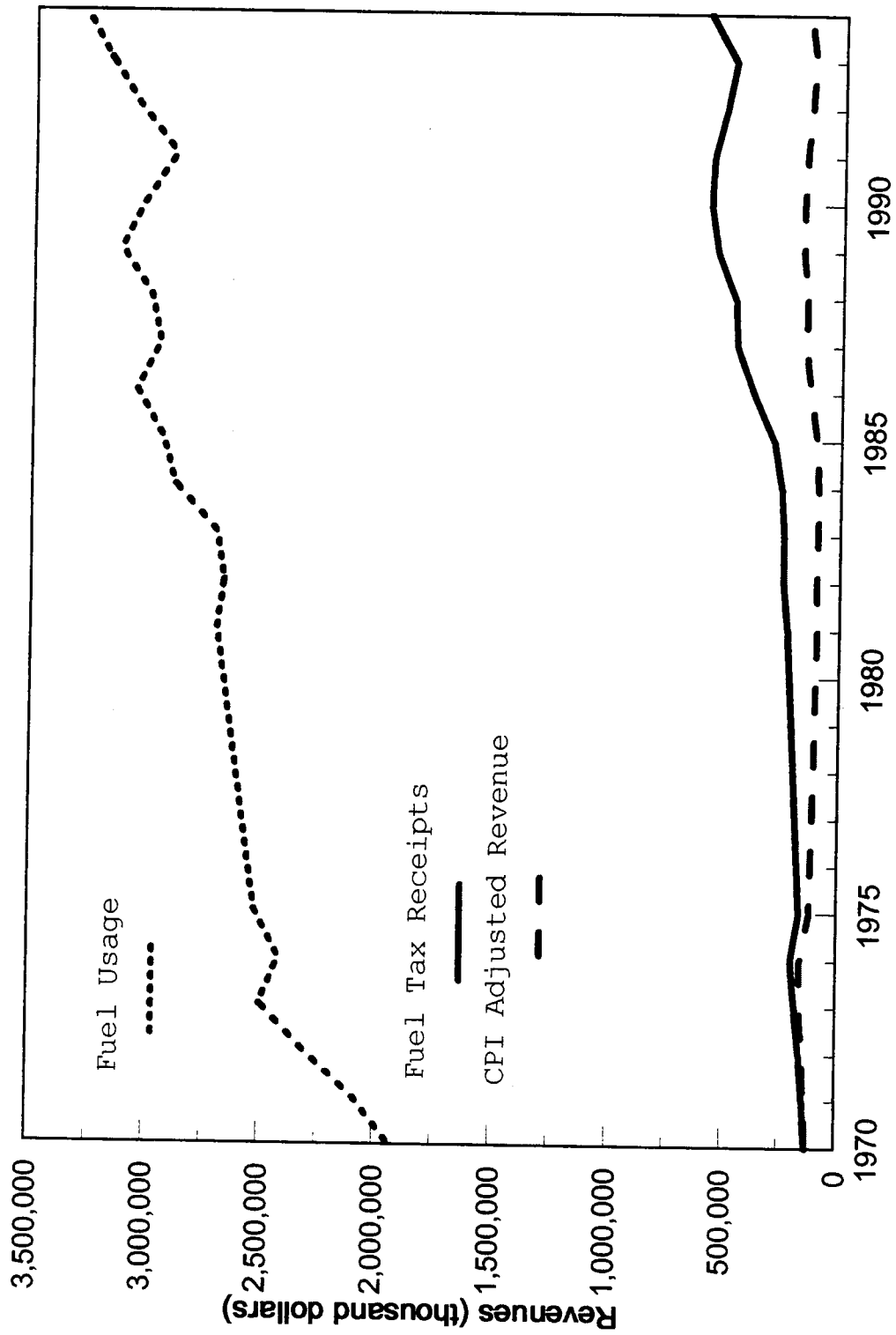


Figure 3.2. Fuel Tax Receipts and Fuel Use
 For Tennessee Highways
Source: Highway Statistics 1994. Department of Transportation,
 Federal Highway Administration.

vehicle. Vehicle registration has risen steadily the twenty-four years studied from 1970 to 1994 (Figure 3.3). These revenues rose by one hundred and four percent over the twenty years between 1974 and 1994. However, when the revenues are adjusted for inflation, they have dropped by thirty-two percent between 1974 and 1994.

Toll roads play a minor roll in funding highways in the State of Tennessee. There are only a few ferries that charge a toll. The State began receiving toll revenue for highways in 1988. However, this tax does not provide a significant amount of revenue. It provided \$68,000 in 1994 (Table 3.1).

The State also receives funding from other State sources. These sources include other State Imposts and the General Fund (Figure 3.4). Other State Imposts provide little funding for the highways. In 1993, the General Fund provided \$251,764,000 for all highways in the State and in 1992 the General Fund provided \$405,434,000 for all highways in the State due to heavy construction needs. For the remainder of the years studied, the General Fund did not provide any funding for the highways. If the General

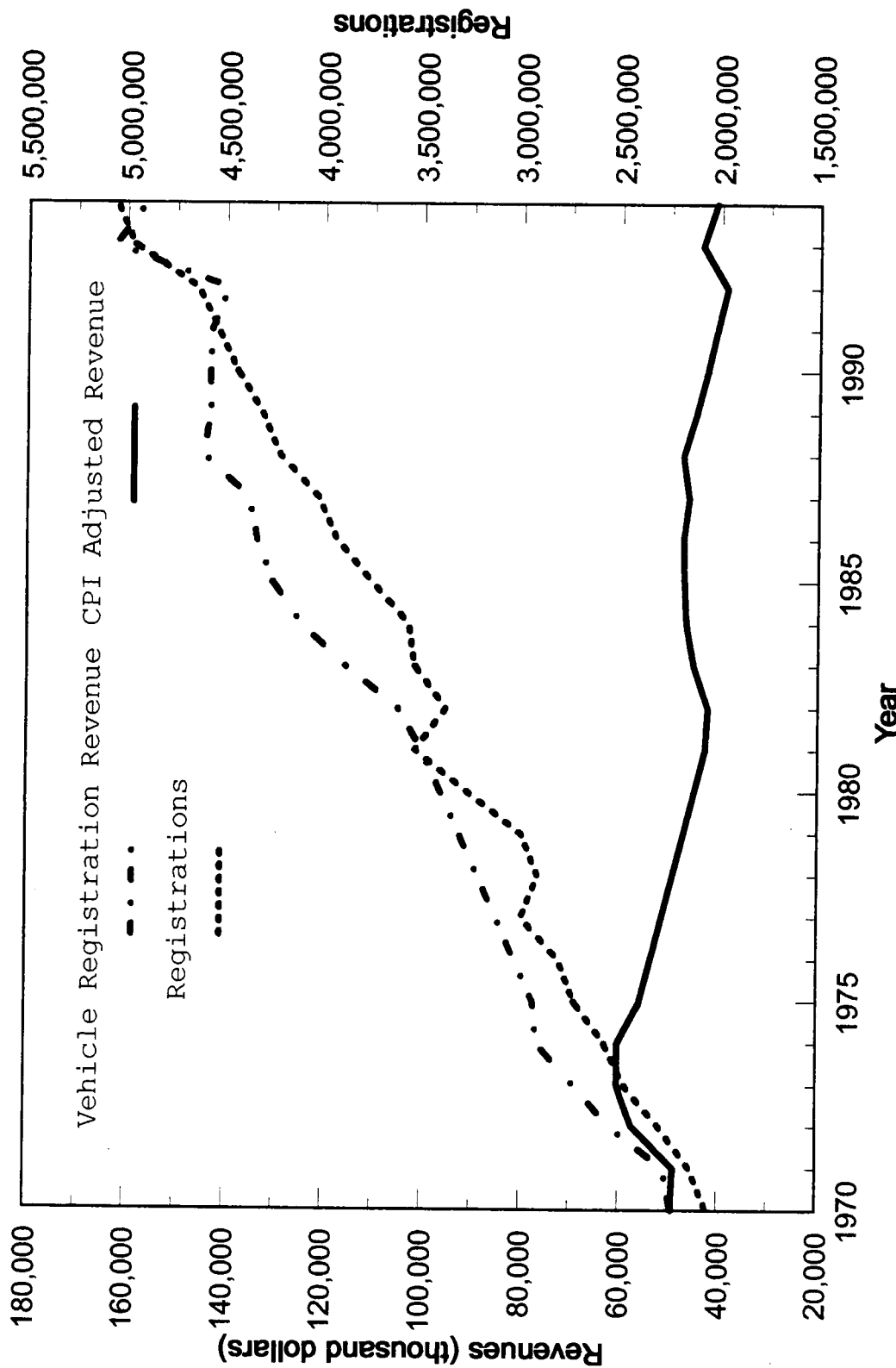


Figure 3.3. Vehicle Registration and Registration Revenue
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

Table 3.1.
Toll Revenues for Tennessee
(thousands)

Year	Toll Revenues	Percent Change	Toll Revenues After CPI Adjustment	Percent Change After CPI Adjustment
1988	37	NA	12	NA
1989	42	13.51%	13	8.29%
1990	39	-7.14%	12	-11.89%
1991	48	23.08%	14	18.06%
1992	54	12.50%	15	9.20%
1993	67	24.07%	18	20.51%
1994	68	1.49%	18	-1.09%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

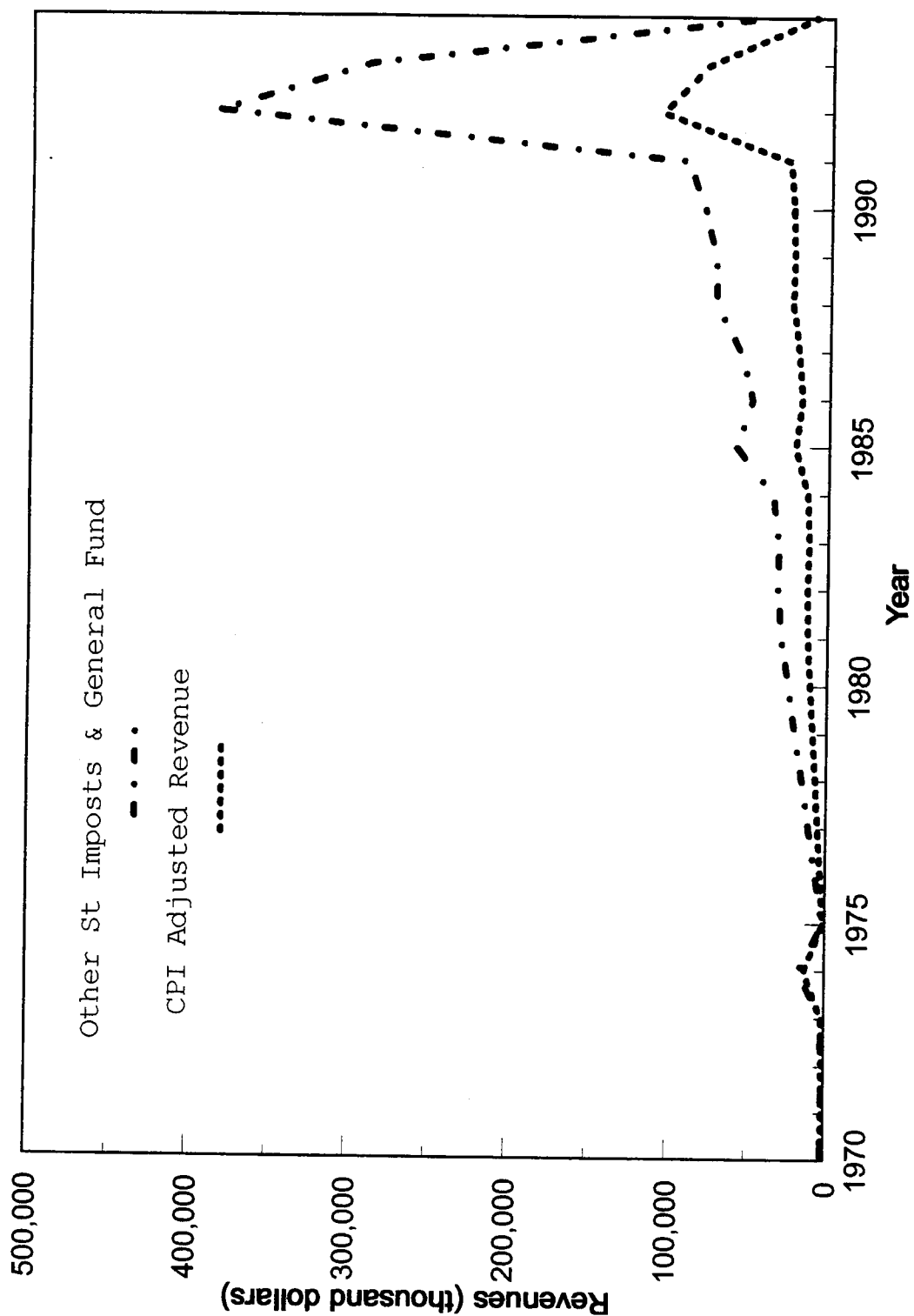


Figure 3.4. Other State Imposts and the General Fund
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

Fund was not added to the other State Imposts, the funding level would slightly increase each year. When this fund is adjusted for inflation, the funding increases by only \$9,250,00 over the twenty-four years between 1970 and 1994.

The State also receives funding for the highways from miscellaneous sources. This income varies from year to year. The income varied over a thirteen year period between 1981 to 1993, from a low of \$1,505,000 in 1985 to a thirteen year high of \$11,554,000 in 1990 (Figure 3.5). When this source is adjusted for inflation, the funding has decreased over the thirteen year period.

The local governments provide some funding for the highways in Tennessee, but this funding has remained relatively insignificant (Figure 3.6). However, this funding has increased over time but had a twenty-four percent drop in 1994 to a funding level of \$11,614,000. When this funding source is adjusted for inflation, the funding has also fluctuated since 1970.

The Federal Government also sends some of the fuel taxes back to the states along with other revenues that are collected for the Highway Trust Fund as part of the

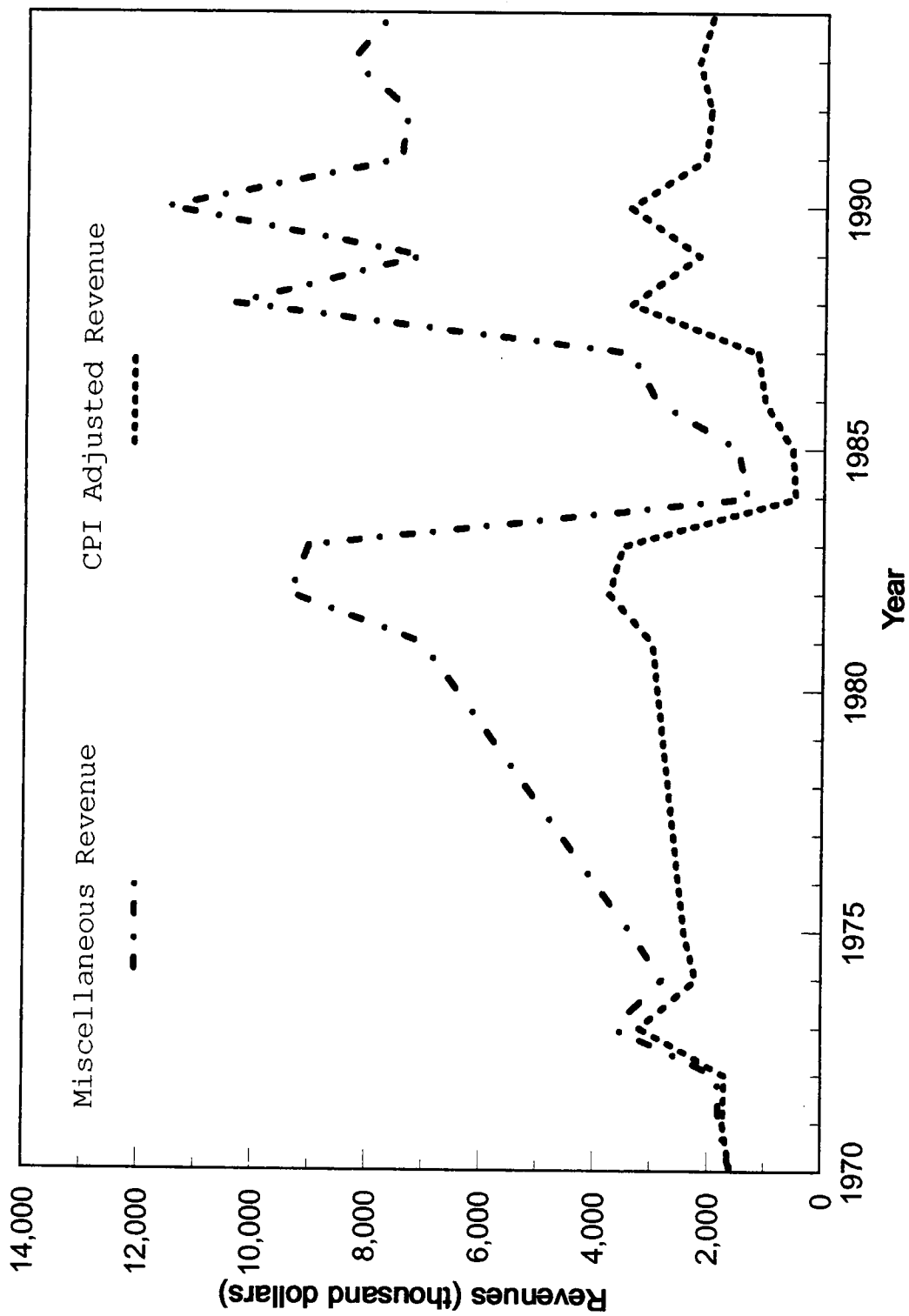


Figure 3.5. Miscellaneous Revenue

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

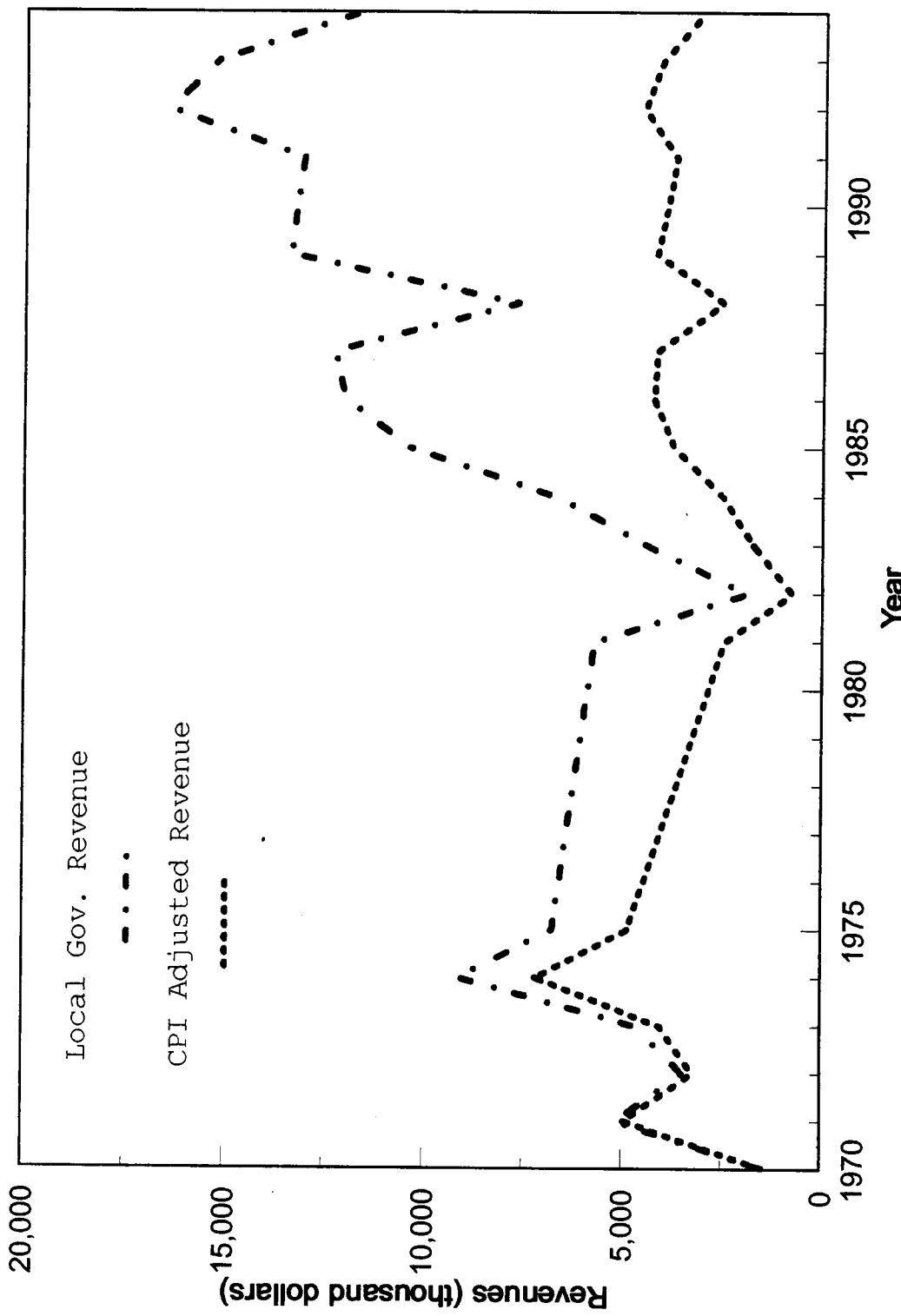


Figure 3.6. Revenues from Local Governments

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

Federal-Aid program. This funding has increased by only eight percent from 1984 to 1994 (Figure 3.7). From 1974 to 1984, the funding from the Federal sources increased by \$175,974,000. However, when the funding is adjusted for inflation, the funding has decreased since 1970.

The total receipts used for Tennessee highways have increased by two hundred and sixty-nine percent between 1970 and 1994. This is an increase of \$794,462,000 in twenty-four years (Figure 3.8). This would appear to be a dramatic increase. However, when the revenues are adjusted for inflation the picture is not quite so positive. The revenue has remained fairly constant with an eleven percent increase between 1984 and 1994. However, there was a three percent drop between 1970 and 1994. Therefore, the highway revenues have not kept up with inflation.

Expenditures

Tennessee spends money on the highways in the State in a variety of ways. Currently, the majority of funds are spent on capital outlays (Figure 3.9). However, the percentage of the expenditures utilized for capital outlays

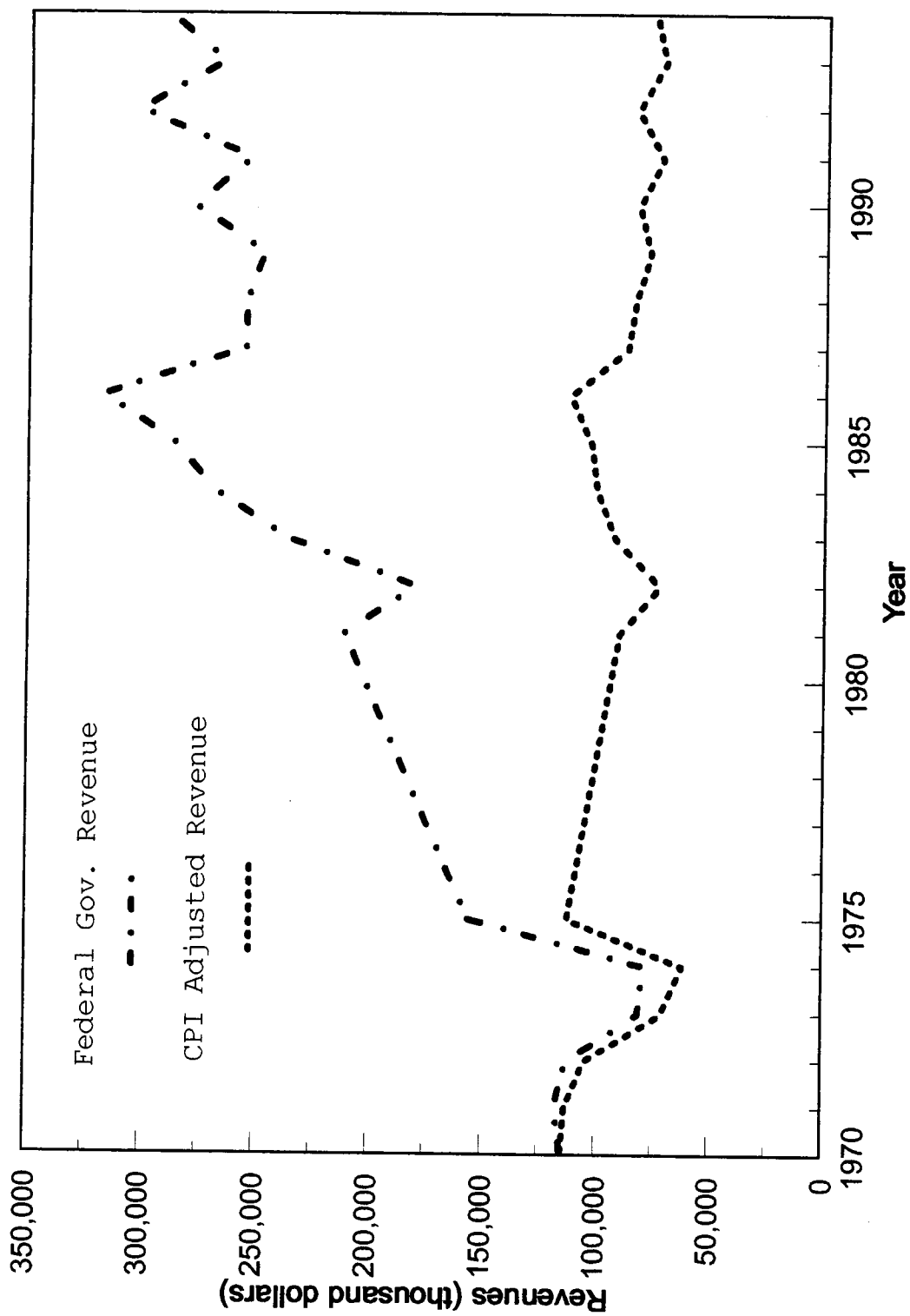


Figure 3.7. Revenues from the Federal Government
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

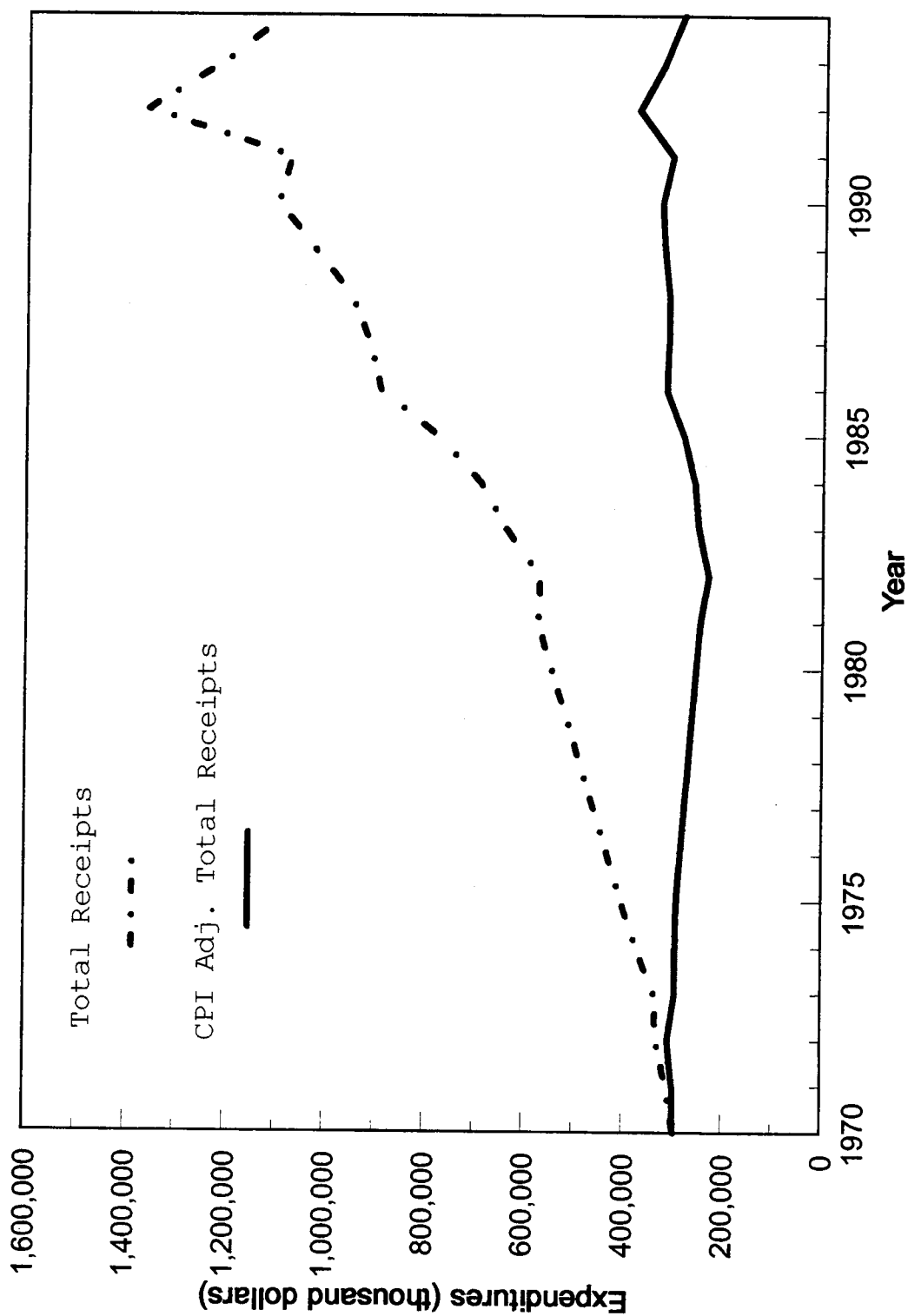
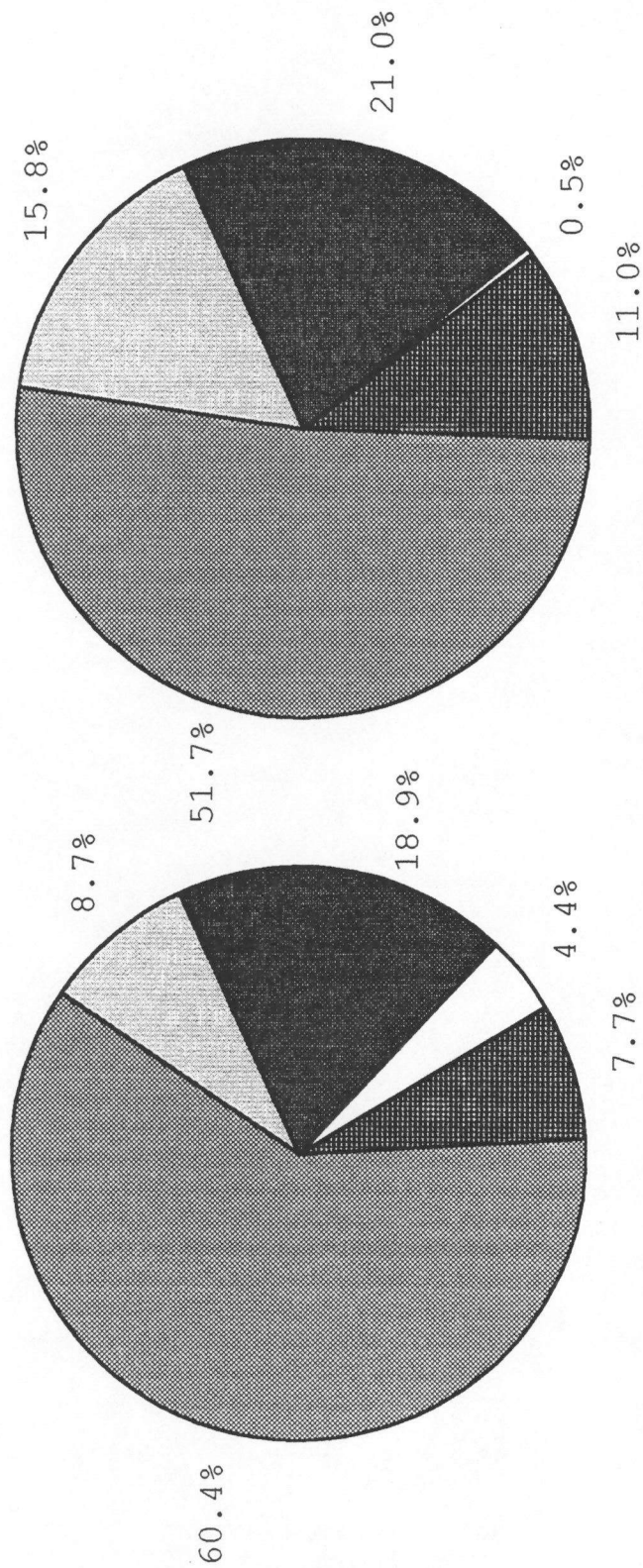


Figure 3.8. Total Receipts

on Tennessee Highways
Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.



1970

1994

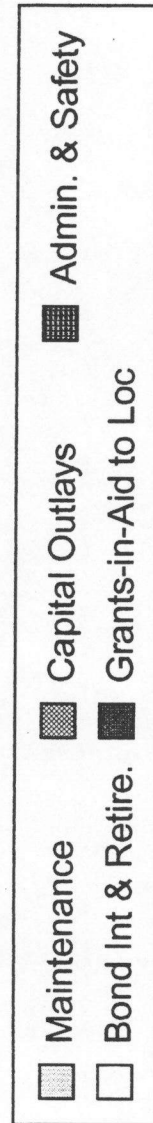


Figure 3.9. Percentage of Highway Expenditures

Source: State of Tennessee, State Transportation Plan. (1994, September).
Department of Transportation

is decreasing. For example, it has been reduced from sixty and four tenths percent in 1970 to fifty-one and seven tenths percent in 1994. Maintenance expenditures have increased from eight and seven tenths percent in 1970 to fifteen and eight tenths percent in 1994. The grants-in-aid to local governments have increased by two and one tenths percent over the twenty-four year period from 1970 to 1994. The percentages spent on administration and safety increased from seven and seven tenths percent in 1970 to eleven percent in 1994. The percentage of the expenditures that has been spent on bond interest and bond retirement has dropped from four and four tenths percent in 1970 to five tenths of a percent in the twenty-four years from 1970 to 1994.

Tennessee increased the spending on maintenance for its highways from 1970 to 1990. This was a six hundred and seventy-four percent increase (Figure 3.10). However, from 1990 to 1994 the annual spending decreased from \$204,531,000 to \$180,825,000.

Highway expenditures for capital outlays have increased over the twenty-four year period from 1970 to

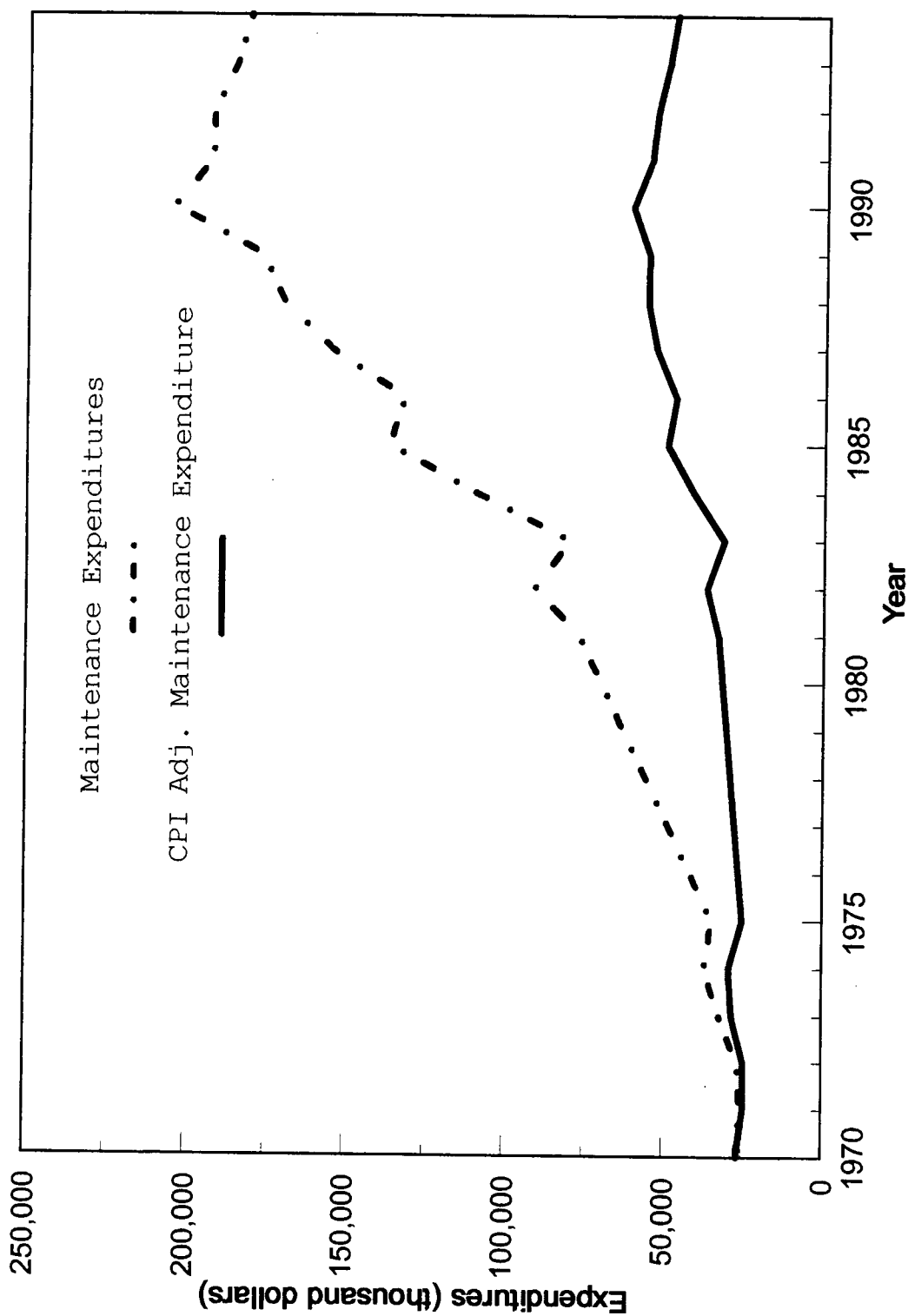


Figure 3.10. Maintenance Expenditures
 For Tennessee Highways
Source: Highway Statistics 1994. Department of Transportation,
 Federal Highway Administration.

1994 (Figure 3.11). In 1988, the State spent a twenty-four year high of \$635,603,000 on capital outlays. However, since 1988, the funding has remained steady. Lane mileage has increased in Tennessee along with the capital outlays. Since 1990, the lane mileage in Tennessee has increased from 141,415 miles in 1980 to 294,236 miles in 1994. When the expenditures are adjusted for inflation they have decreased by sixteen percent over the twenty-four year period.

The State has also consistently increased its spending on Highway Police, Administration, and Highway Safety. The expenditures for these were \$23,343,000 in 1970 and \$125,241,000 in 1994, a four hundred and thirty-seven percent increase (Figure 3.12). After the expenses are adjusted for inflation, the expenditures have increased by forty and one half percent from 1970 to 1994.

The State did not issue a bond for highways from 1978 to 1994, according to *Highway Statistics*. In 1975 the interest on the bonds was \$7,052,000 and by 1994 the interest on the bonds dropped to \$1,310,000 (Figure 3.13). Due to the state retiring the bonds and paying the

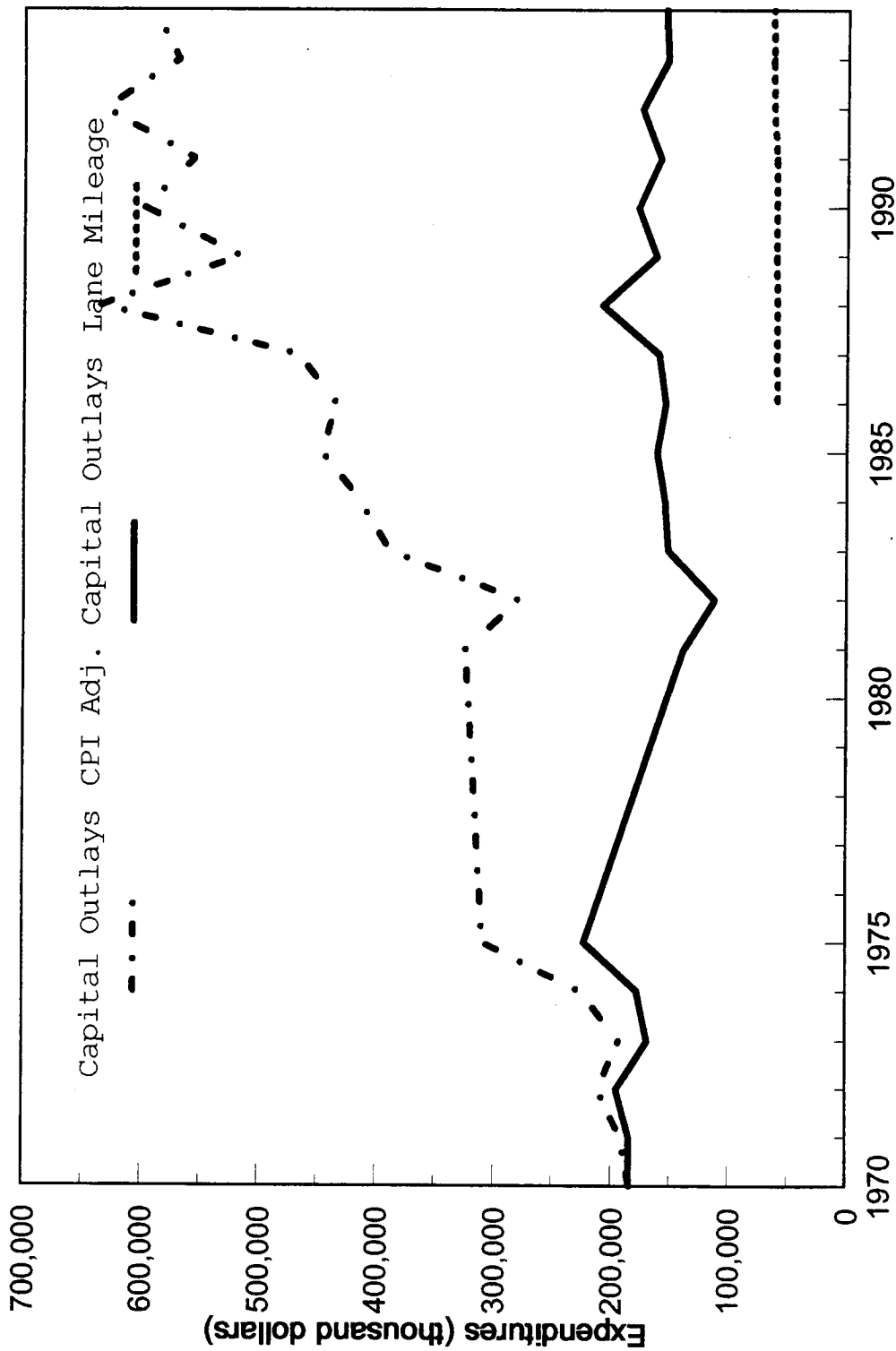


Figure 3.11. Capital Outlays & Lane Mileage
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

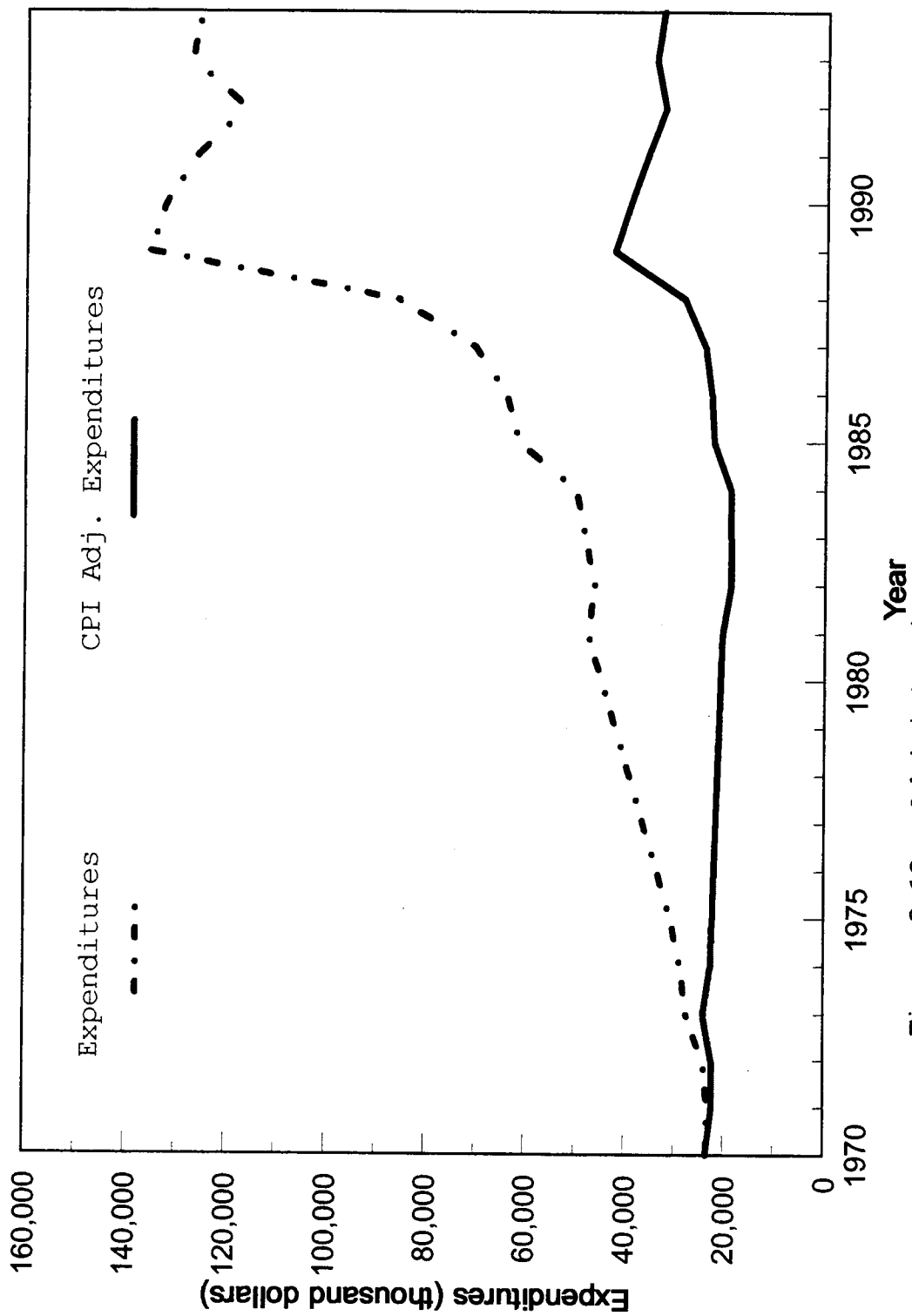


Figure 3.12. Administration, Highway Police and Safety
 Safety on Tennessee Highways
 Source: Highway Statistics 1994. Department of Transportation,
 Federal Highway Administration.

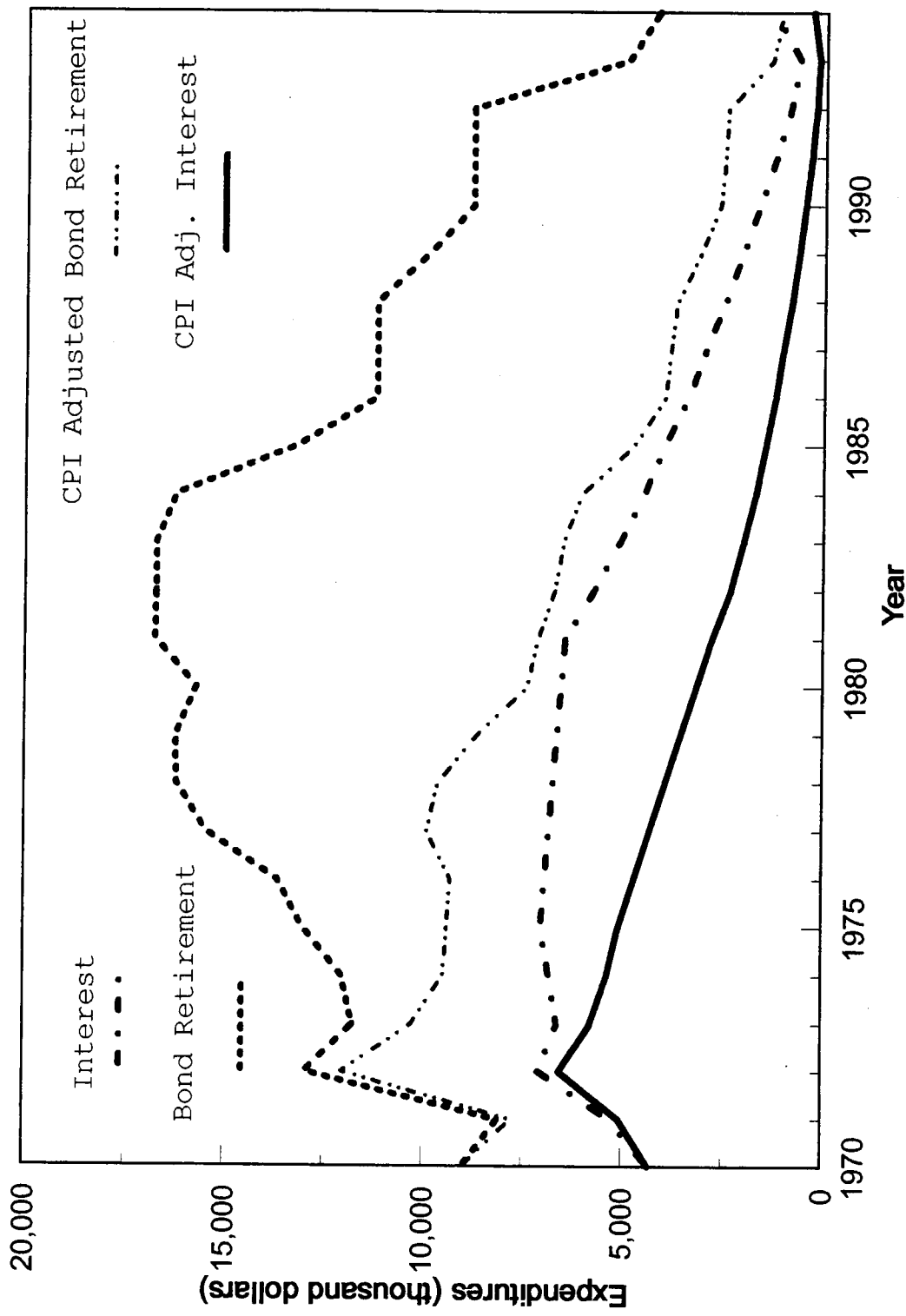


Figure 3.13. Bond Expenditures
on Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

interest, the outstanding bonds dropped from \$133,300,000 in 1970 to \$7,520,000 in 1994. In 1977, there was a total of \$202,690,000 in outstanding bonds. This was a twenty-four year high. The amount of bonds outstanding has decreased since that time. All the bonds that are discussed are backed by highway user revenue.

The State issues grants to local governments for highway improvements. In 1970 these grants totaled \$57,621,000 and in 1994 they totaled \$240,610,000, a three hundred and eighteen percent increase (Figure 3.14). This has been a steady increase throughout the twenty-four year period. However, after the grants are adjusted for inflation, the grants increased by only twelve percent over the twenty-four year period.

The total disbursements by the State of Tennessee in 1994 were \$1,143,734,000 (Figure 3.15). There has been a sixty and one half percent increase in disbursements from 1984 to 1994. After the disbursements are adjusted for inflation, the amount of disbursements has dropped from \$304,502,000 in 1970 to \$299,564,000 in 1994.

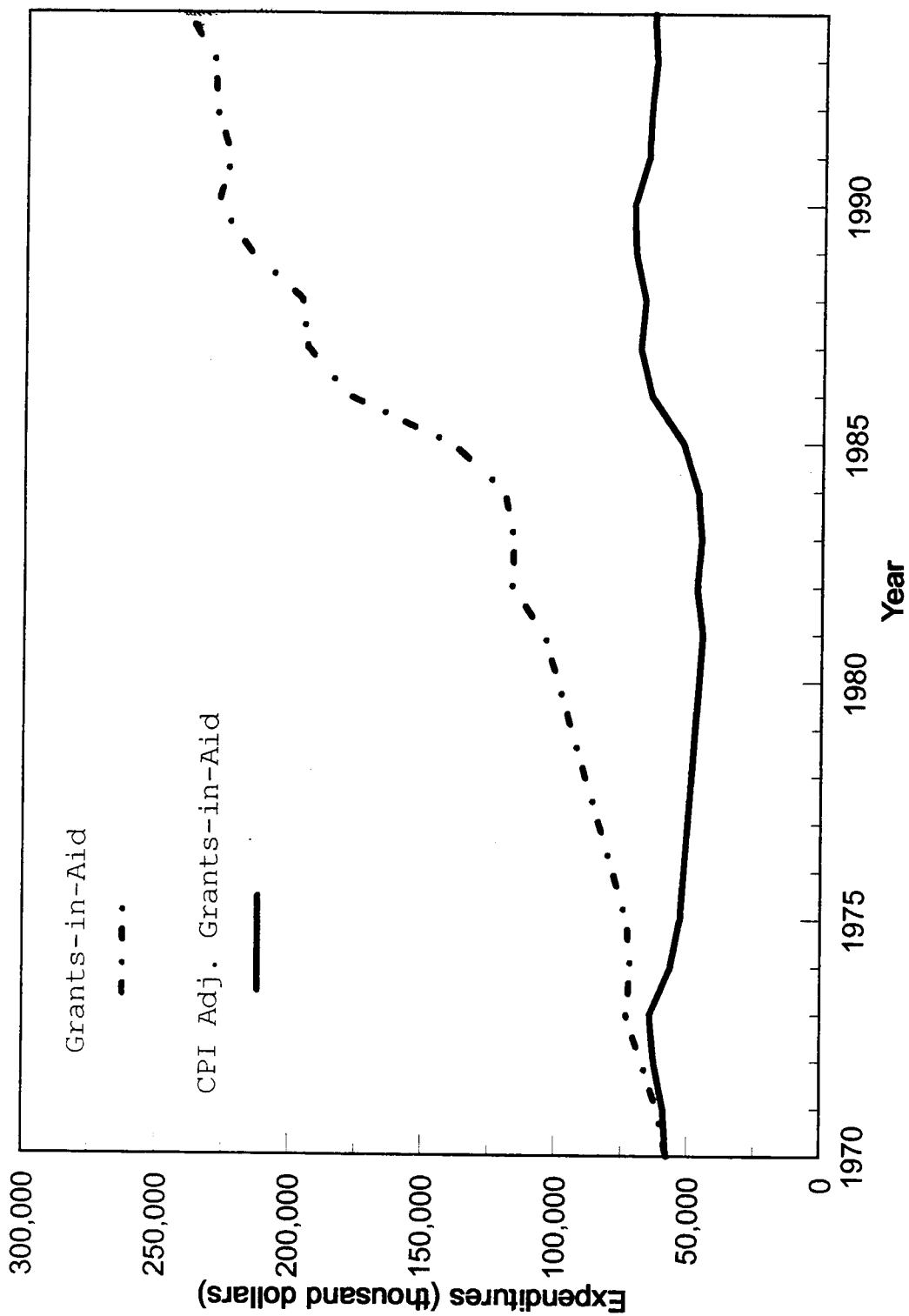


Figure 3.14. Grants-in-Aid to Local Governments
on Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

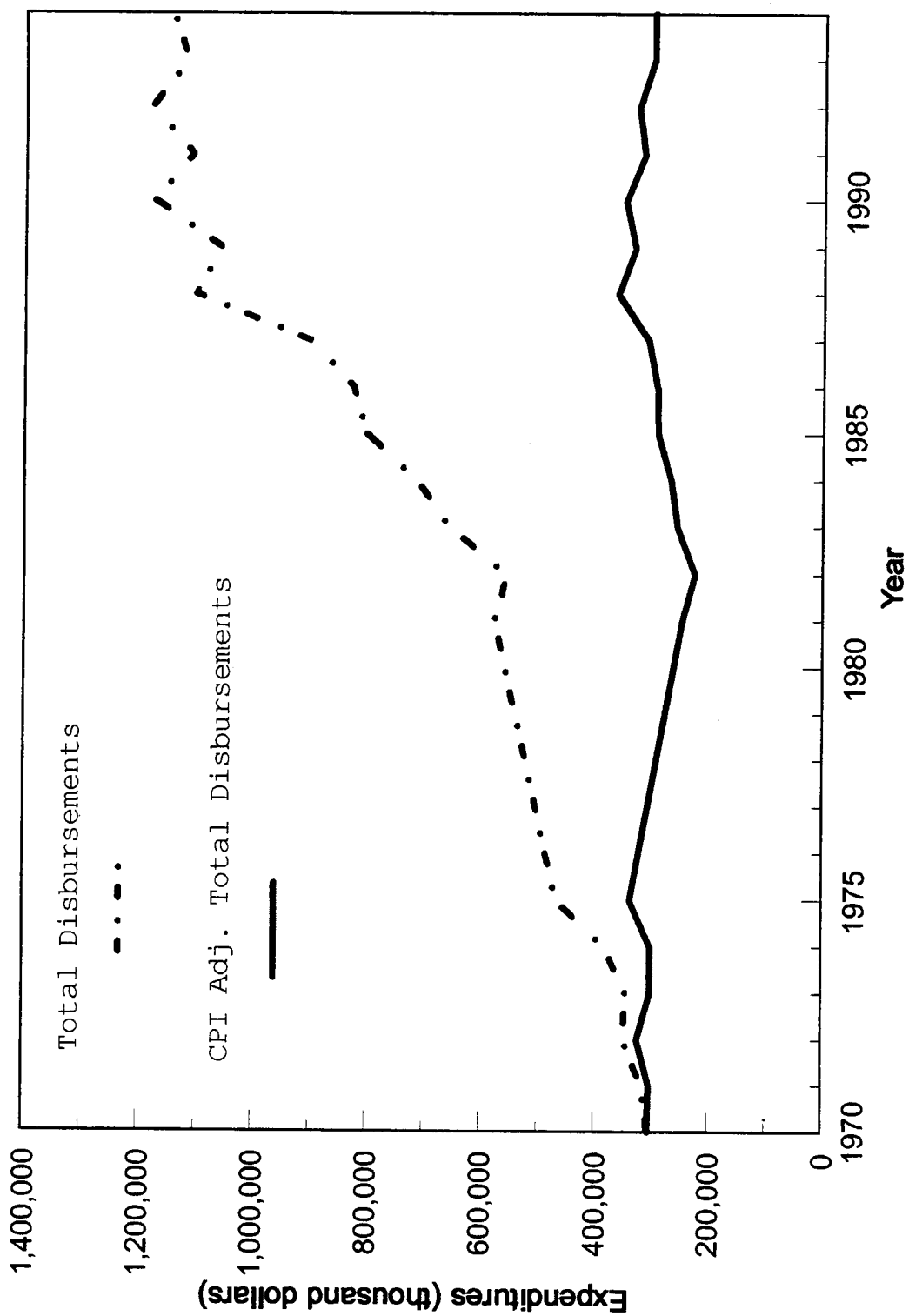


Figure 3.15. Total Disbursements

on Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

The historical disbursements have been constrained by the revenues (Figure 3.16), since the State cannot spend more than it receives. This does not mean all maintenance, capital improvements, and safety measures have been completed. The capital improvements and maintenance needs that are delayed will cost the State more in the future due to the rising costs of construction and additional wear on the highways.

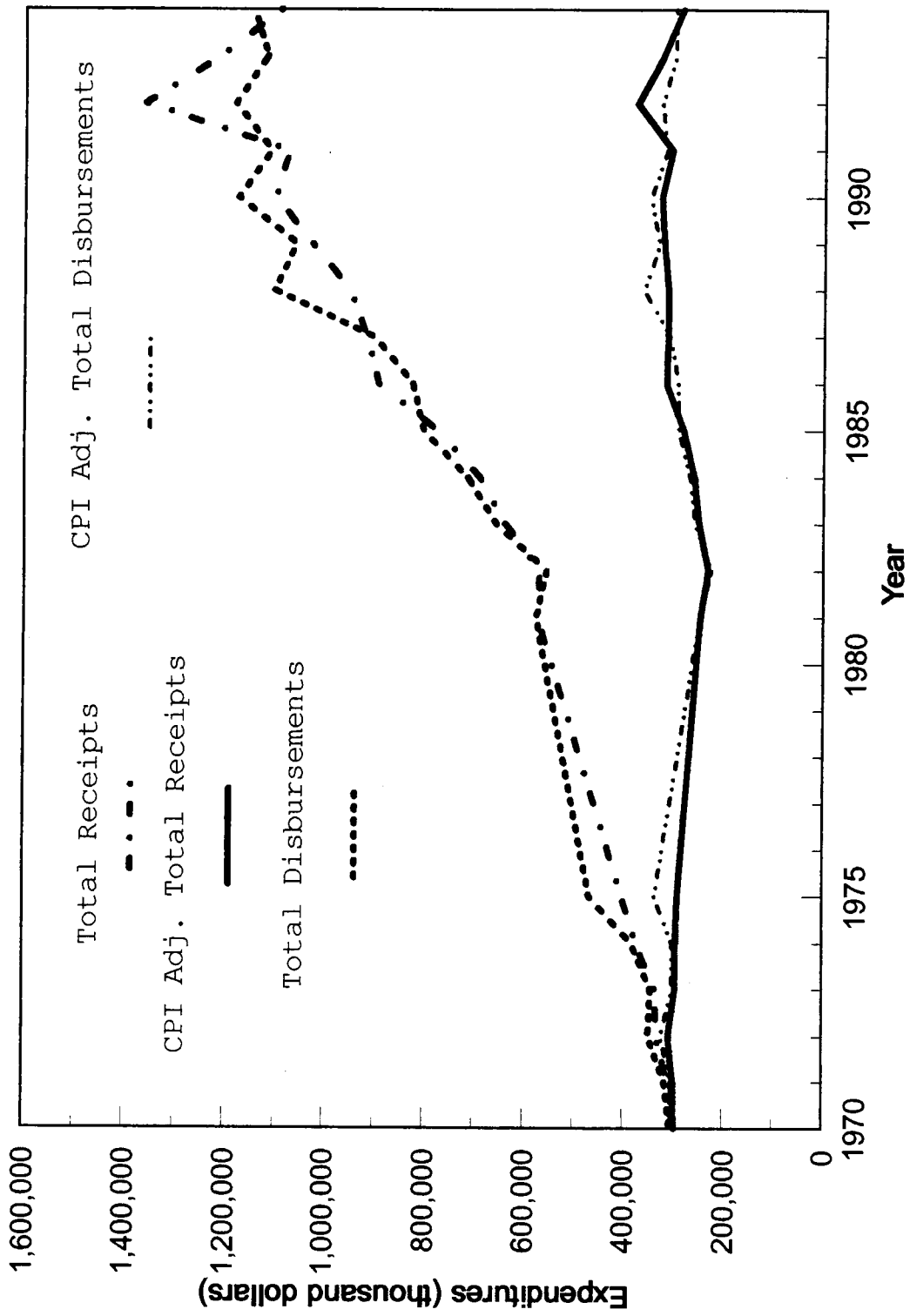


Figure 3.16. Total Receipts & Disbursements

on Tennessee Highways
 Source: Highway Statistics 1994. Department of Transportation,
 Federal Highway Administration.

CHAPTER 4

PROJECTIONS

The State of Tennessee needs to forecast future revenue and expenditures to plan future improvements and maintenance. The State policy makers will also need to determine if the funding is sufficient for the future needs or if they need to increase tax rates. They may also need to look into alternative funding sources.

To project future expenditures and revenues, an inflation rate needs to be assumed. An assumed inflation rate of between two percent and four percent is used for this project. This seems to be a reasonable assumption due to other states, such as Oregon (5) and Ohio (17) assuming three and seven tenths percent and four percent respectively.

Forecasted Revenue

The funds generated by the State of Tennessee, the Local Governments, and the Federal Government that are used for state highways are forecasted to the year 2020. There

are at least three scenarios included with each revenue source. The three scenarios are a two percent growth rate, four percent growth rate, and a twenty-four year trend. The two percent and four percent 1995 revenues were determined by adding two or four percent to the 1994 trend forecast. With an inflation prediction of three to four percent, it can be assumed that revenue ultimately parallels inflation at four percent or lags inflation at two percent. The Federal Government and fuel tax receipts have four forecasts, the Federal Government includes a ten year trend and a seven year trend is included with the fuel tax revenues.

The fuel tax revenues are forecasted using the above mentioned scenarios. Using the existing twenty-four year trend, the forecasted revenue for the year 2020 is \$1,058,135,000 (Figure 4.1). The fuel tax revenue has not grown at the same pace the last seven years as the last twenty-four years. Due to this, a seven year trend was forecasted as well, in case the trend continues. The lowest forecasted revenue is produced when the existing seven year trend (1987 to 1994) is assumed; this is only a

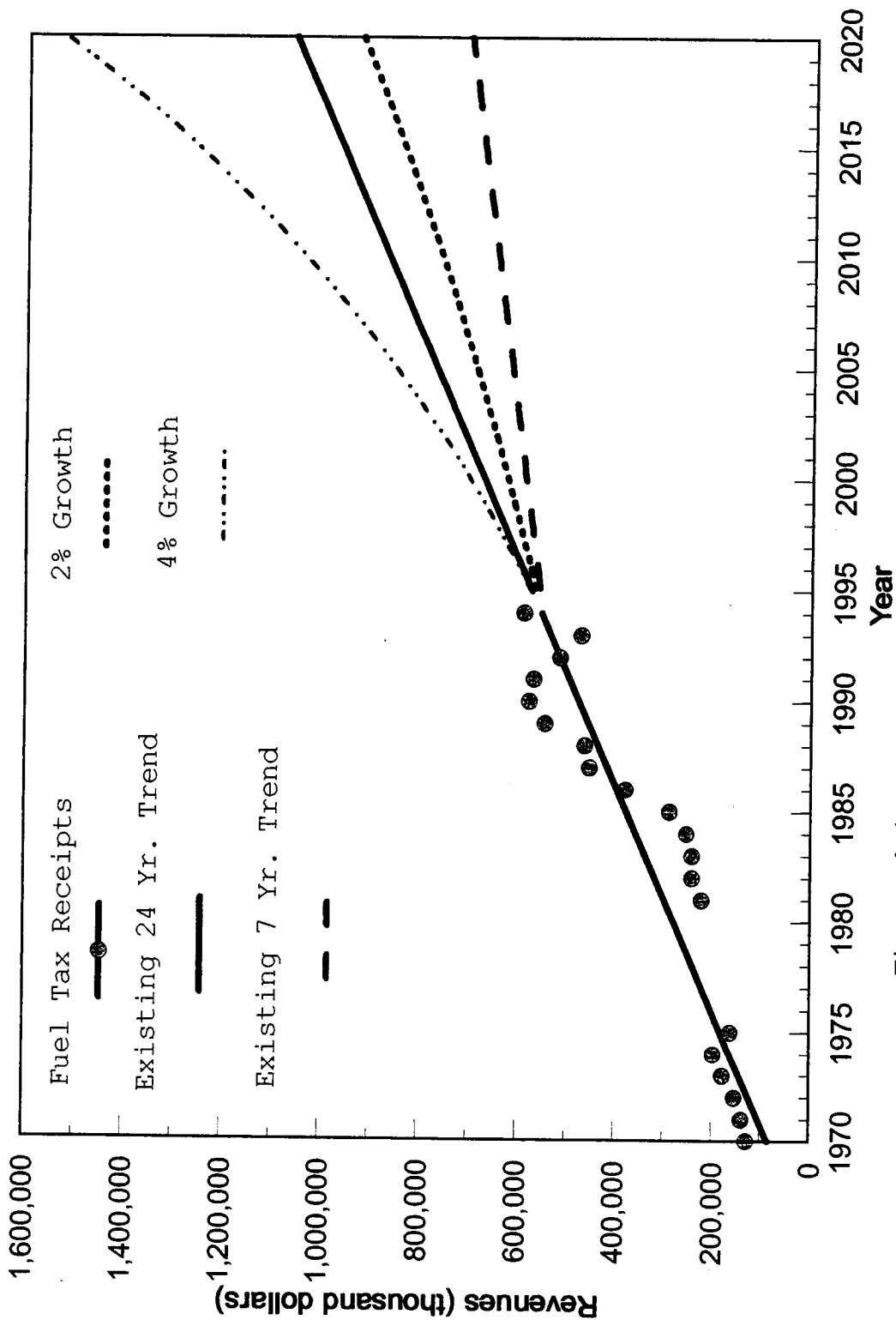


Figure 4.1. Forecasted Fuel Tax Receipts

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

\$148,227,000 increase during the twenty-five years from 1995 to 2020. The highest forecasted revenue was \$1,528,180,000. This was produced using the four percent growth rate assumption.

Fuel tax revenues were also projected assuming different tax rates. Tax rates of twenty-five, forty, fifty-five and sixty-five cents per gallon were assumed. When a sixty-five cents per gallon tax rate is assumed, a tax revenue of \$2,483,427,000 is produced (Table 4.1). The projected revenue is \$1,528,263,000 when a forty cents per gallon tax rate is assumed. This is slightly higher than the projections stated in the previous paragraph.

The lowest amount of forecasted revenue from vehicle registration is \$273,140,000 in 2020, which is determined by a growth rate assumption of two percent (Figure 4.2), and the four percent growth rate assumption produced the highest 2020 forecasted revenue of \$452,531,000. This is a \$179,391,000 difference between lowest and highest revenue forecasts. The difference between the existing trend and the two percent growth rate is only \$8,686,000.

Table 4.1
Forecasted Tax Revenue for Different Tax Rates
(thousands)

Year	Fuel Use*	Tax Rate Per Gallon	Tax Revenue
2010	3,900,000	25	955,164
2010	3,900,000	40	1,528,263
2010	3,900,000	55	2,101,361
2010	3,900,000	65	2,483,427

*The fuel use projection was taken from the projections in source 16.

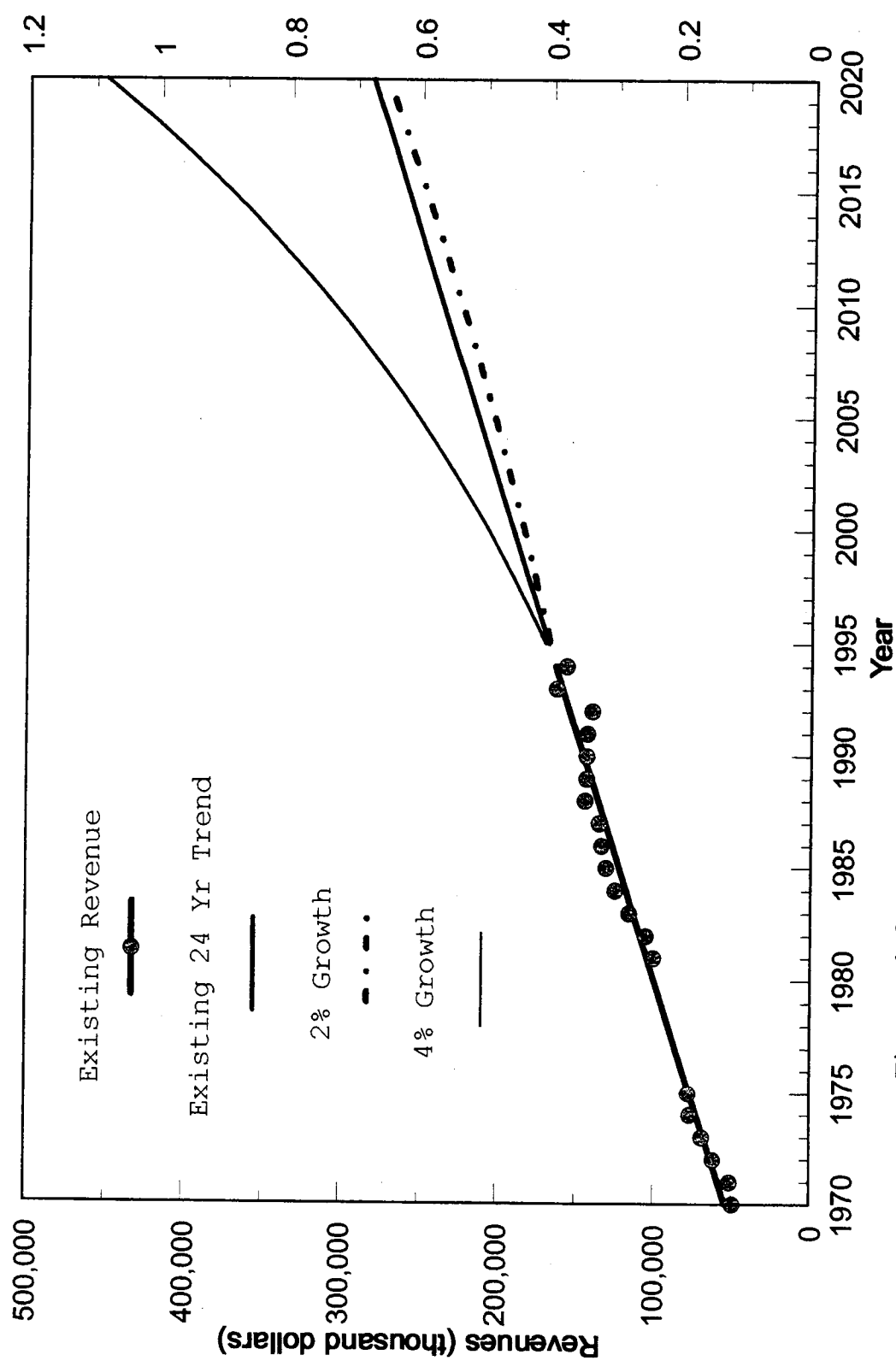


Figure 4.2. Forecasted Vehicle Registration Revenue
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

The toll revenues only had seven years to develop a trend line. The existing trend produced the highest revenue projection of \$214,000 in 2020 (Figure 4.3). The two percent growth rate produced the lowest forecast of \$113,000.

The two percent growth rate assumption for other state imposts and the General Fund revenue produced the lowest forecasted revenue and had a 2020 forecasted revenue of \$252,014,000 (Figure 4.4). The four percent growth rate produced the highest revenue in the year 2020 of \$417,530,000.

The existing trend for miscellaneous revenue produced a 2020 revenue of \$15,450,000 (Figure 4.5), a difference of only \$1,332,000 from the revenue estimate with a two percent growth rate and a difference of \$7,941,000 from the four percent growth rate. Extrapolation of the existing trend indicates that the revenue will grow at a much slower rate than the four percent growth rate assumption.

The local government forecasted revenue using the existing trend is \$25,588,00 (Figure 4.6). The two percent growth rate assumption produced the lowest forecast of

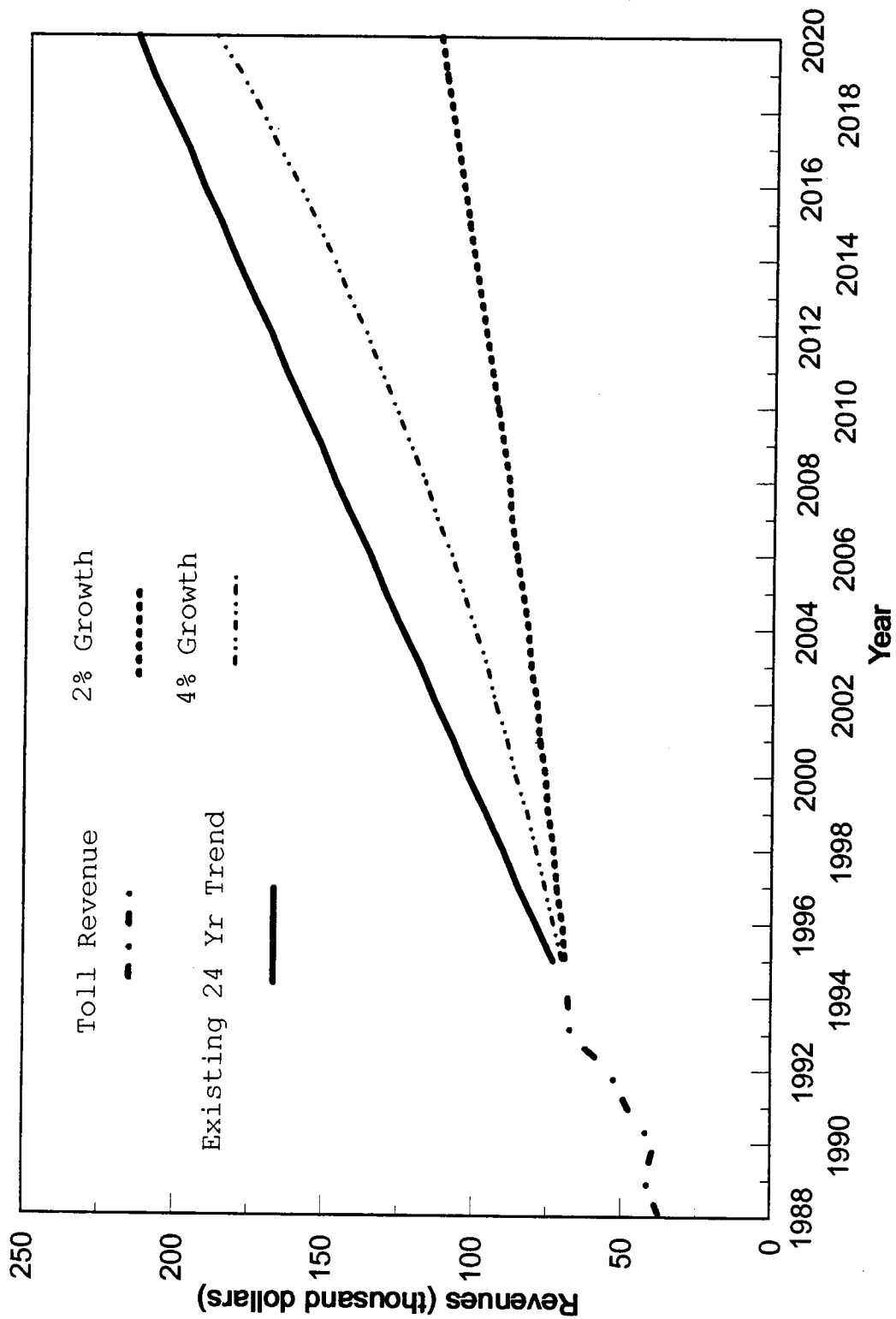


Figure 4.3. Forecasted Toll Revenues

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

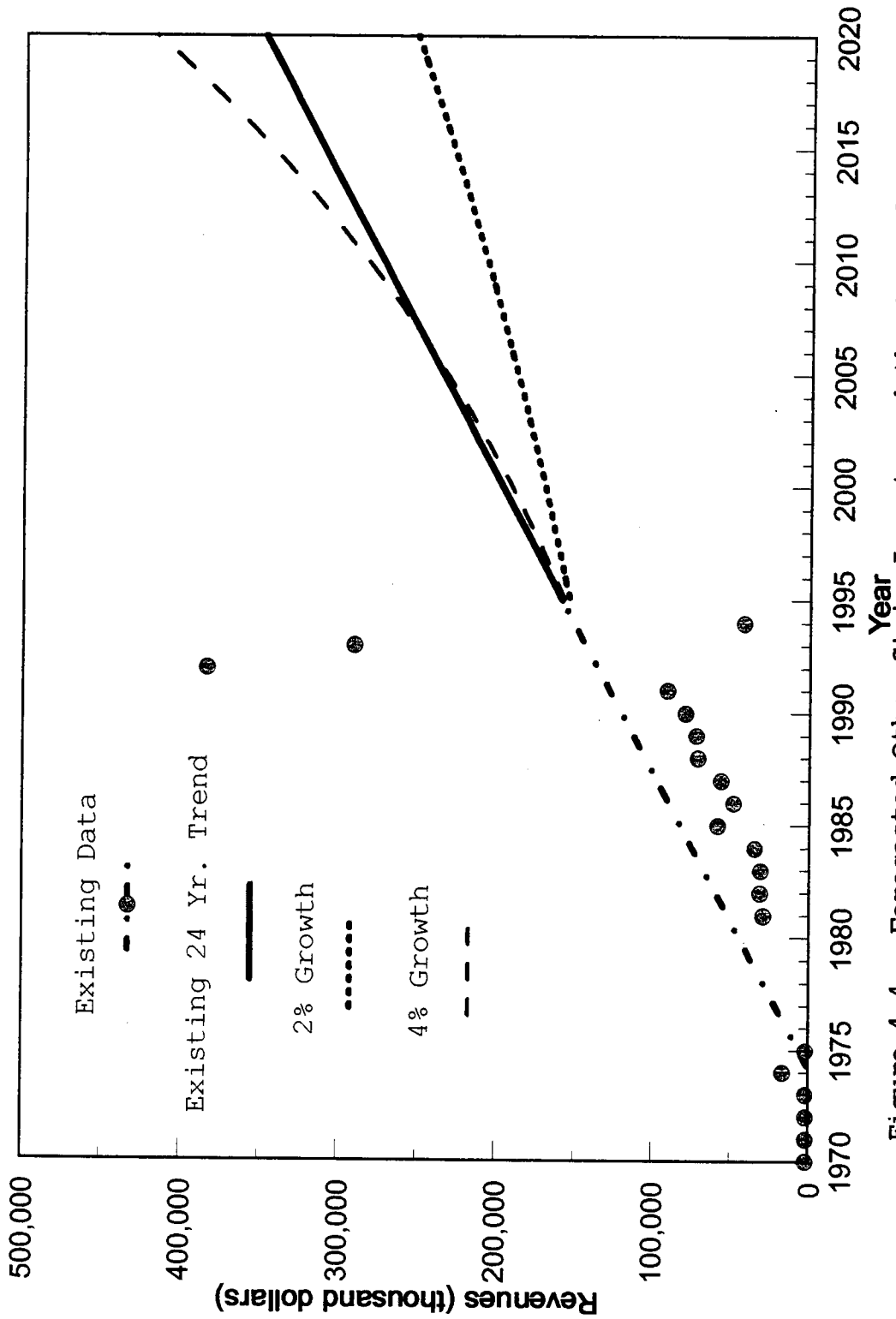


Figure 4.4. Forecasted Other State Imposts and the General Fund
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

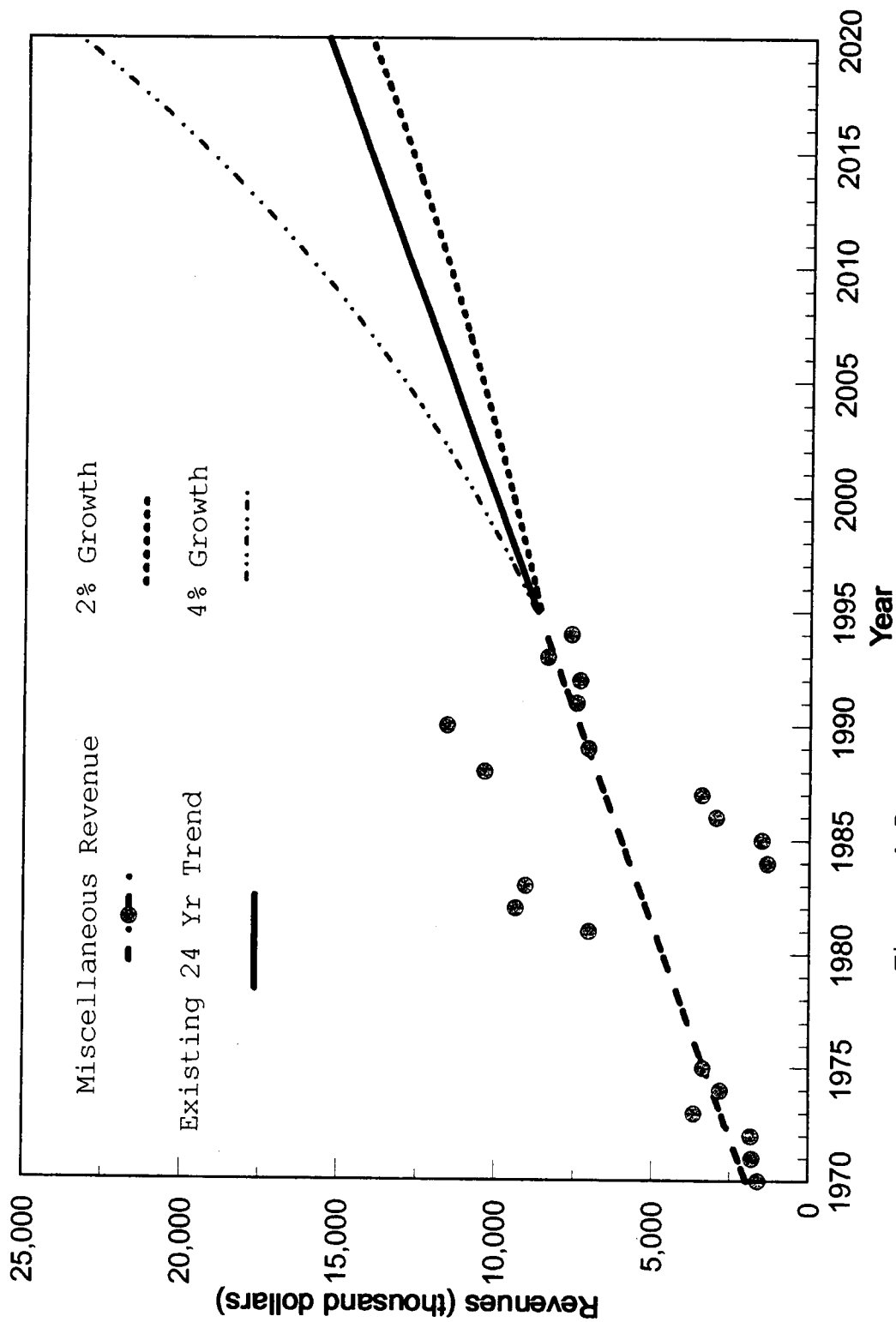


Figure 4.5. Forecasted Miscellaneous Revenue
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

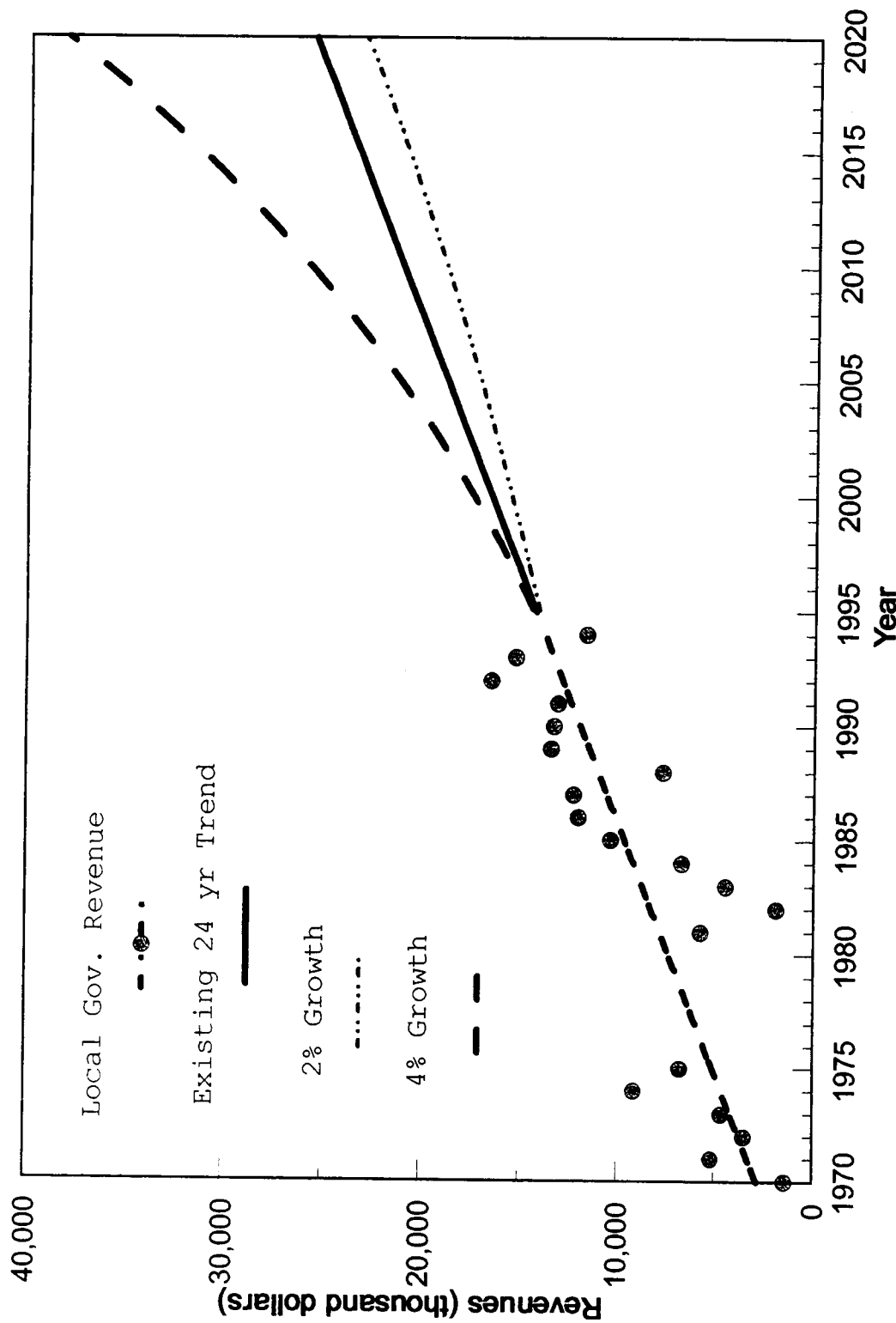


Figure 4.6. Forecasted Funds from the Local Government
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

revenue. Reviewing the last nine years of data, it becomes apparent that the local revenue rate of growth is beginning to plateau. This would make the four percent growth rate too high.

The Federal revenue forecast was completed using a twenty-four year trend (1970 to 1994) and ten year trend (1984 to 1994). A two percent growth rate and a four percent growth rate were also applied. The ten years were forecasted because of the change for the previous long range trend. The Federal Government has stabilized the funding for the ten years between 1984 to 1994. The four percent growth rate provided the highest forecast of \$545,412,000 (Figure 4.7). The existing ten year trend produced the lowest revenue forecast of \$274,377,000. The ten year trend produced a very flat forecast with only a \$20,000 difference between the 1995 figure and the 2020 figure. The existing twenty-four year trend and the two percent growth rate produced approximately the same forecasts for the year 2020. While future Federal programs are uncertain and part of reauthorization discussion for ISTEA, other States have used modest increases in their revenue forecasts of one to two percent increases.

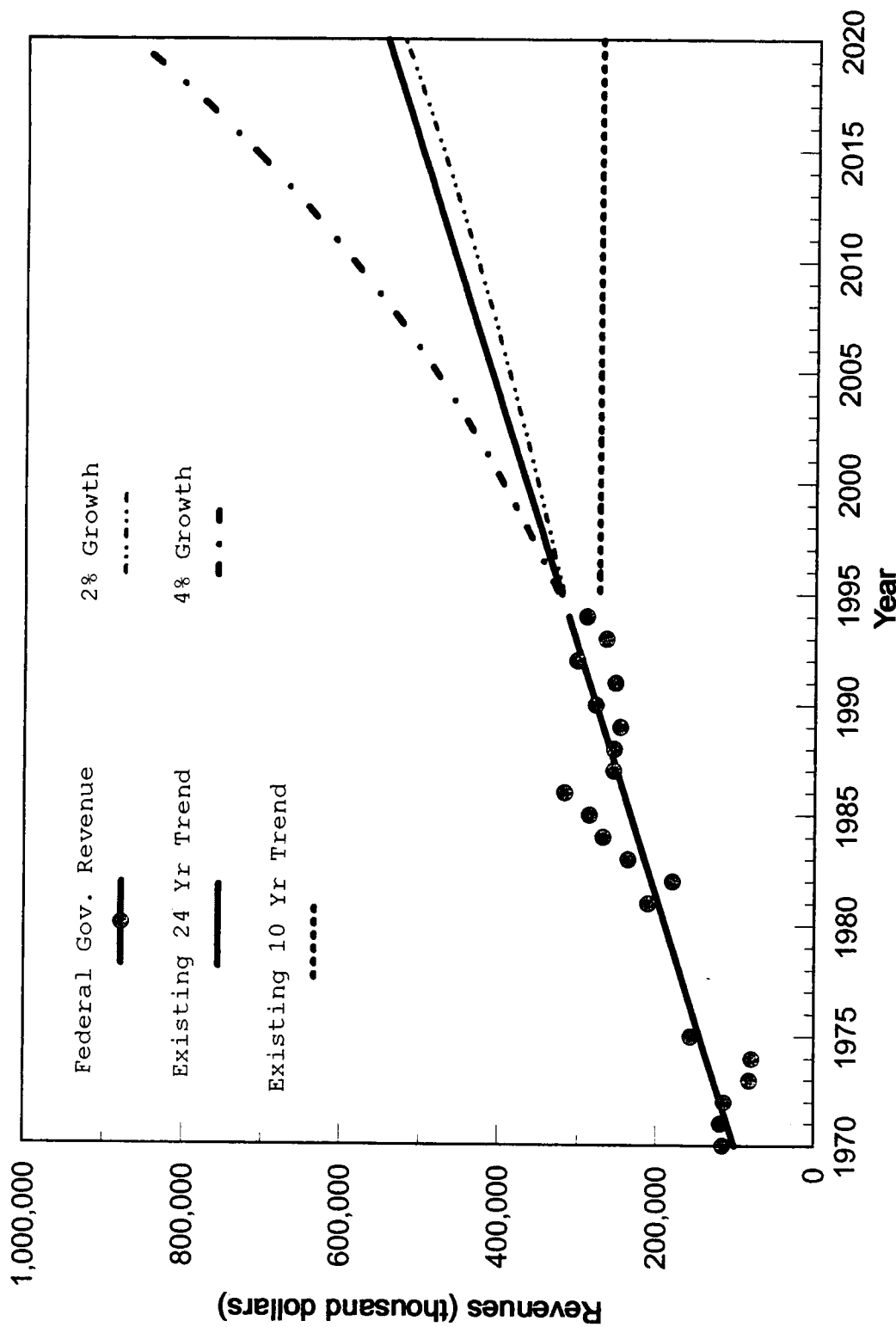


Figure 4.7. Forecasted Funds From the Federal Government
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

The total State produced forecasted revenue for highways for a two percent growth rate, a four percent growth rate and the existing twenty-four year trend is shown in Figure 4.8. The four percent growth assumption proved to be the most aggressive revenue forecast with a 2020 forecast of \$3,328,638,000.

Forecasted Expenditures

The expenditures were forecasted in the same manner as the State produced revenues. The existing trend was forecasted using linear regression for the period from 1970 to 1994. Also, both a two percent and a four percent growth rate were assumed to reflect inflation. Bond issues were viewed as unique financing activities and were not included in the forecasts. At the present rate of redemption, all bonds that are backed by highway user revenue will be paid off by 1996.

Tennessee has several management systems in place due to section 1034 of ISTEA. The act required Tennessee to establish a pavement management system and a bridge management system. "A pavement system (PMS) is a systematic process that provides, analyzes and summarizes

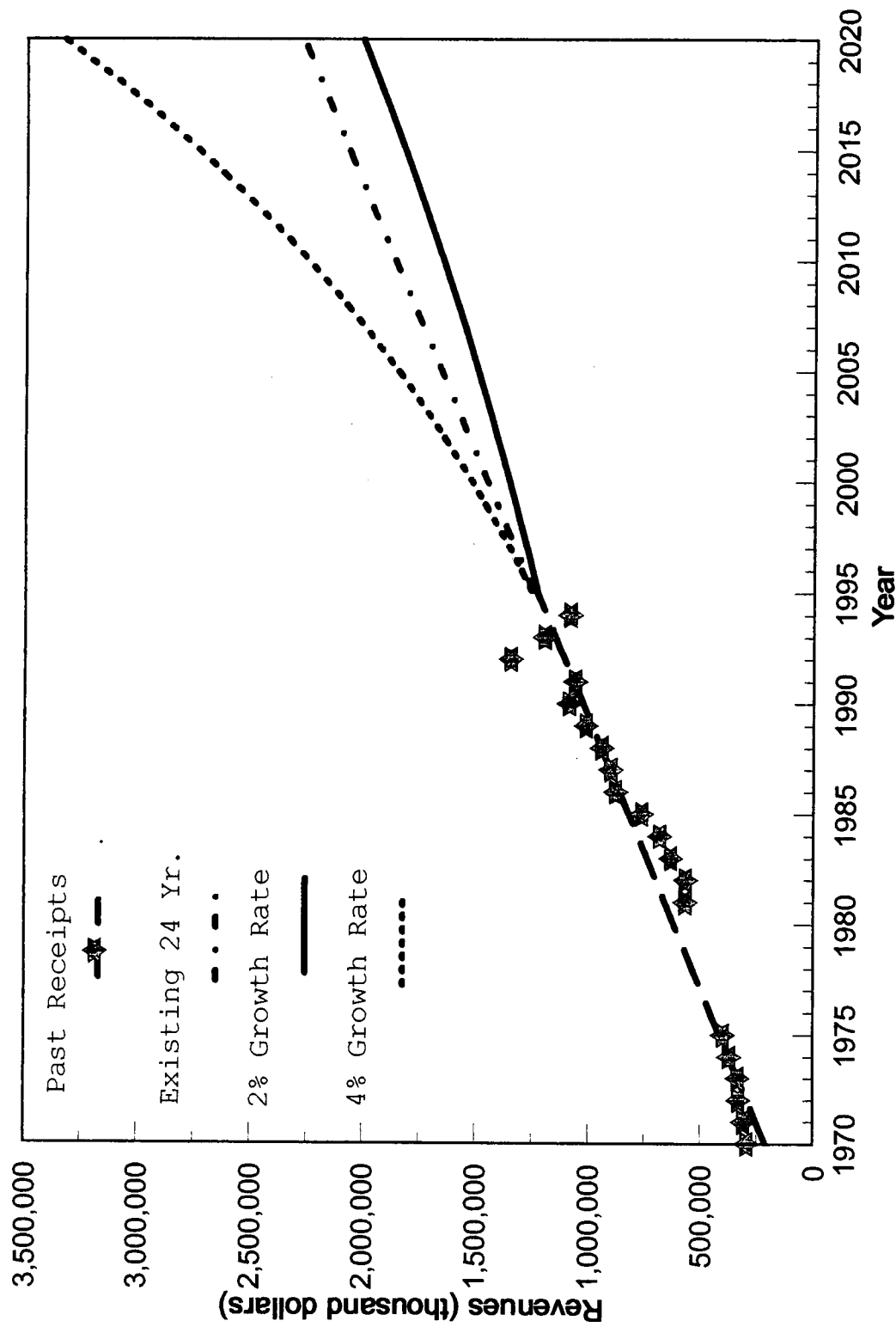


Figure 4.8. Existing and Forecasted Total Revenues

For Tennessee Highways
 Source: Highway Statistics 1994. Department of Transportation,
 Federal Highway Administration

pavement information for use in selecting and implementing cost effective pavement construction, rehabilitation and maintenance programs" (16). The State began to establish a PMS in 1993. Figure 4.9 shows the highway surface conditions for state highways and interstate highways. A bridge management system is a program support tool which should "provide the means by which alternative policies and programs may be efficiently considered" (16) for bridges. In 1993 there were 2,080 deficient bridges on state highways out of a total of 7,080 bridges (16). The number of deficient bridges and pavement illustrate the continual need for maintenance. In reality a more detailed analysis of needs would need to be conducted and the pavement, bridges, and congestion management systems would need to be analyzed for Tennessee.

The existing maintenance expenditure trend produced a 2020 forecast of \$416,081,000 (Figure 4.10). The two percent growth rate assumption provided the lowest 2020 forecast of maintenance expenditures at \$340,035,000. The four percent forecasted growth rate provided an expenditure

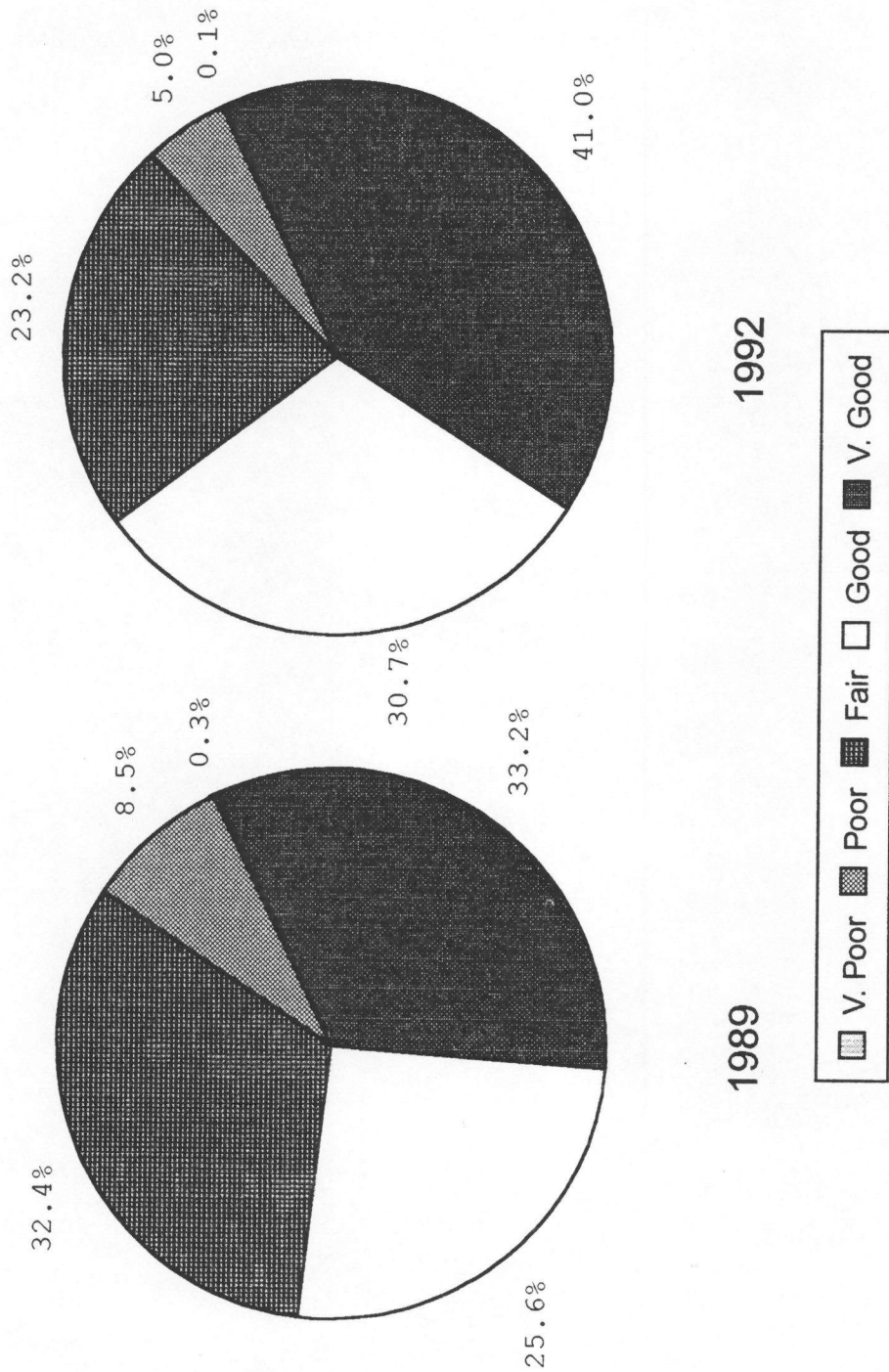


Figure 4.9. State and Interstate Highway Surface Conditions

Source: State of Tennessee, State Transportation Plan. (1994, September).
Department of Transportation

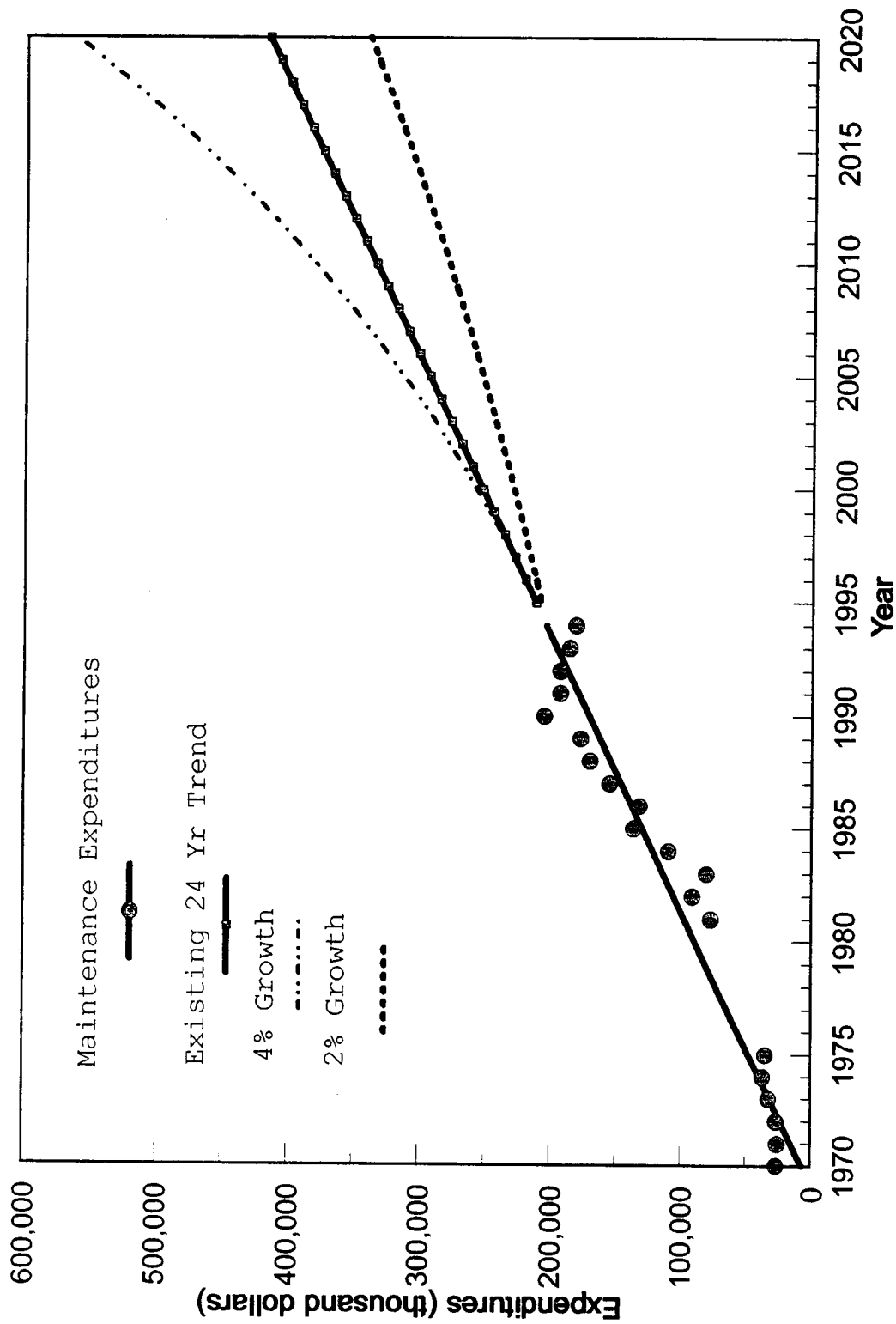


Figure 4.10. Forecasted Maintenance Expenditures
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

in 2020 of \$563,361,000, the highest expenditure forecast for maintenance.

The forecasted capital outlays are shown in Figure 4.11. Again, the two percent growth rate provided the lowest forecasted expenditures for Capital Outlays. The existing trend forecasted a 2020 expenditure of \$1,121,418,000 and the four percent growth rate provided the highest expenditure each year and a forecasted expenditure of \$1,719,839,000 in 2020.

The forecasted expenditures on Administration, Highway Police, and Safety on Tennessee Highways are shown on Figure 4.12. Using the existing trend, the forecasted expenditure for 2020 is \$248,807,000. The four percent growth projection had the highest forecasted expenditure of \$340,833,000 and the two percent growth projection forecasted the lowest expenditure of \$205,721,000.

The Grants-in-Aid to local governments are forecasted in Figure 4.13. The lowest forecasted aid to the local governments in the year 2020 was \$398,703,000. This forecast was projected using the two percent growth rate

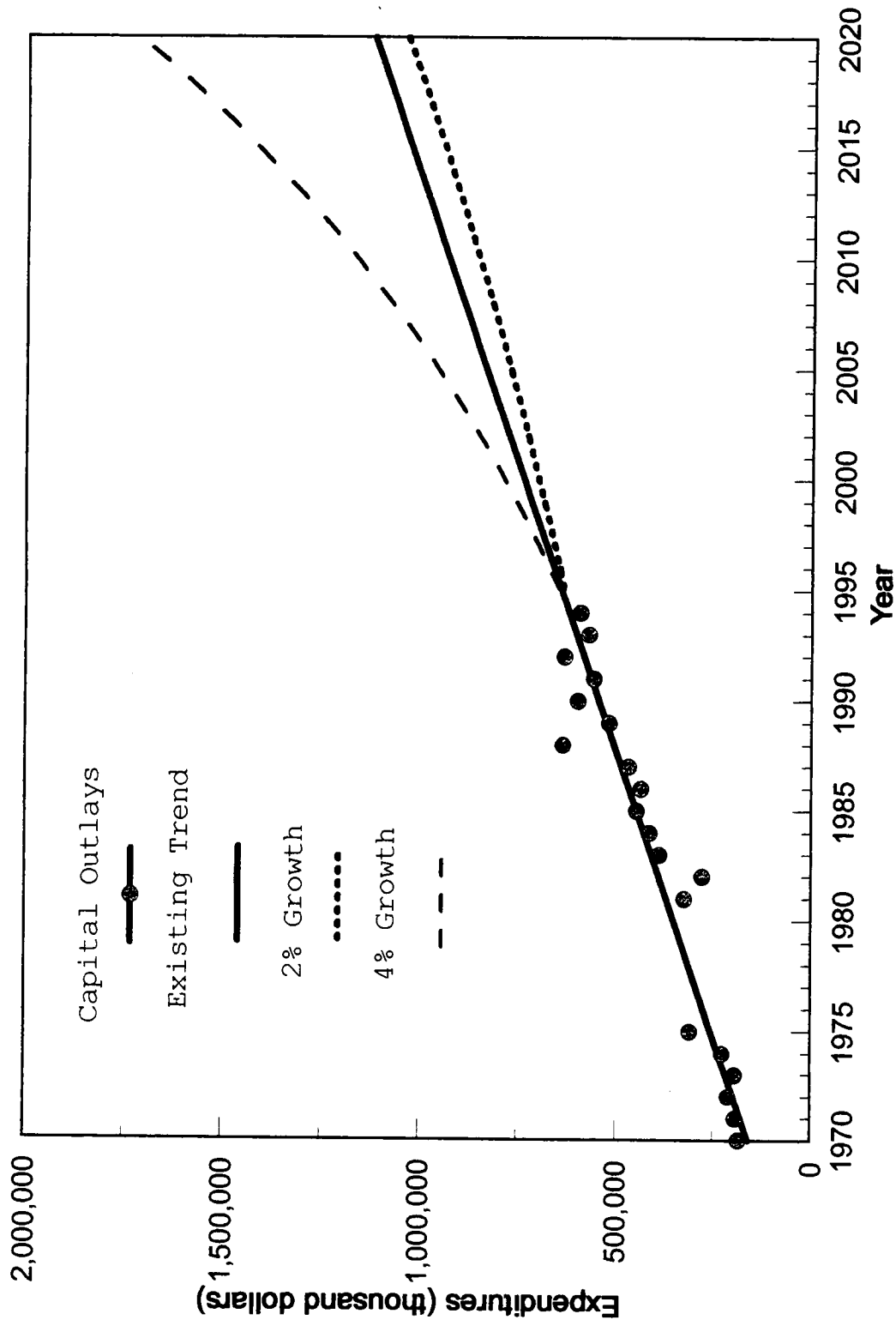


Figure 4.11. Forecasted Capital Outlays

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

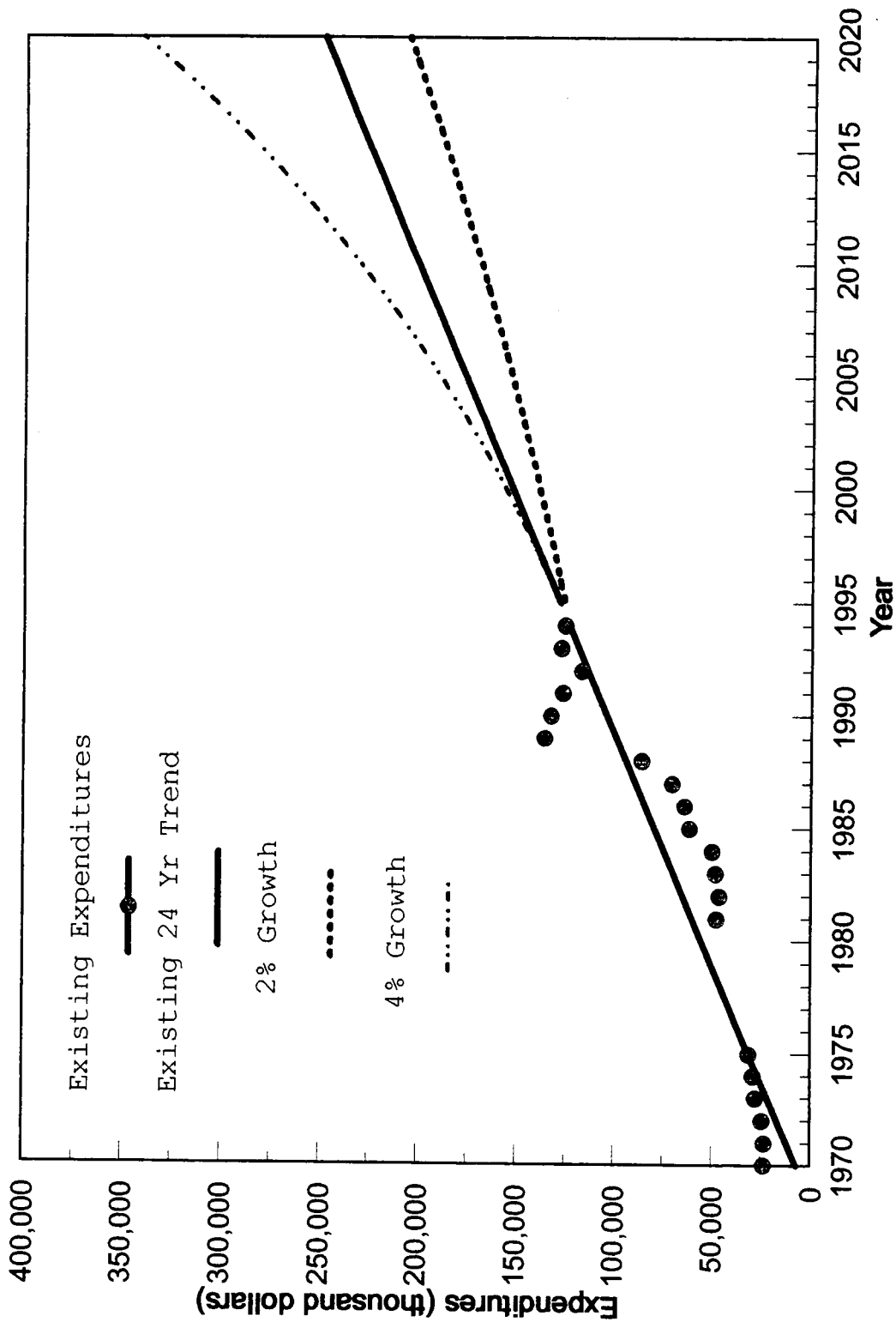


Figure 4.12. Forecasted Expenditures on Admin., Highway Police and Safety For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation, Federal Highway Administration.

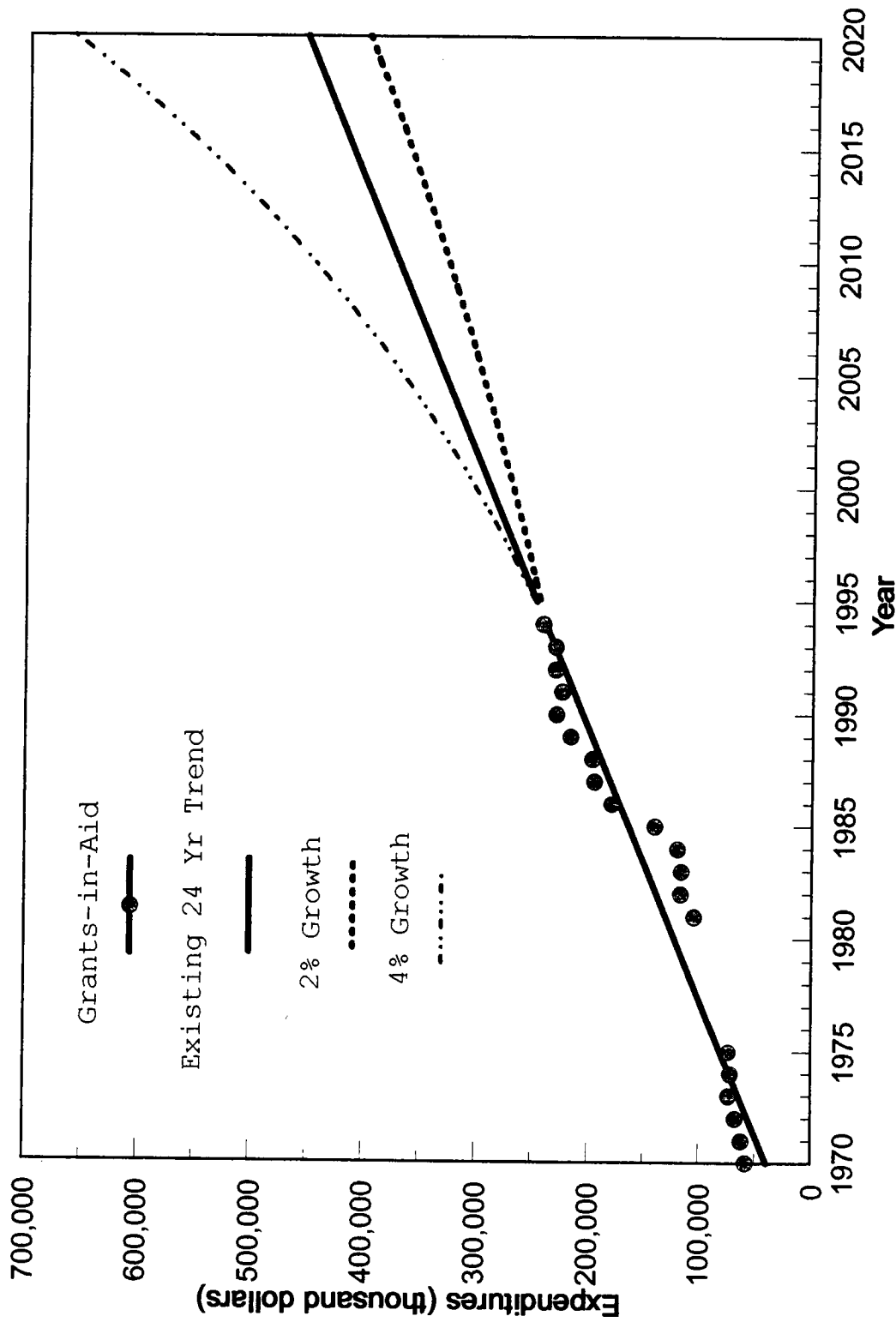


Figure 4.13. Forecasted Grants-in-Aid to Local Governments
For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration.

assumption. The four percent growth rate forecast provided the highest forecast of \$660,560,000.

The total forecasted disbursements for Tennessee Highways ranged from \$1,982,527,000 to \$3,284,592,000 (Figure 4.14). This is a sixty-six percent difference between the lowest and highest expenditure forecasts. The existing trend forecast fell between the lowest and highest forecasts at \$2,240,385,000. This is thirteen percent higher than the lowest forecasted expenditure. In 1994, the maintenance made up fifteen and eight tenths percent of the total disbursements. With the assumption of a four percent growth rate, maintenance would make up seventeen percent of the disbursements (Figure 4.15). The capital outlays continue to make up the highest percentage of disbursements with fifty-two percent in 2020. Grants-in-aid to local governments would make up approximately twenty percent of the disbursements.

Ultimately, the revenues and expenditures must be computed to determine if future revenue will be able to support historical expenditure trends. Alternate scenarios

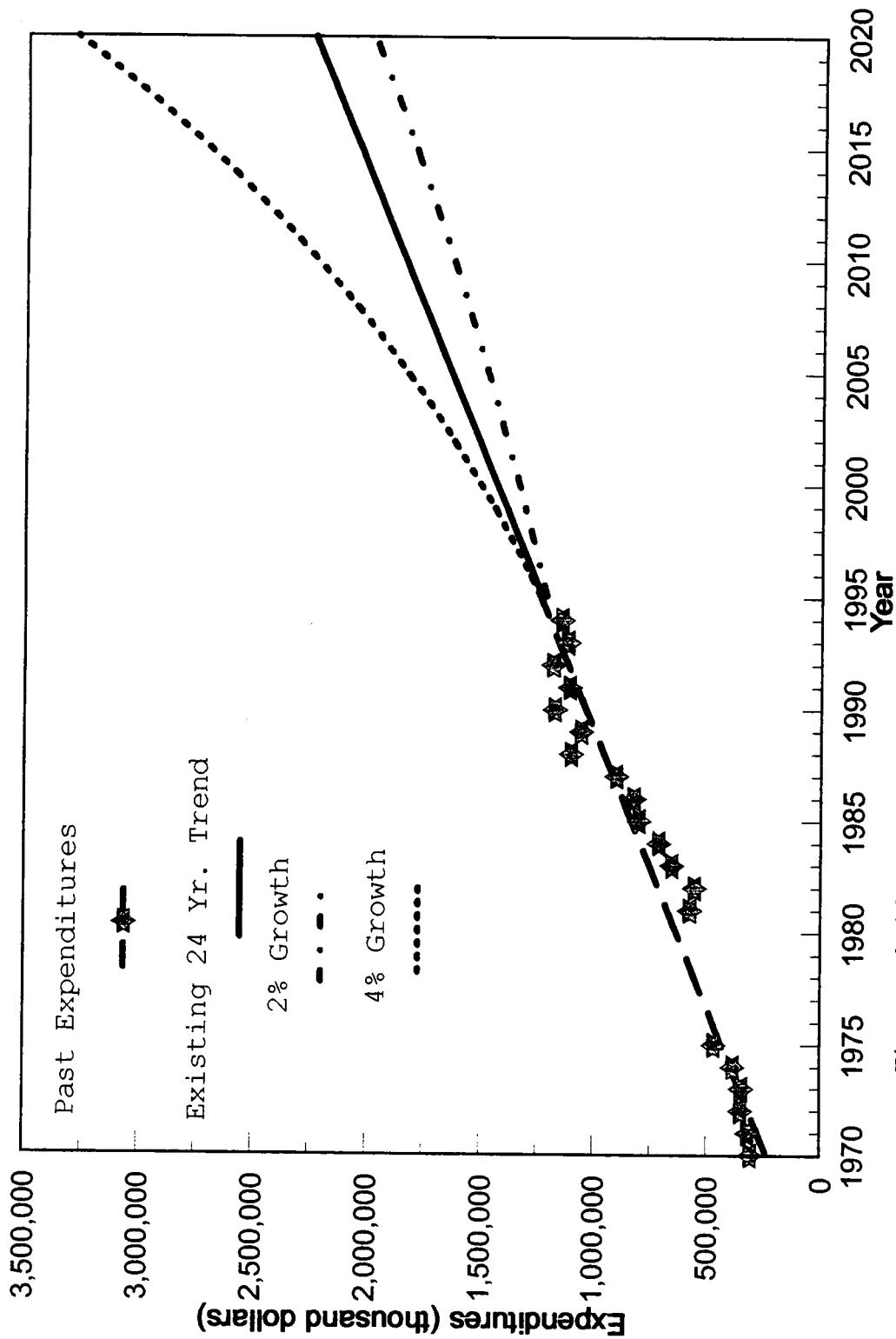


Figure 4.14. Past and Forecasted Total Expenditures

For Tennessee Highways

Source: Highway Statistics 1994. Department of Transportation,
Federal Highway Administration

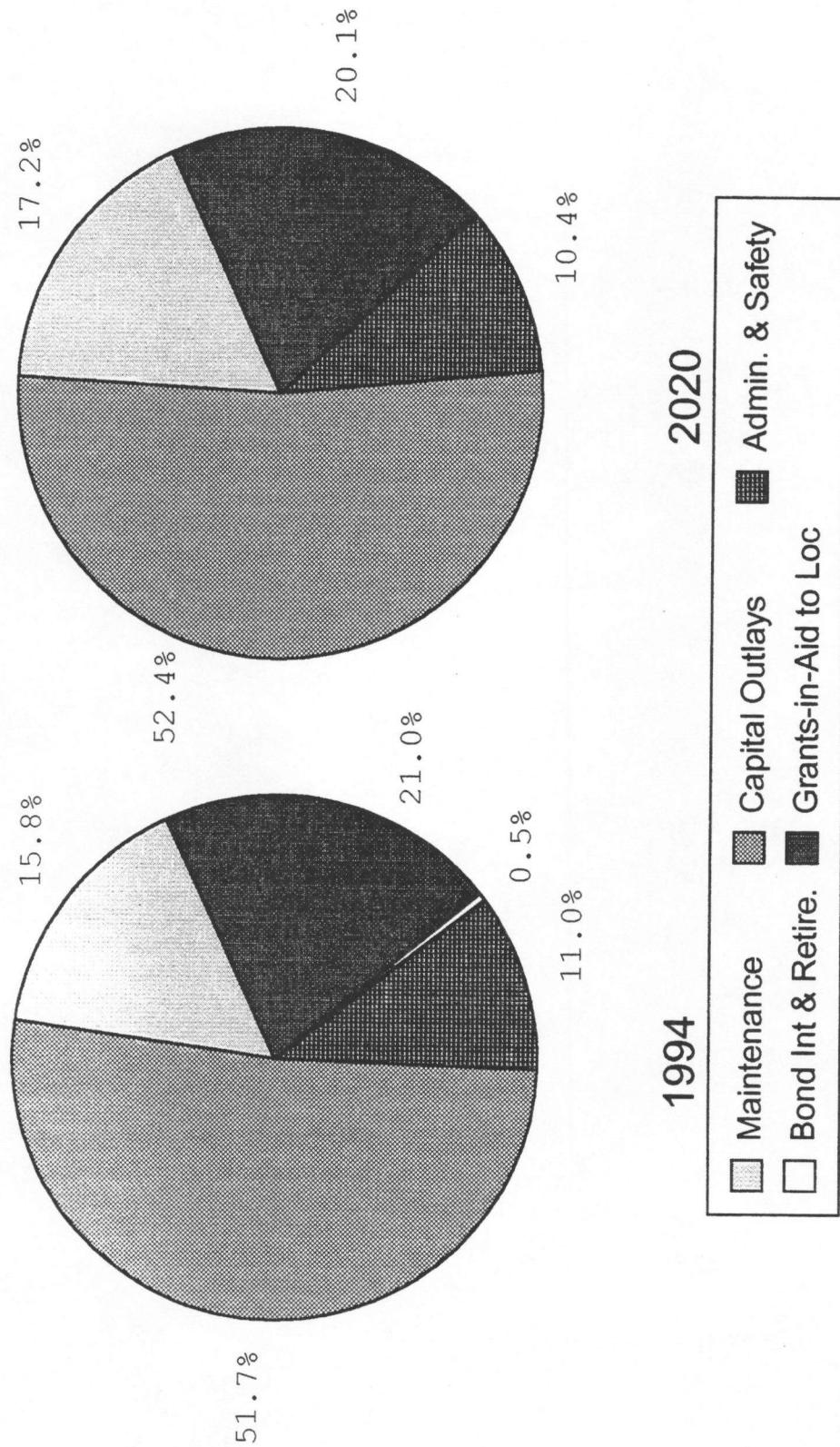


Figure 4.15. Percentage of Highway Expenditures

Source: State of Tennessee, State Transportation Plan. (1994, September).
Department of Transportation

of revenue and expenses will be discussed in the next chapter.

CHAPTER 5

RESULTS

The funds available for construction and maintenance on Tennessee's highways will probably be constrained by the revenue available which will reflect issues such as introduction of alternative fuel vehicles and an increase in fuel efficiency. Alternative fueled vehicles are scheduled to be a part of everyday life early in the next century. Fuel efficiency is also improving for the motor vehicle fleet. This will cut the dependence on motor fuel, especially gasoline. This will decrease the amount of revenue available for the highway improvement and maintenance. The increase in vehicle miles traveled will help to offset some of the decrease in fuel receipts. However, the Federal-aid is also beginning to plateau and the State can not depend on substantial growth from the Federal Grants in Aid program. Expenditures will probably follow the existing trend or grow more quickly due to inflation and the amount of new highways to be built.

When the revenues and expenditures are forecasted using the existing data and trends, there will not be a

problem in financing the highways in the future (Figure 5.1). The revenues always exceed or match the expenditures with this assumption, which is logical since the past expenditures have been constrained by the revenue.

However, expenditures and revenues do not have to grow at the same rate. The revenues do not necessarily grow at the same rate as inflation, while the expenditures are more responsive to inflation. The expenditures could grow by four percent a year while the revenues continue to follow the existing trends (Figure 5.2). This would leave a revenue shortfall of \$1,019,444,000. Another possibility is that the expenditures could grow at four percent per year while the revenues grow at only two percent per year. This scenario would leave a shortfall of \$1,275,480,000 (Figure 5.3).

The Federal-aid funding has not grown very quickly during the past ten years. The Federal funding could follow the ten year trend while the rest of the revenues grow by two percent a year. If the expenditures grow by four percent a year, there would be a shortfall of

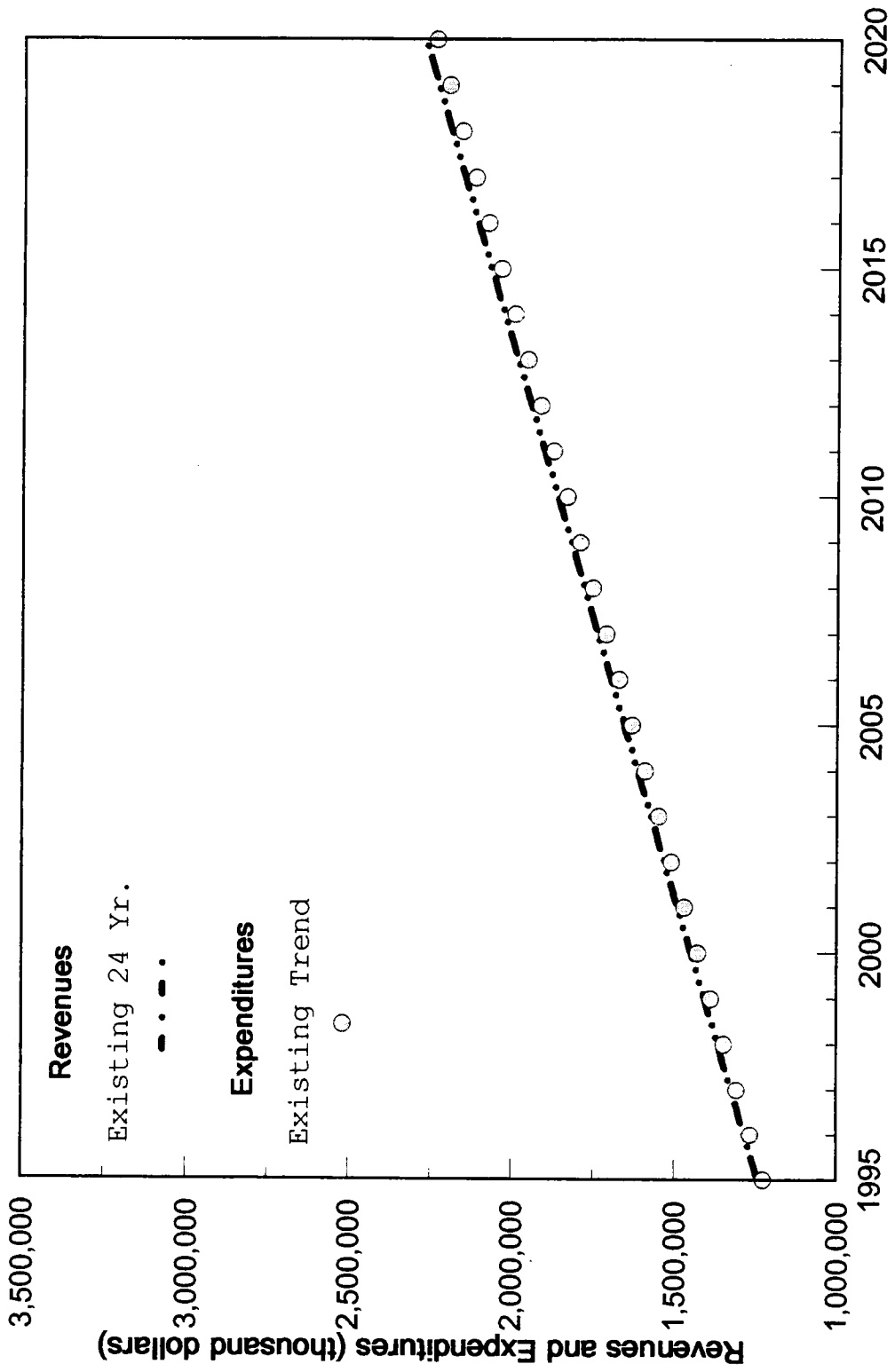


Figure 5.1. Forecasted Revenues & Expenditures
(When Revenues and Expenditures Grow With Existing Trend)
 For Tennessee Highways

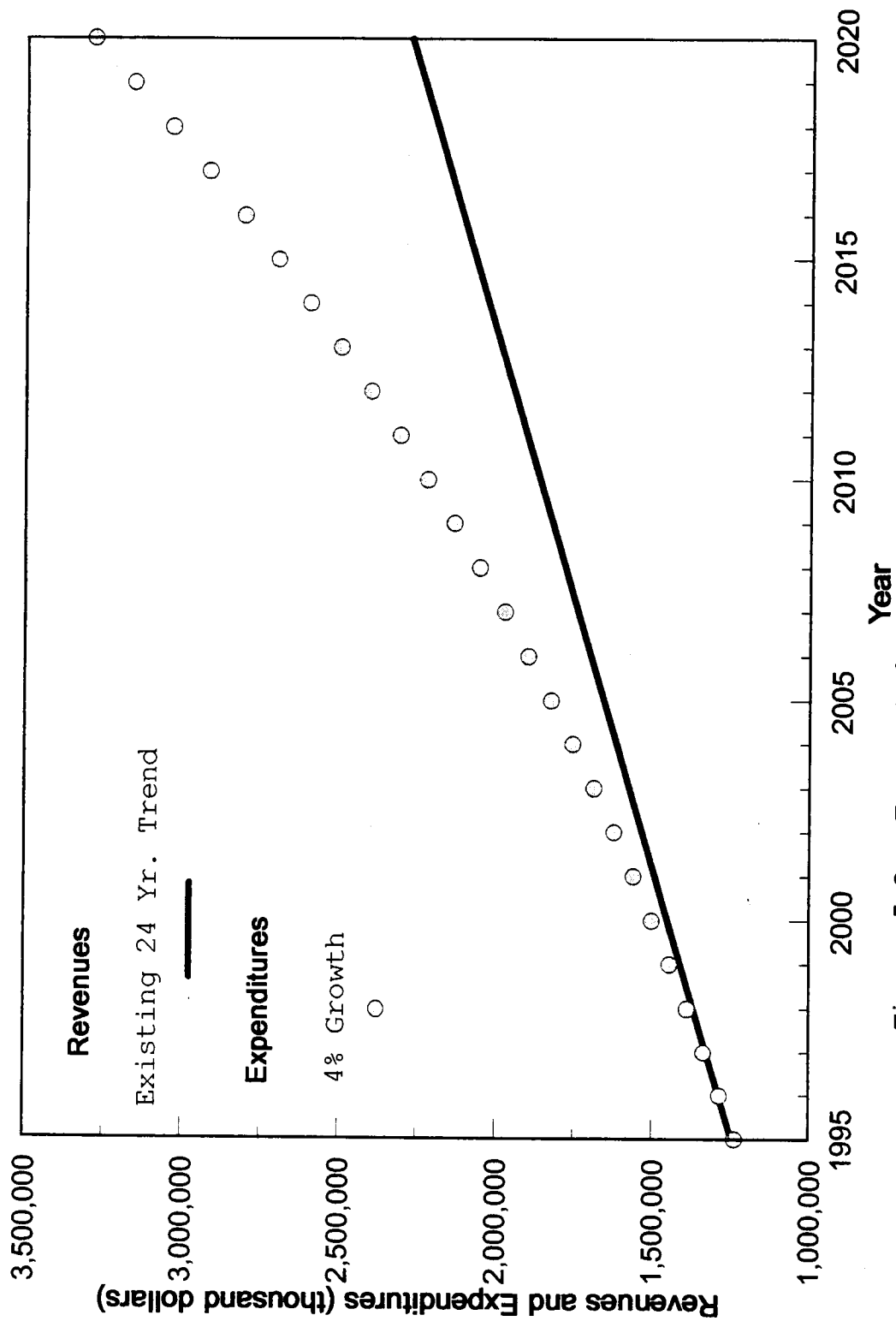


Figure 5.2. Forecasted Revenues & Expenditures
(When Revenues Grow With Existing Trend and Expenditures at 4%)
For Tennessee Highways

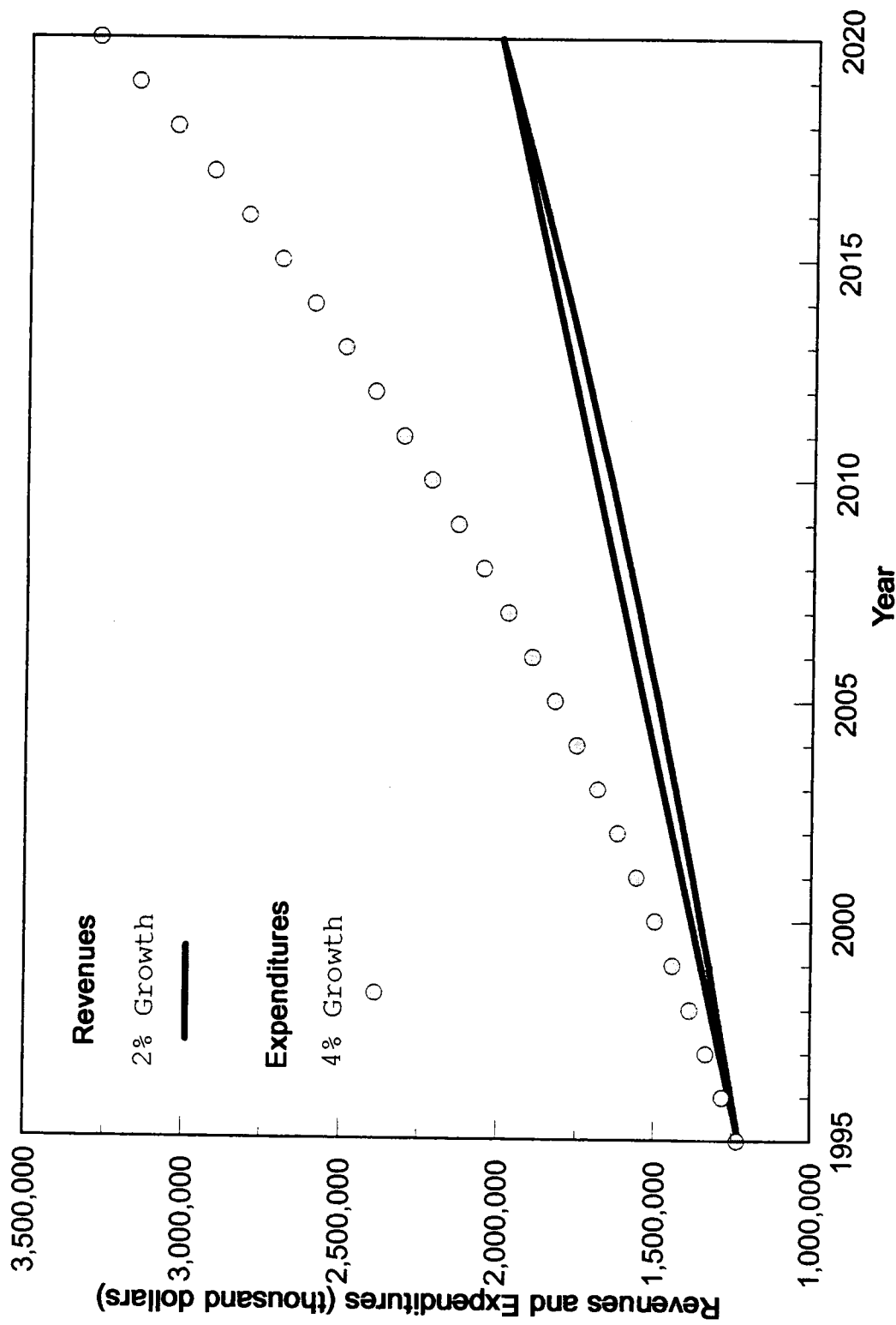


Figure 5.3. Forecasted Revenues & Expenditures
(When Revenues Grow at 2% and Expenditures at 4%)
For Tennessee Highways

\$1,525,443,000 to allow additional revenue to equal the expenditures (Figure 5.4).

The fuel tax revenue has shown signs that its growth is beginning to slow. The fuel tax could follow the seven year trend (1987 to 1994) with the other revenues growing by two percent per year. Expenditures could grow by four percent per year, leaving a difference of \$1,495,316,000 in 2020 (Figure 5.5).

The worst scenario presented is if the Federal-aid follows the ten year trend, the fuel tax revenue follows the seven year trend, and the rest of the revenue sources grows by only two percent per year. The expenditures could grow by four percent per year during this same period. A shortfall of \$1,745,279,000 would be expected in 2020 if this scenario occurs (Figure 5.6).

As noted in Table 5.1, there is a strong possibility that expenditures will outpace revenues for highways by the year 2020. The State of Tennessee will need to look at ways to offset the shortfall or delay construction and/or maintenance. Opportunities for additional revenue will be an important issue.

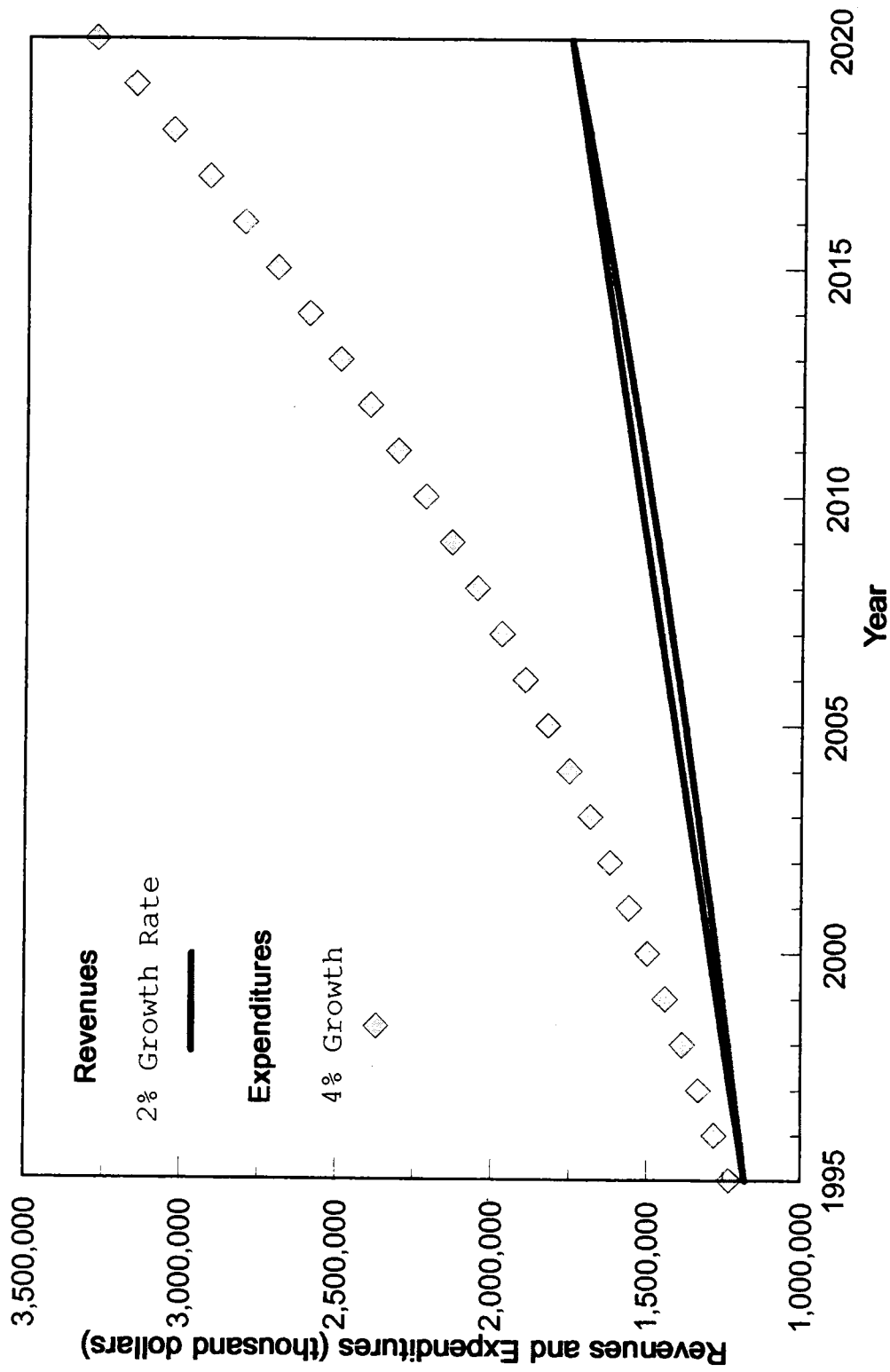


Figure 5.4. Forecasted Revenues & Expenditures
(When Federal Aid follows a 10 Year Trend)
 For Tennessee Highways

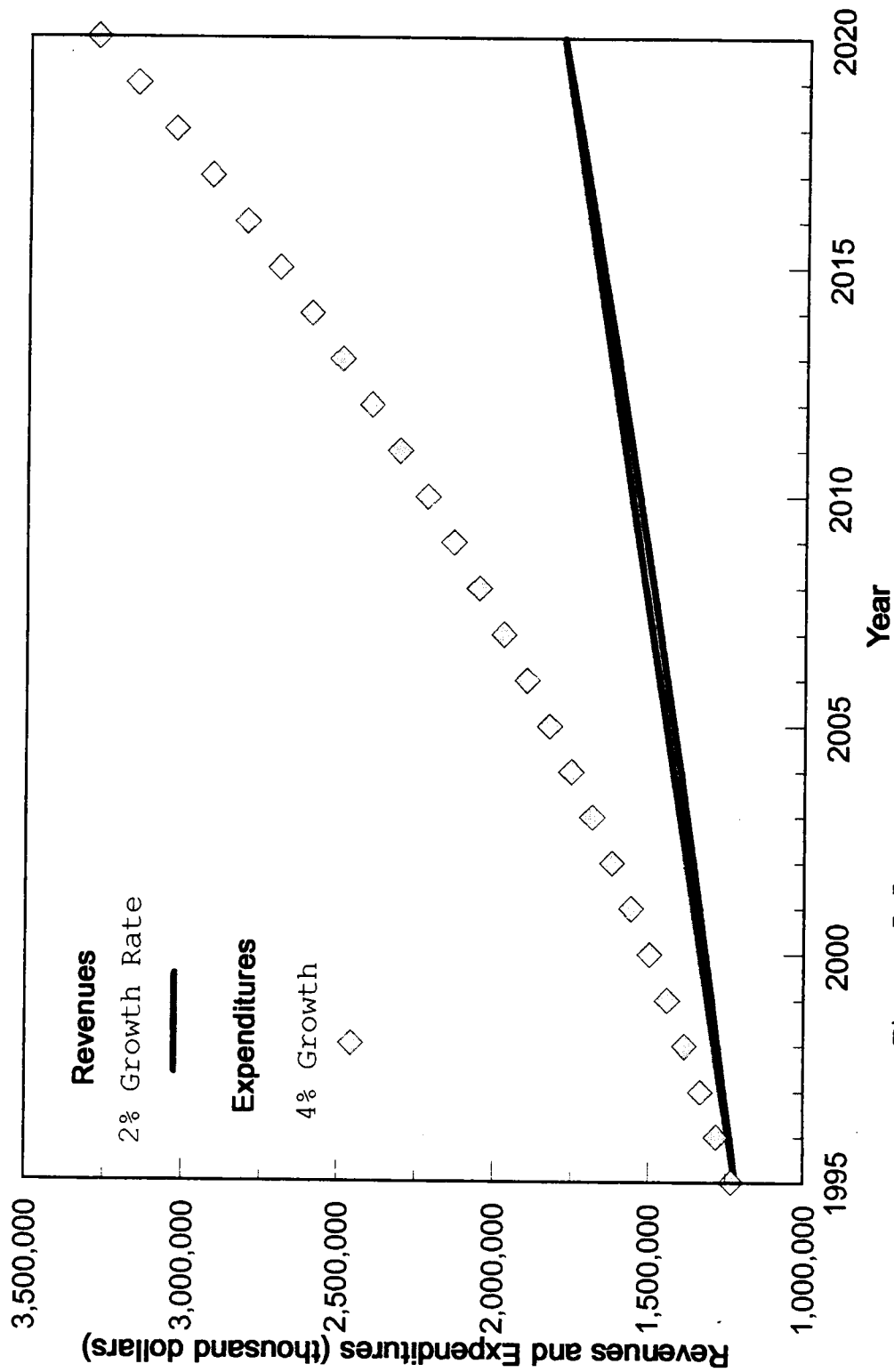


Figure 5.5. Forecasted Revenues & Expenditures
(When Fuel Tax Revenues follows a 7 Year Trend)
 For Tennessee Highways

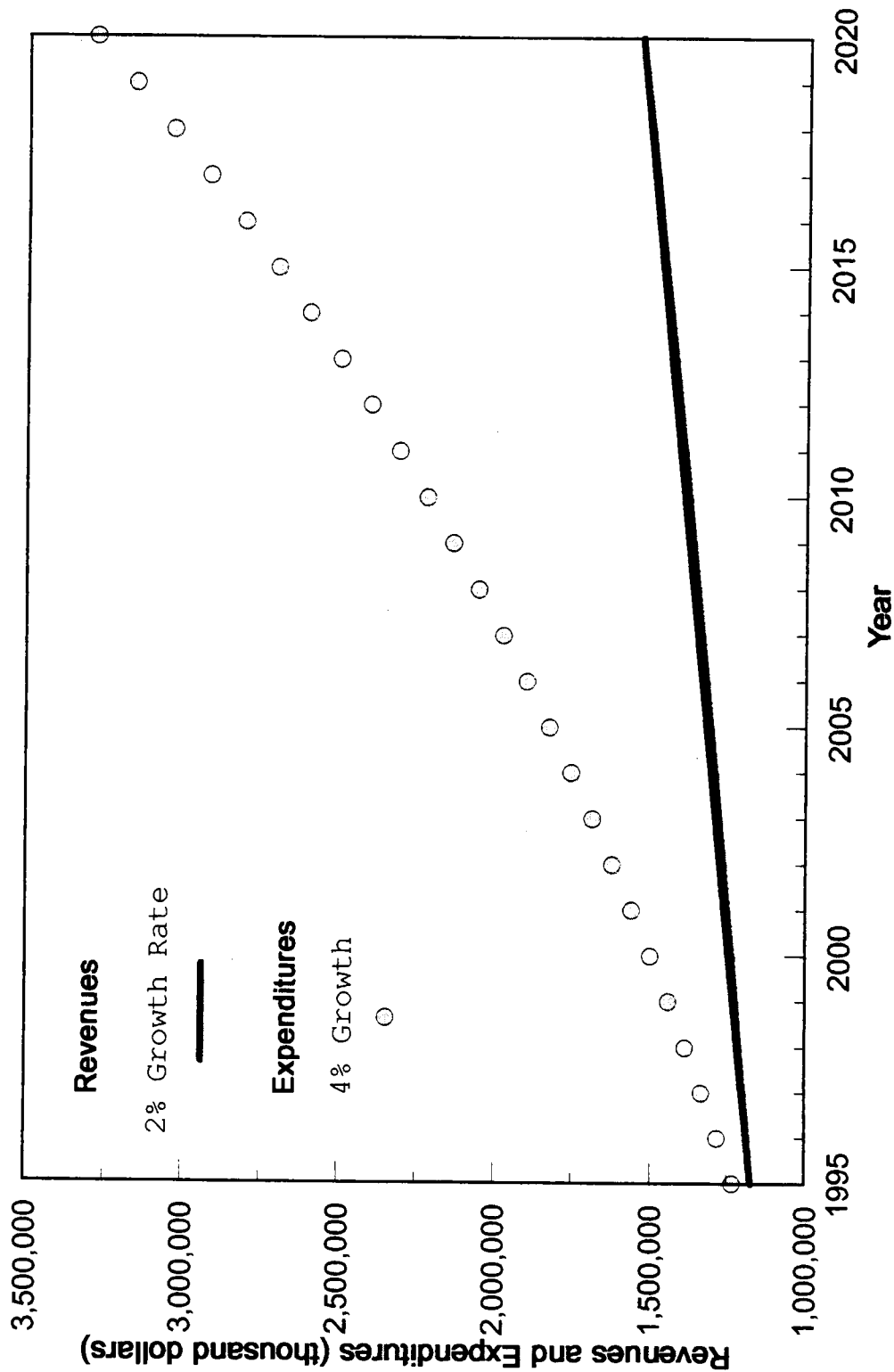


Figure 5.6. Forecasted Revenues & Expenditures
 (When Fuel Tax the 7 Year Trend & the Federal the 10 Year Trend)
 For Tennessee Highways

Table 5.1
2020 Revenue Shortfall
(thousands)

Scenarios	Revenue	Expenditures at a 4% Growth Rate	Year 2020 Shortfall
Exiting 24 Yr. Trend in Revenue	2,275,148,000	3,284,592,000	1,009,444,000
A 2% Growth Rate with Revenues	2,009,112,000	3,284,592,000	1,275,480,000
10 Yr. Trend with Federal Funds and a 2% Revenue Growth Rate	1,759,149,000	3,284,592,000	1,525,443,000
7 Yr. Trend with Fuel Tax Receipts and a 2% Revenue Growth Rate	1,789,276,000	3,284,592,000	1,495,316,000
10 Yr. Federal Fund Trend and 7 Yr. Fuel Tax Trend with a 2% Revenue Growth Rate	1,539,313,000	3,284,592,000	1,745,279,000

CHAPTER 6

CONCLUSIONS

Tennessee highways have been adequately funded for many years. The State of Tennessee has been able to provide additional lane miles to stimulate economic growth and meet the annual increase in vehicle miles of travel. However, the future of funding for State highways is in jeopardy.

As long as the revenue streams and expenditures continue to grow at the same rate, the State can fund the State highways in the future. However, as observed in other states the expenditures and revenues will most likely grow at different rates, with a number of factors such as reluctance to increase taxes, fuel efficiency of vehicles, use of alternative fuel, and limited growth in Federal Highway programs becoming major factors. Also the Federal highway grant program and State fuel tax receipts are stagnating. The State will be forced to make a decision on whether to delay maintenance and capital improvements due

to the revenue shortfall or find ways to raise additional revenues.

Delaying maintenance and capital improvements would not be a prudent decision and could be costly to the State in the future. It would also cost the highway users additional money in vehicle operation costs and result in increased highway accidents.

The year 2020 shortfall can range from \$34,963,000 to \$1,745,279,000. Raising additional revenue is the only alternative that makes sense. The State could raise the revenue through alternative financing techniques, by increasing the tax rate on existing sources, or by levying a new tax. The State generally has been able to avoid debt financing for State highways in recent history. This saves future revenue by not incurring interest on the debts. Many of innovative financing techniques involve leveraging techniques. Everything the State decides to finance in this way will cost additional money in the future.

One option available to the State is to raise additional revenue by raising the tax rate on existing taxes or finding new tax sources. Raising the State fuel

tax rate on motor fuel will increase the revenues more than any of the other existing revenue streams. However, the tax rate on motor fuel would be around sixty-five cents per gallon to cover the largest shortfall. Another option is to look into new tax sources. This can include part of the innovative financing techniques which involve income generation streams. With State Infrastructure Banks, the State can establish a revolving fund and identify public or private streams to pay back the loans. Unlike traditional grants, the loans are to be paid back and become available for other users. The terms of the loans and interest rates are established by the State. Local revenue sources can include special benefit assessment districts, traffic impact fees and/or private sector payments.

The State of Tennessee has some important decisions to make concerning financing the State highways in the future. They will need to decide between debt financing and raising additional revenues from tax sources.

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Appendices

Appendix A

Table A.1
Gallons of Gasoline and Diesel Sold in Tennessee

Year	Gallons of Gasoline (thousands)	Percent Change	Gallons of Diesel (thousands)	Percent Change After CPI Adjustment
1970	1,727,989	3.12%	162,817	10.70%
1971	1,855,602	7.39%	192,748	18.38%
1972	2,029,809	9.39%	227,468	18.01%
1973	2,099,125	3.41%	262,660	15.47%
1974	2,116,329	0.82%	265,905	1.24%
1975	2,221,267	4.96%	264,097	-0.68%
1976	2,342,448	5.46%	304,991	15.48%
1977	2,403,912	2.62%	344,495	12.95%
1978	2,516,965	4.70%	381,398	10.71%
1979	2,431,083	-3.41%	394,468	3.43%
1980	2,330,051	-4.16%	383,751	-2.72%
1981	2,279,831	-2.16%	420,017	9.45%
1982	2,263,193	-0.73%	412,448	-1.80%
1983	2,239,771	-1.03%	466,539	13.11%
1984	2,385,707	6.52%	510,624	9.45%
1985	2,434,154	2.03%	517,455	1.34%
1986	2,531,557	4.00%	530,445	2.51%
1987	2,630,164	3.90%	565,029	6.52%
1988	2,441,696	-7.17%	581,703	2.95%
1989	2,495,173	2.19%	590,190	1.46%
1990	2,418,720	-3.06%	607,875	3.00%
1991	2,321,430	-4.02%	577,968	-4.92%
1992	2,457,839	5.88%	599,877	3.79%
1993	2,548,678	3.70%	648,223	8.06%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.2
Fuel Tax Receipts

Year	Tax Revenues (thousands)	Percent Change	Adjusted by CPI (thousands)	Percent Change per Year After CPI Adjustment
1970	126,894	NA	126,894	NA
1971	136,930	7.91%	131,285	3.46%
1972	151,608	10.72%	140,638	7.12%
1973	176,290	16.28%	154,100	9.57%
1974	195,614	10.96%	154,027	-0.05%
1975	160,348	-18.03%	115,691	-24.89%
1981	220,253	NA	94,045	NA
1982	240,939	9.39%	96,918	3.06%
1983	240,675	-0.11%	93,794	-3.22%
1984	252,803	5.04%	94,506	0.76%
1985	288,183	14.00%	104,037	10.09%
1986	377,748	31.08%	133,763	28.57%
1987	451,971	19.65%	154,414	15.44%
1988	461,632	2.14%	151,554	-1.85%
1989	542,679	17.56%	169,959	12.14%
1990	575,047	5.96%	170,891	0.55%
1991	566,133	-1.55%	161,383	-5.56%
1992	512,562	-9.46%	141,827	-12.12%
1993	469,808	-8.34%	126,259	-10.98%
1994	586,379	24.81%	153,583	21.64%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.3
Vehicle Registration in Tennessee
(thousands)

Year	Automobile	Truck	Bus	Total	Percent Change
1970	1,638,268	404,292	7,432	2,049,992	4.00%
1971	1,703,756	424,352	7,527	2,135,635	4.18%
1972	1,819,121	466,906	7,608	2,293,635	7.40%
1973	1,938,735	520,290	7,796	2,466,821	7.55%
1974	1,987,890	572,585	7,906	2,568,381	4.12%
1975	2,092,996	624,270	8,303	2,725,569	6.12%
1976	2,153,922	642,213	8,705	2,804,840	2.91%
1977	2,307,783	679,600	8,774	2,996,157	6.82%
1978	2,351,910	550,137	9,175	2,911,222	-2.83%
1979	2,337,221	648,660	9,424	2,995,305	2.89%
1980	2,564,551	696,420	10,374	3,271,345	9.22%
1981	2,870,407	652,147	10,475	3,533,299	8.01%
1982	2,765,974	603,618	11,624	3,381,216	-4.30%
1983	2,904,367	621,417	11,228	3,537,012	4.61%
1984	2,822,315	734,791	11,555	3,568,661	0.89%
1985	2,944,971	796,906	12,049	3,753,926	5.19%
1986	3,097,473	822,248	12,499	3,932,220	4.75%
1987	3,194,605	819,882	12,078	4,026,565	2.40%
1988	3,373,276	839,400	12,814	4,225,490	4.94%
1989	3,451,763	850,748	13,191	4,315,702	2.13%
1990	3,552,828	877,413	13,867	4,444,108	2.98%
1991	3,642,146	885,063	14,467	4,541,676	2.20%
1992	3,726,216	903,866	15,001	4,645,083	2.28%
1993	3,989,183	958,966	15,699	4,963,848	6.86%
1994	3,712,180	1,330,017	16,455	5,058,653	1.91%

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Transportation, Federal Highway Administration

Table A.4
Vehicle Registration Revenue

Year	Revenue (thousands)	Percent Change	CPI Adjusted Revenue (thousands)	Percent Change per Year After CPI Adjustment
1970	49,194	NA	49,194	NA
1971	50,822	3.31%	48,727	-0.95%
1972	61,594	21.20%	57,137	17.26%
1973	68,785	11.67%	60,127	5.23%
1974	76,525	11.25%	60,256	0.21%
1975	77,281	0.99%	55,758	-7.46%
1981	100,016	NA	42,705	NA
1982	104,785	4.77%	42,150	-1.30%
1983	115,590	10.31%	45,047	6.87%
1984	124,731	7.91%	46,628	3.51%
1985	130,548	4.66%	47,129	1.07%
1986	133,672	2.39%	47,334	0.44%
1987	135,333	1.24%	46,236	-2.32%
1988	144,435	6.73%	47,418	2.56%
1989	143,069	-0.95%	44,807	-5.51%
1990	143,263	0.14%	42,574	-4.98%
1991	142,852	-0.29%	40,722	-4.35%
1992	139,667	-2.23%	38,646	-5.10%
1993	162,559	16.39%	43,687	13.04%
1994	156,175	-3.93%	40,905	-6.37%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.5
Other State Imposts, General Fund Revenues

Year	Revenues (thousands)	Percent Change	Revenues After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	1,624	NA	1,624	NA
1971	1,525	-6.10%	1,462	-9.97%
1972	1,571	3.02%	1,457	-0.33%
1973	1,781	13.37%	1,557	6.83%
1974	16,222	810.84%	12,773	720.47%
1975	1,719	-89.40%	1,240	-90.29%
1981	28,719	NA	12,263	NA
1982	30,883	7.54%	12,423	1.31%
1983	30,558	-1.05%	11,909	-4.14%
1984	34,240	12.05%	12,800	7.48%
1985	57,952	69.25%	20,921	63.45%
1986	47,974	-17.22%	16,988	-18.80%
1987	55,851	16.42%	19,081	12.32%
1988	70,927	26.99%	23,285	22.03%
1989	72,148	1.72%	22,596	-2.96%
1990	78,852	9.29%	23,433	3.71%
1991	90,348	14.58%	25,755	9.91%
1992	383,289	324.24%	106,057	311.79%
1993	289,535	-24.46%	77,811	-26.63%
1994	41,516	-85.66%	10,874	-86.03%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.6
Miscellaneous Income

Year	Miscellaneous Income (thousands)	Percent Change	Miscellaneous Income After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	1,584	NA	1,584	NA
1971	1,787	12.82%	1,713	8.16%
1972	1,824	2.07%	1,692	-1.24%
1973	3,648	100.00%	3,189	88.46%
1974	2,795	-23.38%	2,201	-30.98%
1975	3,358	20.14%	2,423	10.09%
1981	7,034	NA	3,003	NA
1982	9,361	33.08%	3,765	25.37%
1983	9,049	-3.33%	3,527	-6.35%
1984	1,337	-85.22%	500	-85.83%
1985	1,505	12.57%	543	8.70%
1986	2,948	95.88%	1,044	92.13%
1987	3,418	15.94%	1,168	11.86%
1988	10,356	202.98%	3,400	191.15%
1989	7,061	-31.82%	2,211	-34.96%
1990	11,554	63.63%	3,434	55.27%
1991	7,454	-35.49%	2,125	-38.12%
1992	7,339	-1.54%	2,031	-4.43%
1993	8,368	14.02%	2,249	10.74%
1994	7,615	-9.00%	1,994	-11.31%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.7
Funding From Local Governments

Year	Local Funds (thousands)	Percent Change	Local Funds Adjusted By CPI (thousands)	Percent Change After CPI Adjustment
1970	1,397	NA	1,397	NA
1971	5,166	269.79%	4,953	254.55%
1972	3,488	-32.48%	3,236	-34.67%
1973	4,636	32.91%	4,052	25.24%
1974	9,125	96.83%	7,185	77.30%
1975	6,772	-25.79%	4,886	-32.00%
1981	5,736	NA	2,449	NA
1982	1,893	-67.00%	761	-68.91%
1983	4,439	134.50%	1,730	127.18%
1984	6,703	51.00%	2,506	44.85%
1985	10,369	54.69%	3,743	49.39%
1986	12,011	15.84%	4,253	13.62%
1987	12,265	2.11%	4,190	-1.48%
1988	7,679	-37.39%	2,521	-39.84%
1989	13,394	74.42%	4,195	66.39%
1990	13,264	-0.97%	3,942	-6.03%
1991	13,074	-1.43%	3,727	-5.45%
1992	16,437	25.72%	4,548	22.04%
1993	15,220	-7.40%	4,090	-10.07%
1994	11,614	-23.69%	3,042	-25.63%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.8
Federal Funds Contributed to Tennessee

Year	Federal Funds (thousands)	Percent Change	Federal Funds Adjusted by CPI (thousands)	Percent Change After CPI Adjustment
1970	114,284	NA	114,284	NA
1971	117,257	2.60%	112,423	-1.63%
1972	112,362	-4.17%	104,232	-7.29%
1973	80,804	-28.09%	70,633	-32.23%
1974	78,036	-3.43%	61,446	-13.01%
1975	155,629	99.43%	112,286	82.74%
1981	210,786	NA	90,003	NA
1982	179,596	-14.80%	72,243	-19.73%
1983	236,337	31.59%	92,103	27.49%
1984	268,513	13.61%	100,379	8.98%
1985	285,676	6.39%	103,132	2.74%
1986	317,359	11.09%	112,379	8.97%
1987	255,216	-19.58%	87,194	-22.41%
1988	254,961	-0.10%	83,704	-4.00%
1989	247,253	-3.02%	77,436	-7.49%
1990	278,130	12.49%	82,654	6.74%
1991	253,286	-8.93%	72,202	-12.64%
1992	302,050	19.25%	83,578	15.75%
1993	265,171	-12.21%	71,263	-14.73%
1994	290,258	9.46%	76,024	6.68%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.9
Total Receipts for Tennessee Highways

Year	Total Revenues (thousands)	Percent Change	Total Revenues After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	295,164	NA	295,164	NA
1971	310,108	5.06%	297,323	0.73%
1972	330,783	6.67%	306,849	3.20%
1973	334,956	1.26%	292,794	-4.58%
1974	371,987	11.06%	292,903	0.04%
1975	401,693	7.99%	289,822	-1.05%
1981	572,544	NA	244,468	NA
1982	567,457	-0.89%	228,261	-6.63%
1983	636,648	12.19%	248,109	8.70%
1984	688,327	8.12%	257,319	3.71%
1985	774,233	12.48%	279,506	8.62%
1986	891,712	15.17%	315,762	12.97%
1987	914,054	2.51%	312,284	-1.10%
1988	950,027	3.94%	311,893	-0.12%
1989	1,025,646	7.96%	321,217	2.99%
1990	1,100,149	7.26%	326,939	1.78%
1991	1,073,195	-2.45%	305,928	-6.43%
1992	1,361,398	26.85%	376,701	23.13%
1993	1,210,728	-11.07%	325,377	-13.62%
1994	1,089,626	-10.00%	285,392	-12.29%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.10
Highway Maintenance Expenditures for Tennessee

Year	Maintenance (thousands)	Percent Change	Maintenance After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	26,432	NA	26,432	NA
1971	25,372	-4.01%	24,326	-7.97%
1972	26,284	3.59%	24,382	0.23%
1973	31,966	21.62%	27,942	14.60%
1974	36,788	15.08%	28,967	3.67%
1975	34,532	-6.13%	24,915	-13.99%
1981	76,477	NA	32,655	NA
1982	90,688	18.58%	36,479	11.71%
1983	79,879	-11.92%	31,130	-14.66%
1984	109,025	36.49%	40,757	30.93%
1985	136,447	25.15%	49,259	20.86%
1986	131,783	-3.42%	46,665	-5.26%
1987	154,738	17.42%	52,866	13.29%
1988	169,838	9.76%	55,758	5.47%
1989	176,942	4.18%	55,416	-0.61%
1990	204,531	15.59%	60,782	9.68%
1991	192,580	-5.84%	54,897	-9.68%
1992	192,392	-0.10%	53,235	-3.03%
1993	185,130	-3.77%	49,753	-6.54%
1994	180,825	-2.33%	47,361	-4.81%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.11
Highway Capital Outlays for Tennessee

Year	Capital Outlays (thousands)	Percent Change	Capital Outlays After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	183,782	NA	183,782	NA
1971	191,637	4.27%	183,736	-0.02%
1972	210,327	9.75%	195,109	6.19%
1973	192,700	-8.38%	168,444	-13.67%
1974	225,481	17.01%	177,544	5.40%
1975	308,781	36.94%	222,786	25.48%
1981	323,977	NA	138,333	NA
1982	278,622	-14.00%	112,076	-18.98%
1983	388,522	39.44%	151,412	35.10%
1984	413,350	6.39%	154,523	2.06%
1985	446,525	8.03%	161,200	4.32%
1986	434,958	-2.59%	154,022	-4.45%
1987	467,550	7.49%	159,737	3.71%
1988	635,603	35.94%	208,668	30.63%
1989	517,445	-18.59%	162,056	-22.34%
1990	597,866	15.54%	177,672	9.64%
1991	556,325	-6.95%	158,588	-10.74%
1992	632,264	13.65%	174,949	10.32%
1993	569,277	-9.96%	152,990	-12.55%
1994	591,558	3.91%	154,939	1.27%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.12
Administration, Highway Police and
Safety on Tennessee Highways

Year	Revenues	Percent Change	Revenues After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	23,343	NA	23,343	NA
1971	23,115	-0.98%	22,162	-5.06%
1972	24,071	4.14%	22,329	0.75%
1973	27,423	13.93%	23,971	7.35%
1974	28,622	4.37%	22,537	-5.98%
1975	30,676	7.18%	22,133	-1.79%
1981	47,453	NA	20,262	NA
1982	46,154	-2.74%	18,566	-8.37%
1983	48,026	4.06%	18,716	0.81%
1984	49,892	3.89%	18,651	-0.35%
1985	61,412	23.09%	22,170	18.87%
1986	63,997	4.21%	22,662	2.22%
1987	70,309	9.86%	24,021	6.00%
1988	85,885	22.15%	28,196	17.38%
1989	135,465	57.73%	42,426	50.47%
1990	132,271	-2.36%	39,308	-7.35%
1991	126,296	-4.52%	36,002	-8.41%
1992	116,696	-7.60%	32,290	-10.31%
1993	127,268	9.06%	34,203	5.92%
1994	125,241	-1.59%	32,803	-4.09%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.13
Interest on Bonds

Year	Interest (thousands)	Percent Change	Interest After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	4,324	NA	4,324	NA
1971	5,289	22.32%	5,071	17.27%
1972	7,084	33.94%	6,571	29.59%
1973	6,618	-6.58%	5,785	-11.97%
1974	6,822	3.08%	5,372	-7.14%
1975	7,052	3.37%	5,088	-5.28%
1981	6,461	NA	2,759	NA
1982	5,742	-11.13%	2,310	-16.28%
1983	5,102	-11.15%	1,988	-13.92%
1984	4,492	-11.96%	1,679	-15.54%
1985	3,993	-11.11%	1,442	-14.16%
1986	3,389	-15.13%	1,200	-16.75%
1987	2,979	-12.10%	1,018	-15.19%
1988	2,487	-16.52%	816	-19.78%
1989	2,055	-17.37%	644	-21.17%
1990	1,642	-20.10%	488	-24.18%
1991	1,237	-24.67%	353	-27.74%
1992	878	-29.02%	243	-31.10%
1993	649	-26.08%	174	-28.21%
1994	1,310	101.85%	343	96.72%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.14
Bond Retirement

Year	Bond Retirement (thousands)	Percent Change	Bond Retirement After CPI Adjustment	Percent Change After CPI Adjustment
1970	9,000	NA	9,000	NA
1971	8,100	-10.00%	7,766	-13.71%
1972	12,960	60.00%	12,022	54.81%
1973	11,760	-9.26%	10,280	-14.49%
1974	12,040	2.38%	9,480	-7.78%
1975	13,035	8.26%	9,405	-0.80%
1976	13,660	4.79%	9,318	-0.92%
1977	15,455	13.14%	9,901	6.26%
1978	16,200	4.82%	9,643	-2.60%
1979	16,220	0.12%	8,678	-10.00%
1980	15,720	-3.08%	7,408	-14.64%
1981	16,740	6.49%	7,148	-3.51%
1982	16,720	-0.12%	6,726	-5.90%
1983	16,720	0.00%	6,516	-3.12%
1984	16,220	-2.99%	6,064	-6.94%
1985	13,220	-18.50%	4,773	-21.29%
1986	11,220	-15.13%	3,973	-16.75%
1987	11,220	0.00%	3,833	-3.52%
1988	11,220	0.00%	3,684	-3.91%
1989	9,920	-11.59%	3,107	-15.66%
1990	8,820	-11.09%	2,621	-15.63%
1991	8,820	0.00%	2,514	-4.08%
1992	8,820	0.00%	2,441	-2.93%
1993	4,950	-43.88%	1,330	-45.49%
1994	4,190	-15.35%	1,097	-17.50%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.15
Bonds Outstanding

Year	Bonds Outstanding (thousands)	Percent Change	Bonds Outstanding After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	133,300	NA	133,300	NA
1971	172,600	29.48%	165,484	24.14%
1972	179,640	4.08%	166,642	0.70%
1973	167,880	-6.55%	146,748	-11.94%
1974	171,040	1.88%	134,677	-8.23%
1975	181,005	5.83%	130,595	-3.03%
1976	202,345	11.79%	138,025	5.69%
1977	202,690	0.17%	129,846	-5.93%
1978	186,490	-7.99%	111,006	-14.51%
1979	170,270	-8.70%	91,102	-17.93%
1980	154,550	-9.23%	72,832	-20.05%
1981	137,810	-10.83%	58,843	-19.21%
1982	121,090	-12.13%	48,709	-17.22%
1983	104,870	-13.39%	40,869	-16.10%
1984	91,650	-12.61%	34,262	-16.17%
1985	80,430	-12.24%	29,036	-15.25%
1986	69,210	-13.95%	24,508	-15.60%
1987	57,990	-16.21%	19,812	-19.16%
1988	48,070	-17.11%	15,781	-20.34%
1989	39,250	-18.35%	12,293	-22.11%
1990	30,430	-22.47%	9,043	-26.43%
1991	21,610	-28.98%	6,160	-31.88%
1992	16,660	-22.91%	4,610	-25.17%
1993	11,710	-29.71%	3,147	-31.73%
1994	7,520	-35.78%	1,970	-37.41%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.16
Grants-in-Aid to Local Governments

Year	Grants to Local Governments (thousands)	Percent Change	Grants To Local Governments After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	57,621	NA	57,621	NA
1971	61,461	6.66%	58,927	2.27%
1972	67,170	9.29%	62,310	5.74%
1973	73,167	8.93%	63,957	2.64%
1974	71,506	-2.27%	56,304	-11.97%
1975	73,134	2.28%	52,766	-6.28%
1981	104,522	NA	44,629	NA
1982	116,702	11.65%	46,944	5.19%
1983	116,213	-0.42%	45,290	-3.52%
1984	119,774	3.06%	46,677	3.06%
1985	140,093	16.96%	52,371	12.20%
1986	178,890	27.69%	64,581	23.31%
1987	194,296	8.61%	68,802	6.54%
1988	196,503	1.14%	67,135	-2.42%
1989	216,017	9.93%	70,918	5.64%
1990	228,538	5.80%	71,575	0.93%
1991	223,624	-2.15%	66,456	-7.15%
1992	229,448	2.60%	65,407	-1.58%
1993	229,660	0.09%	63,547	-2.84%
1994	240,610	4.77%	64,663	1.76%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Table A.17
Total Disbursements for Tennessee Highways

Year	Total Disbursements (thousands)	Percent Change	Total Disbursements After CPI Adjustment (thousands)	Percent Change After CPI Adjustment
1970	304,502	NA	304,502	NA
1971	314,974	3.44%	301,988	-0.83%
1972	347,896	10.45%	322,724	6.87%
1973	343,634	-1.23%	300,379	-6.92%
1974	381,259	10.95%	300,204	-0.06%
1975	467,210	22.54%	337,092	12.29%
1981	575,630	NA	245,786	NA
1982	554,628	-3.65%	223,101	-9.23%
1983	654,462	18.00%	255,051	14.32%
1984	712,753	8.91%	266,450	4.47%
1985	801,690	12.48%	289,419	8.62%
1986	824,237	2.81%	291,869	0.85%
1987	901,092	9.32%	307,855	5.48%
1988	1,101,536	22.24%	361,634	17.47%
1989	1,057,844	-3.97%	331,301	-8.39%
1990	1,173,668	10.95%	348,787	5.28%
1991	1,108,882	-5.52%	316,101	-9.37%
1992	1,180,498	6.46%	326,646	3.34%
1993	1,116,934	-5.38%	300,170	-8.11%
1994	1,143,734	2.40%	299,564	-0.20%

Highway Statistics 1994. Department of
Transportation, Federal Highway Administration

Appendix B

Table B.1
Forecasted Fuel Receipts
(thousands)

Year	Existing 24 Yr. Trend	2% Growth	4% Growth	Existing 7 Yr Trend
1995	570,696	562,222	573,246	554,322
1996	590,193	573,466	596,176	560,251
1997	609,691	584,936	620,023	566,180
1998	629,188	596,634	644,824	572,109
1999	648,686	608,567	670,617	578,038
2000	668,183	620,739	697,441	583,967
2001	687,681	633,153	725,339	589,896
2002	707,179	645,816	754,353	595,825
2003	726,676	658,733	784,527	601,755
2004	746,174	671,907	815,908	607,684
2005	765,671	685,345	848,544	613,613
2006	785,169	699,052	882,486	619,542
2007	804,666	713,033	917,785	625,471
2008	824,164	727,294	954,497	631,400
2009	843,662	741,840	992,677	637,329
2010	863,159	756,677	1,032,384	643,258
2011	882,657	771,810	1,073,679	649,187
2012	902,154	787,247	1,116,626	655,116
2013	921,652	802,991	1,161,291	661,045
2014	941,149	819,051	1,207,743	666,974
2015	960,647	835,432	1,256,053	672,903
2016	980,145	852,141	1,306,295	678,832
2017	999,642	869,184	1,358,546	684,762
2018	1,019,140	886,567	1,412,888	690,691
2019	1,038,637	904,299	1,469,404	696,620
2020	1,058,135	922,385	1,528,180	702,549

Table B.2
Forecasted Vehicle Registration Revenue
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	167,785	166,488	169,752
1996	172,346	169,817	176,542
1997	176,908	173,214	183,604
1998	181,470	176,678	190,948
1999	186,031	180,211	198,586
2000	190,593	183,816	206,529
2001	195,155	187,492	214,790
2002	199,716	191,242	223,382
2003	204,278	195,067	232,317
2004	208,840	198,968	241,610
2005	213,401	202,947	251,274
2006	217,963	207,006	261,325
2007	222,525	211,146	271,778
2008	227,086	215,369	282,650
2009	231,648	219,677	293,956
2010	236,210	224,070	305,714
2011	240,771	228,552	317,942
2012	245,333	233,123	330,660
2013	249,895	237,785	343,886
2014	254,456	242,541	357,642
2015	259,018	247,392	371,948
2016	263,580	252,340	386,825
2017	268,141	257,386	402,298
2018	272,703	262,534	418,390
2019	277,265	267,785	435,126
2020	281,826	273,140	452,531

Table B.3
Forecasted Toll Revenue
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	73	69	70
1996	79	70	73
1997	85	72	76
1998	90	73	79
1999	96	75	82
2000	102	76	86
2001	107	78	89
2002	113	79	93
2003	118	81	96
2004	124	82	100
2005	130	84	104
2006	135	86	108
2007	141	88	113
2008	147	89	117
2009	152	91	122
2010	158	93	127
2011	164	95	132
2012	169	97	137
2013	175	99	143
2014	181	101	148
2015	186	103	154
2016	192	105	160
2017	197	107	167
2018	203	109	173
2019	209	111	180
2020	214	113	188

Table B.4
Forecasted Other State Imposts,
and
General Fund Revenue
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	158,211	153,610	156,622
1996	165,823	156,683	162,887
1997	173,436	159,816	169,403
1998	181,048	163,013	176,179
1999	188,661	166,273	183,226
2000	196,273	169,598	190,555
2001	203,885	172,990	198,177
2002	211,498	176,450	206,104
2003	219,110	179,979	214,349
2004	226,723	183,579	222,922
2005	234,335	187,250	231,839
2006	241,948	190,995	241,113
2007	249,560	194,815	250,757
2008	257,172	198,711	260,788
2009	264,785	202,686	271,219
2010	272,397	206,739	282,068
2011	280,010	210,874	293,351
2012	287,622	215,092	305,085
2013	295,235	219,394	317,288
2014	302,847	223,781	329,980
2015	310,460	228,257	343,179
2016	318,072	232,822	356,906
2017	325,684	237,479	371,182
2018	333,297	242,228	386,030
2019	340,909	247,073	401,471
2020	348,522	252,014	417,530

Table B.5
Forecasted Miscellaneous Revenue
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	8,707	8,606	8,774
1996	8,976	8,778	9,125
1997	9,246	8,953	9,490
1998	9,516	9,132	9,870
1999	9,786	9,315	10,265
2000	10,055	9,501	10,675
2001	10,325	9,691	11,102
2002	10,595	9,885	11,546
2003	10,864	10,083	12,008
2004	11,134	10,284	12,489
2005	11,404	10,490	12,988
2006	11,674	10,700	13,508
2007	11,943	10,914	14,048
2008	12,213	11,132	14,610
2009	12,483	11,355	15,194
2010	12,753	11,582	15,802
2011	13,022	11,814	16,434
2012	13,292	12,050	17,092
2013	13,562	12,291	17,775
2014	13,832	12,537	18,486
2015	14,101	12,787	19,226
2016	14,371	13,043	19,995
2017	14,641	13,304	20,794
2018	14,911	13,570	21,626
2019	15,180	13,842	22,491
2020	15,450	14,118	23,391

Table B.6
Forecasted Local Government Revenue
(thousands)

Year	Existing 24 yr. Trend	2% Growth	4% Growth
1995	14,200	14,020	14,295
1996	14,656	14,300	14,866
1997	15,111	14,586	15,461
1998	15,567	14,878	16,080
1999	16,022	15,175	16,723
2000	16,478	15,479	17,392
2001	16,934	15,789	18,087
2002	17,389	16,104	18,811
2003	17,845	16,426	19,563
2004	18,300	16,755	20,346
2005	18,756	17,090	21,160
2006	19,211	17,432	22,006
2007	19,667	17,780	22,886
2008	20,122	18,136	23,802
2009	20,578	18,499	24,754
2010	21,033	18,869	25,744
2011	21,489	19,246	26,774
2012	21,944	19,631	27,845
2013	22,400	20,024	28,958
2014	22,855	20,424	30,117
2015	23,311	20,833	31,321
2016	23,766	21,249	32,574
2017	24,222	21,674	33,877
2018	24,677	22,108	35,232
2019	25,133	22,550	36,642
2020	25,588	23,001	38,107

Table B.7
Forecasted Federal Revenue
(thousands)

Year	Existing 24 yr. Trend	Existing 10 yr. Trend	2% Growth	4% Growth
1995	322,261	274,357	319,601	325,868
1996	331,187	274,358	325,994	338,903
1997	340,113	274,358	332,513	352,459
1998	349,039	274,359	339,164	366,557
1999	357,965	274,360	345,947	381,220
2000	366,891	274,361	352,866	396,468
2001	375,817	274,362	359,923	412,327
2002	384,743	274,362	367,122	428,820
2003	393,669	274,363	374,464	445,973
2004	402,595	274,364	381,953	463,812
2005	411,521	274,365	389,592	482,365
2006	420,447	274,366	397,384	501,659
2007	429,373	274,366	405,332	521,725
2008	438,300	274,367	413,439	542,594
2009	447,226	274,368	421,707	564,298
2010	456,152	274,369	430,142	586,870
2011	465,078	274,369	438,744	610,345
2012	474,004	274,370	447,519	634,759
2013	482,930	274,371	456,470	660,149
2014	491,856	274,372	465,599	686,555
2015	500,782	274,373	474,911	714,017
2016	509,708	274,373	484,409	742,578
2017	518,634	274,374	494,097	772,281
2018	527,560	274,375	503,979	803,172
2019	536,486	274,376	514,059	835,299
2020	545,412	274,377	524,340	868,711

Table B.8
Forecasted Revenue For Tennessee
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	1,241,932	1,224,616	1,248,628
1996	1,283,261	1,249,108	1,298,573
1997	1,324,590	1,274,090	1,350,516
1998	1,365,918	1,299,572	1,404,537
1999	1,407,247	1,325,564	1,460,718
2000	1,448,575	1,352,075	1,519,147
2001	1,489,904	1,379,116	1,579,913
2002	1,531,233	1,406,699	1,643,109
2003	1,572,561	1,434,833	1,708,833
2004	1,613,890	1,463,529	1,777,187
2005	1,655,219	1,492,800	1,848,274
2006	1,696,547	1,522,656	1,922,205
2007	1,737,876	1,553,109	1,999,093
2008	1,779,204	1,584,171	2,079,057
2009	1,820,533	1,615,855	2,162,219
2010	1,861,862	1,648,172	2,248,708
2011	1,903,190	1,681,135	2,338,657
2012	1,944,519	1,714,758	2,432,203
2013	1,985,848	1,749,053	2,529,491
2014	2,027,176	1,784,034	2,630,671
2015	2,068,505	1,819,715	2,735,897
2016	2,109,833	1,856,109	2,845,333
2017	2,151,162	1,893,231	2,959,147
2018	2,192,491	1,931,096	3,077,513
2019	2,233,819	1,969,718	3,200,613
2020	2,275,148	2,009,112	3,328,638

Table B.9
Forecasted Maintenance Expenditures
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	211,386	207,262	211,326
1996	219,574	211,407	219,779
1997	227,761	215,635	228,570
1998	235,949	219,948	237,713
1999	244,137	224,347	247,222
2000	252,325	228,834	257,110
2001	260,513	233,411	267,395
2002	268,700	238,079	278,091
2003	276,888	242,841	289,214
2004	285,076	247,697	300,783
2005	293,264	252,651	312,814
2006	301,452	257,704	325,327
2007	309,639	262,858	338,340
2008	317,827	268,116	351,873
2009	326,015	273,478	365,948
2010	334,203	278,947	380,586
2011	342,391	284,526	395,810
2012	350,578	290,217	411,642
2013	358,766	296,021	428,108
2014	366,954	301,942	445,232
2015	375,142	307,981	463,041
2016	383,329	314,140	481,563
2017	391,517	320,423	500,826
2018	399,705	326,831	520,859
2019	407,893	333,368	541,693
2020	416,081	340,035	563,361

Table B.10
Forecasted Capital Outlays
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	639,600	632,734	645,141
1996	658,873	645,389	670,946
1997	678,146	658,297	697,784
1998	697,418	671,462	725,695
1999	716,691	684,892	754,723
2000	735,964	698,590	784,912
2001	755,237	712,561	816,309
2002	774,509	726,813	848,961
2003	793,782	741,349	882,919
2004	813,055	756,176	918,236
2005	832,327	771,299	954,966
2006	851,600	786,725	993,164
2007	870,873	802,460	1,032,891
2008	890,146	818,509	1,074,207
2009	909,418	834,879	1,117,175
2010	928,691	851,577	1,161,862
2011	947,964	868,608	1,208,336
2012	967,237	885,980	1,256,670
2013	986,509	903,700	1,306,936
2014	1,005,782	921,774	1,359,214
2015	1,025,055	940,210	1,413,582
2016	1,044,327	959,014	1,470,126
2017	1,063,600	978,194	1,528,931
2018	1,082,873	997,758	1,590,088
2019	1,102,146	1,017,713	1,653,692
2020	1,121,418	1,038,067	1,719,839

Table B.11
Forecasted Expenditures on Administration, Highway
Police and Safety on Tennessee Highways
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	127,776	125,393	127,852
1996	132,617	127,901	132,966
1997	137,458	130,459	138,285
1998	142,300	133,068	143,816
1999	147,141	135,730	149,569
2000	151,982	138,444	155,552
2001	156,823	141,213	161,774
2002	161,665	144,038	168,245
2003	166,506	146,918	174,974
2004	171,347	149,857	181,973
2005	176,189	152,854	189,252
2006	181,030	155,911	196,822
2007	185,871	159,029	204,695
2008	190,712	162,210	212,883
2009	195,554	165,454	221,398
2010	200,395	168,763	230,254
2011	205,236	172,138	239,464
2012	210,077	175,581	249,043
2013	214,919	179,093	259,005
2014	219,760	182,674	269,365
2015	224,601	186,328	280,140
2016	229,442	190,054	291,345
2017	234,284	193,856	302,999
2018	239,125	197,733	315,119
2019	243,966	201,687	327,724
2020	248,807	205,721	340,833

Table B.12
Forecasted Grants-in-Aid to Local Governments
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	246,558	243,022	247,787
1996	254,859	247,882	257,699
1997	263,159	252,840	268,007
1998	271,460	257,897	278,727
1999	279,761	263,055	289,876
2000	288,062	268,316	301,471
2001	296,363	273,682	313,530
2002	304,664	279,156	326,071
2003	312,964	284,739	339,114
2004	321,265	290,434	352,678
2005	329,566	296,242	366,785
2006	337,867	302,167	381,457
2007	346,168	308,211	396,715
2008	354,469	314,375	412,584
2009	362,770	320,662	429,087
2010	371,070	327,076	446,251
2011	379,371	333,617	464,101
2012	387,672	340,289	482,665
2013	395,973	347,095	501,971
2014	404,274	354,037	522,050
2015	412,575	361,118	542,932
2016	420,876	368,340	564,649
2017	429,176	375,707	587,235
2018	437,477	383,221	610,725
2019	445,778	390,886	635,154
2020	454,079	398,703	660,560

Table B.13
Forecasted Total Disbursements on Tennessee Highways
(thousands)

Year	Existing Trend	2% Growth	4% Growth
1995	1,225,320	1,208,411	1,232,106
1996	1,265,922	1,232,580	1,281,390
1997	1,306,525	1,257,231	1,332,646
1998	1,347,128	1,282,376	1,385,951
1999	1,387,730	1,308,023	1,441,389
2000	1,428,333	1,334,184	1,499,045
2001	1,468,935	1,360,868	1,559,007
2002	1,509,538	1,388,085	1,621,367
2003	1,550,141	1,415,847	1,686,222
2004	1,590,743	1,444,164	1,753,671
2005	1,631,346	1,473,047	1,823,818
2006	1,671,949	1,502,508	1,896,770
2007	1,712,551	1,532,558	1,972,641
2008	1,753,154	1,563,209	2,051,547
2009	1,793,757	1,594,473	2,133,609
2010	1,834,359	1,626,363	2,218,953
2011	1,874,962	1,658,890	2,307,711
2012	1,915,564	1,692,068	2,400,019
2013	1,956,167	1,725,909	2,496,020
2014	1,996,770	1,760,427	2,595,861
2015	2,037,372	1,795,636	2,699,695
2016	2,077,975	1,831,549	2,807,683
2017	2,118,578	1,868,179	2,919,991
2018	2,159,180	1,905,543	3,036,790
2019	2,199,783	1,943,654	3,158,262
2020	2,240,385	1,982,527	3,284,592

Vita

David McFarlin was born in Murfreesboro, Tennessee on September 27, 1973. After attending schools in both the private and public school systems in Murfreesboro, he graduated from Riverdale High School in May, 1991. He entered the University of Tennessee, Knoxville during August of 1991 and in May of 1995 he received the degree of Bachelor of Science in Civil Engineering. He entered the Master's Program in Civil Engineering at the University of Tennessee, Knoxville in August of 1995, officially receiving the Master's degree in May, 1997. Throughout his Master's program he worked with Oak Ridge National Laboratory to co-author the Department of Energy Transportation Energy Data Book.