

CHAPTER 8

Comparison of Spending and Investment Requirements

Introduction

This chapter compares the current spending for capital improvements described in Chapter 6 with the future investment requirement scenarios outlined in Chapter 7. These comparisons are intended to be illustrative, rather than to endorse a specific level of future investment. While the analysis identifies “gaps” between investment requirements and current spending levels, it does not take a position as to whether or not these gaps should be closed. The impacts of different levels of investment are discussed in Chapter 9.

The size of the gaps between the investment requirement scenarios and current spending is dependent on the investment requirement analysis, and the underlying assumptions used to develop that analysis. Chapter 10 explores the impacts that varying some assumptions would have on the investment requirements.

The chapter begins with a brief summary, contrasting the investment requirements versus spending comparisons in this report with those included in the 1997 C&P report.

The highway and bridge portion of this chapter starts by comparing average annual investment requirements for the Cost to Maintain Highways and Bridges and the Cost to Improve Highways and Bridges with 1997 capital expenditure data. This includes an analysis of the current and recommended mix of improvement types. The section continues by making a projection of capital spending for 1998-2003, and comparing these with the investment requirement scenarios. This is followed by a year-by-year analysis of investment requirements. The section concludes with a comparison of the results with those shown in previous C&P reports.

The transit portion of this chapter follows the approach used in the highway and bridge section. Average annual investment requirements are first compared to 1997 transit capital expenditures, both in total and by spending on vehicles versus non-vehicles. Investment requirements are then contrasted with the projected capital spending for 1998-2003 given the funding levels authorized by TEA-21. Forecast capital expenditures by 5-year segments are noted, and the funding gap between actual expenditures and estimated investment requirements in previous reports is compared to the current estimates of the gap.

Summary

Exhibit 8-1 compares the difference between investment requirements and spending in this report, with the corresponding difference based on the data reported in the 1997 C&P report. The first column contains values shown in the 1997 C&P report, which compared 1995 spending with estimated investment requirements for 1996. The second column restates these values, comparing 1995 spending with the average annual investment requirements reported in the 1997 C&P report. These restated values are comparable to the latest values based on 1997 data, shown in the third column.

Exhibit 8-1

Highway, Bridge and Transit Spending Versus Investment Requirements, Compared with Data from the 1997 C&P Report

Statistic	Based on 1995 Data		Based on 1997 Data
	1997 Report	Restated	
Percent by Which Investment Requirements Exceed Current Spending:			
Cost to Improve Highways, Bridges and Transit			
Highway Maximum Economic Investment scenario	N/A	---	95.6%
Bridge Eliminate Deficiencies scenario	N/A	---	73.8%
Highway plus Bridge	93%	108.9%	92.9%
Transit Cost to Improve scenario	103%	---	110.2%
Cost to Maintain Highway, Bridges and Transit			
Highway Maintain Conditions scenario	N/A	---	19.2%
Bridge Maintain Backlog scenario	N/A	---	-4.2%
Highway plus Bridge	13%	21.0%	16.3%
Transit Cost to Maintain scenario	38%		41.0%
Percent by Which Investment Requirements Exceed Projected 1998-2003 Spending:			
Cost to Improve Highways and Bridges	N/A	---	75.3%
Transit Cost to Improve Scenario	N/A	---	68.3%
Cost to Maintain Highways and Bridges	N/A	---	5.7%
Transit Cost to Maintain Scenario	N/A	---	12.9%

This chapter compares current highway and bridge spending with average annual investment requirements, while the 1997 C&P report cited figures based on a comparison of current spending with estimated “Year 1” (1996) investment requirements. The procedure for estimating the distribution of the investment requirements within the 20-year period was changed in this report. The 1997 C&P report used a process called “ramping,” in which it was assumed that investment requirements for capacity expansion would grow in proportion to average annual VMT growth. In this report, the distribution of highway, bridge, and transit investment requirements is based more directly on the outputs of the Highway Economic Requirements System (HERS), the Bridge Needs and Investment Process (BNIP), and the Transit Economic Requirements Model (TERM).

When measured using the comparable procedures, the gaps between highway and bridge spending and the investment requirement scenarios have declined since the last report, and are expected to decline further in the future, as a result of increased funding for highways, bridges, and transit under TEA-21. While this comparison was not shown in the 1997 C&P report, the average investment

requirements for the Maintain User Costs scenario developed using 1995 data were 21.0 percent higher than 1995 report-related capital expenditures. The comparable difference using 1997 data for the Cost to Maintain Highways and Bridges and 1997 spending is 16.3 percent (\$7.9 billion), and is expected to decline to an average of 5.7 percent (\$3.0 billion) annually over the six-year period 1998 through 2003.

Average annual transit investment requirements for the Cost to Maintain Transit in the 1997 C&P report were 38.6 percent higher than actual 1995 capital expenditures. The comparable difference using the most recent data increased to 41.0 percent (\$3.2 billion), but is expected to decline to an average of 12.9 percent (\$1.2 billion) annually from 1998 through 2003.

The average investment requirements for the Maximum Economic Investment scenario in the 1997 C&P report were 108.9 percent higher than the 1995 report-related capital expenditures. This difference declined to 92.9 percent (\$45.3 billion) based on the most recent data, and is projected to decline to an average of 75.3 percent (\$40.4 billion) annually from 1998 through 2003. For the Transit Cost to Improve scenario, the difference has increased from 102.9 percent to 110.2 percent (\$8.4 billion) since the 1997 C&P report, but is expected to decline to an average of 68.3 percent (\$6.5 billion) annually from 1998 through 2003.

Highway and Bridge Spending Versus Investment Requirements

This section starts by comparing the average annual investment requirements identified in Chapter 7 with the 1997 highway and bridge capital spending outlined in Chapter 6. A second analysis compares average annual investment requirements with projected spending for 1998–2003, since highway capital investment is expected to rise sharply during this period, as a result of the higher funding levels under TEA-21.

Previous C&P reports utilized a technique called “ramping” to turn the average annual investment requirement projections into estimates for individual years. The investment requirements required for system preservation were assumed to be approximately the same for each year, while the amount for capacity improvement was assumed to grow at the same rate as average annual growth in highway travel. This technique has been criticized, because the values for individual years that it produces are not consistent with the results of the HERS and BNIP analyses. Investments at the annual levels developed using the ramping technique might not have the effect on conditions and performance that would be expected, since the timing of the investments would be different than those specified by the models. In this report, the “ramping” technique has not been utilized.

One significant change in this report is that the concept of “Reported-Related Capital Outlay” has been eliminated. As discussed in Chapter 7, the investment requirements have been expanded in this report to include all types of highway capital improvements. Therefore, there is no need to make adjustments to the 1997 capital expenditure data when making comparisons, as was done in previous C&P reports.

Average Annual Investment Requirements Versus 1997 Spending

Exhibit 8-2 compares the average annual investment requirements to maintain highways and bridges with 1997 capital expenditures. Chapter 7 identifies the Cost to Maintain Highways and Bridges as the combination of the Highway Maintain Conditions scenario and the Bridge Maintain Backlog scenario. As indicated in Chapter 7, investment requirements for bridge expansion are included in the highway investment requirement scenarios. Therefore, the \$1.0 billion expended for new bridges in 1997 is included as part of the \$42.6 billion of “highway” expenditures, rather than as part of the \$6.1 billion of “bridge” expenditures.

The average annual Cost to Maintain Highways and Bridges for the 1998–2017 period is \$7.9 billion (16.3 percent) higher than 1997 capital expenditures. The gap is larger for highways (\$8.2 billion), because 1997 bridge preservation expenditures were \$0.3 billion higher than the average annual investment required under the Bridge Maintain Backlog scenario.

Q. Does this report recommend any specific level of investment?

A. No. The analysis of investment requirements in this report is intended to estimate what the consequences may be of various levels of spending on highway system performance. The comparisons in this chapter between current spending and the highway and bridge investment requirement scenarios are intended to be illustrative only. They are not intended to endorse any of the investment requirement scenarios as the “correct” level of transportation investment.

Exhibit 8-2

Average Annual Investment Required to Maintain Highways and Bridges Versus 1997 Capital Outlay	Investment Requirements (Billions of 1997 Dollars)				1997 Capital Outlay (\$Billions)	Percent Difference
	System Preservation	System Expansion	System Enhancements	Total		
Highway Maintain Conditions Scenario	26.0	20.3	4.5	50.8	42.6	19.2%
Bridge Maintain Backlog Scenario	5.8	^^	^^	5.8	6.1	-4.2%
Cost to Maintain Highways and Bridges	31.8	20.3	4.5	56.6	48.7	16.3%

Exhibit 8-3 compares the average annual investment requirements to improve highways and bridges with 1997 capital expenditures. Chapter 7 identifies the Cost to Improve Highways and Bridges as the combination of the Highway Maximum Economic Investment scenario and the Bridge Eliminate Deficiencies scenario.

The average annual Cost to Improve Highways and Bridges for the 1998–2017 period is \$45.3 billion (92.9 percent) higher than 1997 capital expenditures. The relative difference is larger for highways (95.6 percent), and smaller for bridges (73.8 percent).

Exhibit 8-3

Average Annual Investment Required to Improve Highways and Bridges Versus 1997 Capital Outlay	Investment Requirements (Billions of 1997 Dollars)				1997 Capital Outlay (\$Billions)	Percent Difference
	System Preservation	System Expansion	System Enhancements	Total		
Highway Maximum Economic Investment Scenario	37.6	38.3	7.5	83.4	42.6	95.6%
Bridge Eliminate Deficiencies Scenario	10.6	^^	^^	10.6	6.1	74.2%
Cost to Improve Highways and Bridges	48.1	38.3	7.5	94.0	48.7	92.9%

Q. To what extent is the “gap” between current funding levels and the investment requirement scenarios the result of assumptions made about future VMT growth?

A. The specific impacts that changing the VMT growth projections would have on the investment requirement projections is discussed in Chapter 10. In general terms, the projections in the HPMS database assume that VMT will grow more slowly in the future than in the past. The travel demand elasticity features in HERS serve to channel growth away from urbanized areas with rising highway user costs, diverting traffic to other areas or to other modes of transportation. (To some extent, the HERS elasticity features mimic the effect that transportation demand management programs would be expected to have on the level and location of future travel growth. Elasticity is discussed in more detail in Appendix G.) If VMT growth is higher than predicted in HPMS **as modified by the HERS elasticity features**, then the investment requirements would be higher, and the gap between current funding and the investment requirement scenarios would be larger.

Conversely, the rate of VMT growth has declined in recent years. If VMT increases more slowly than expected due to demographic changes, or if TDM programs are more successful in affecting future travel growth than the travel demand elasticity values in HERS assume, then future highway investment requirements would be lower. In this case, the gap between current funding and the investment requirements would be smaller (and could close entirely).

Note that HERS assumes the future VMT projections for individual highway segments in HPMS are accurate only at the level of investment required to maintain a constant level of service. At lower levels of investment, HERS assumes future VMT will be lower than the projections in the HPMS database.

Types of Improvements

Exhibit 8-4 compares the distribution of highway and bridge capital outlay by improvement type for the Cost to Improve Highways and Bridges and the Cost to Maintain Highways and Bridges with the actual pattern of capital expenditures in 1997. In 1997, 47.6 percent of highway capital outlays went for highway and bridge preservation. The investment requirement scenarios developed using the Highway Economic Requirements System (HERS), and the Bridge Needs and Investment Process (BNIP) suggest that a greater percentage of capital investment should be devoted to system preservation in the future. For the Cost to Maintain Highways and Bridges, 56.1 percent of the projected 20-year investment requirements are for system preservation. If funding increases above this level, the models recommend increasing system expansion expenditures more quickly, so that for the Cost to Improve Highways and Bridges, 51.2 percent of the total investment requirements are for system preservation.

Exhibit 8-4

Highway and Bridge Investment Requirements and 1997 Capital Outlay, Percentage by Improvement Type

	System Preservation			System Expansion	System Enhancements	Total
	Highway	Bridge	Total			
Cost to Improve Highways and Bridges	40.0%	11.3%	51.2%	40.8%	8.0%	100.0%
Cost to Maintain Highways and Bridges	45.8%	10.3%	56.1%	35.9%	8.0%	100.0%
1997 Capital Outlay	35.1%	12.5%	47.6%	44.4%	8.0%	100.0%

As discussed in Chapter 7, investment requirements for non-modeled items were determined by assuming that future increasing in this type of investment would be proportional to increases in total capital spending. For system enhancements, the percentage for the Cost to Improve Highways and Bridges and for the Cost to Maintain Highways and Bridges was set at 8.0 percent, to match the percentage of expenditures in 1997.

Investment Requirements Versus Projected 1998-2003 Spending

The passage of the TEA-21 will result in significant increases in Federal highway funding. This will help to close the gap between the investment requirement scenarios and current spending levels identified earlier in this chapter. As indicated in Chapter 6, due to the nature of the Federal-aid Highway program as a multiple year reimbursable program, the impact of increases in obligation levels phases in gradually over a number of years. The largest percentage increases in cash outlays for highways by the Federal Government are expected to occur in 1999, 2000, and 2001. Federal cash outlays are projected to increase in 2002 and 2003 as well, but are expected to grow more slowly than inflation.

State and Local Funding

State and local funding for highway capital outlay has increased in every year since 1981, and has grown in constant dollar terms over time. In 1996, the FHWA commissioned the development of two State Highway Funding Models to forecast future State highway funding levels. These models are used in the development of supporting materials for the annual FHWA budget submission. State Highway Funding Model I predicts that annual increases in State highway funding will range from 4.5 percent to 5.1 percent during the period from 1997 to 2003. This report assumes that State and local government funding for highway capital expenditures will increase by approximately the same rates.

Q. What factors do the State Highway Funding Models use in their projections?

A. State Highway Funding Model I forecasts total State receipts for highways based on estimates of future fuel consumption, State general fund revenues and nominal Gross Domestic Product (GDP). State Highway Funding Model II makes more detailed forecasts of each major State revenue source. Model II bases its projections for individual revenue components on estimates of future VMT, nominal GDP, licensed drivers, State general fund revenues, State general fund expenditures, commuter railway miles and Treasury Bill Yields. The future funding levels projected by the two models are fairly consistent with each other.

Model I was utilized in this report, since the detailed revenue component projections provided by Model II were not needed.

Projected Federal, State and Local Capital Expenditures

Exhibit 8-5 shows projected expenditures by all levels of government for highway capital projects in current dollars and constant 1997 dollars. As indicated in Chapter 6, historical capital expenditures are converted to constant dollars using the FHWA Construction Bid Price Index. However, there are no projections available for future values for this index, so the expenditure projections were converted to constant dollars using forecasts of the Consumer Price Index (CPI) instead.

Stated in constant 1997 dollars, highway capital expenditures are expected to rise from \$48.7 billion in 1997 to \$56.5 billion in 2003, a 16 percent increase. The growth in capital spending is expected to outpace inflation in each year during this period, with the largest increases occurring between 1999 and 2001.

Exhibit 8-5

Projected Highway Capital Expenditures 1998-2003, All Levels of Government

Year	Projected Capital Expenditures Stated in Billions of Nominal Dollars		Projected Annual Rate of Inflation*	Projected Capital Expenditures Stated in Billions of Constant 1997 Dollars	
	Amount	Increase Over Prior Year		Amount	Increase Over Prior Year
1997	48.7	---	---	48.7	---
1998	49.6	1.9%	1.6%	48.8	0.2%
1999	53.2	7.1%	2.1%	51.2	4.9%
2000	57.3	7.7%	2.4%	53.9	5.2%
2001	60.3	5.2%	2.4%	55.4	2.7%
2002	62.3	3.4%	2.5%	55.9	0.9%
2003	64.6	3.6%	2.5%	56.5	1.1%

* CPI projections are from the Mid-Session Review of the Fiscal Year 2000 Budget.

Comparison of Investment Requirements and Projected 1998–2003 Spending

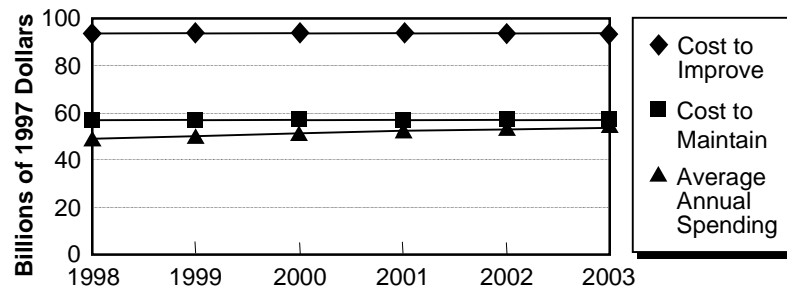
When making multi-year comparisons of spending and investment requirements, it is important to note that the investment requirements shown in this report are cumulative. To achieve a given performance target at the end of 20 years, cumulative spending over the 20-year period would need to match the cumulative investment requirements specified for that target. For example, if spending in 2017 matched the average annual investment requirements identified as the Cost to Maintain Highways and Bridges, but spending in 1998 through 2016 fell below this threshold, highway and bridge conditions would be expected to decline. Highway and bridge conditions would only be maintained

under this scenario if the cumulative average annual spending for the 1998–2017 period reached \$56.6 billion, the average annual Cost to Maintain Highways and Bridges.

Exhibit 8-6 compares the Cost to Maintain Highways and Bridges and the Cost to Improve Highways and Bridges with projected spending for the years 1998 through 2003. The row for 1997 is included to relate the table to Exhibits 8-2 and 8-3, but the 1997 values are not included in the cumulative capital expenditure figures shown. The “Average Annual” column shows the average annual capital expenditures corresponding to the years included in the “Cumulative” column, i.e., the \$51.3 billion average annual expenditures shown for the year 2000 represent the average expenditures for the three-year period 1998 to 2000.

Exhibit 8-6

Average Annual Investment Required to Maintain and Improve Highways and Bridges Versus Projected 1998-2003 Capital Outlay



Year	Projected Capital Expenditures Stated in Billions of Constant 1997 Dollars			Cost to Maintain Highways and Bridges		Cost to Improve Highways and Bridges	
	Annual	Cumulative	Average Annual	Average Annual	Percent Above Projected Spending	Average Annual	Percent Above Projected Spending
1997	48.7	---	---	56.6	16.3%	94.0	92.9%
1998	48.8	48.8	48.8	56.6	16.1%	94.0	92.6%
1999	51.2	100.1	50.0	56.6	13.3%	94.0	87.9%
2000	53.9	153.9	51.3	56.6	10.4%	94.0	83.2%
2001	55.4	209.3	52.3	56.6	8.3%	94.0	79.7%
2002	55.9	265.2	53.0	56.6	6.9%	94.0	77.3%
2003	56.5	321.6	53.6	56.6	5.7%	94.0	75.3%

If State and local government spending increases at the predicted rates, then combined highway capital spending by all levels of government is projected to reach \$56.5 billion in 2003. This is virtually identical to the \$56.6 billion average annual Cost to Maintain Highways and Bridges. However, the “gap” between cumulative average annual spending and the average annual investment requirement for this scenario would not be eliminated at this point, since spending from 1998 through 2002 is projected to be below the Cost to Maintain threshold. Average annual capital expenditures from 1998 through 2003 are expected to reach \$53.6 billion, \$3.0 billion below the average annual Cost to Maintain Highways and Bridges. Spending would need to increase an additional 5.7 percent to reach the Cost to Maintain level.

Exhibit 8-6 shows the gap between cumulative average annual spending and the average annual investment requirements closing steadily between 1997 and 2003. If highway capital expenditures by all levels of government continue to grow faster than inflation beyond 2003, capital expenditures might exceed the Cost to Maintain Highways and Bridges within the 20-year period covered by the investment requirement projections.

Timing of the Investment Requirements

While the investment requirement analysis in this report centers around the average annual investment requirements for the 20-year period 1998 through 2017, the HERS and BNIP models do provide information on how investment requirements would vary within this period. Each model reports investment requirements for four 5-year funding periods.

Effect of Backlog on Early Year Investment Requirements

For the Cost to Improve Highways and Bridges, the pattern of investment is heavily influenced by the existence of a backlog of highway and bridge investments. As indicated in Chapter 7, HERS estimates that a total of \$166.7 billion of investment could be justified based solely on the current conditions and operational performance of the highway system. The BNIP estimates that \$87.3 billion of investment would be required to repair or replace all bridges that are currently functionally obsolete or structurally deficient. For the highway Maximum Economic Investment scenario and the Bridge Eliminate Deficiencies scenario that are included in the Cost to Improve Highways, the models assume that the backlog will be addressed as quickly as possible, within the first 5-year funding period.

The existence of a backlog means that HERS and BNIP have a wide variety of potential improvements to choose from, when selecting investments included as part of the Cost to Maintain Highways and Bridges for the first 5-year funding period. This would tend to reduce investment requirements in this period, as the models would tend to implement the improvements with the greatest returns first. However, for highways this reduction is more than offset by another effect of the backlog, which tends to increase investment requirements in the early years. Some of the highway deficiencies that currently exist could be addressed relatively inexpensively in the short term, but will become much more expensive to correct if they are deferred. HERS recognizes this, and incorporates the potential costs of delaying improvements into its analysis process.

Investment Requirements by Funding Period

Exhibit 8-7 shows the distribution of investment requirements among the four 5-year analysis periods in HERS and BNIP. For the Cost to Improve Highways and Bridges, 36.6 percent of the investment requirements are for the first five years. This investment would eliminate the existing highway and bridge investment backlog, as well as correct new deficiencies that are expected to arise during this period. Investment requirements for the years 6 to 10 are sharply lower than for years 1 to 5. Investment requirements for years 11 to 20 are higher than for the preceding five years, but are still well below those for years 1 to 5.

Exhibit 8-7

Distribution of Investment Requirements by Five-Year Periods								
	Cost to Maintain Highways and Bridges (Billions of 1997 Dollars)				Cost to Improve Highways and Bridges (Billions of 1997 Dollars)			
	Highways	Bridges	Total	Percent	Highways	Bridges	Total	Percent
Cumulative								
1998-2002	283.1	22.5	301.6	26.6%	585.7	102.4	688.1	36.6%
2003-2007	228.7	29.0	257.6	22.7%	359.8	25.1	384.8	20.5%
2008-2012	243.2	31.4	275.9	24.4%	363.1	40.0	403.2	21.5%
2013-2017	261.2	33.7	297.8	26.3%	359.1	44.0	403.2	21.5%
Total	1,016.2	116.6	1,132.8	100.0%	1,667.8	211.5	1,879.3	100.0%
Average Annual	50.8	5.8	56.6		83.4	10.6	94.0	

For the Cost to Maintain Highways and Bridges, the differences in investment requirements between the funding periods is lower. For the Cost to Maintain Highways and Bridges 26.6 percent of investment requirements are for the first five years. Investment requirements for years 6 to 10 are lower. During the final 10 years the investment requirements increase, but not quite to the level for the initial 5-year funding period.

Q. How would the “gap” between current funding levels and the investment requirement scenarios be affected if spending was compared with investment requirements for the first 5-year funding period rather than the average annual investment requirements over 20 years?

A. Since the combined highway and bridge investment requirements projected by HERS and BNIP are highest in the early years of the analysis, the “gap” would be larger.

Comparison with Previous Reports

The comparison between spending and investment requirements is presented differently in this report than in previous versions. Exhibits 8-2 and 8-3 emphasize the difference between current spending and average annual investment requirements. Exhibit 8-8 takes the same approach, and applies it to the spending and investment requirement information in the 1995 and 1997 C&P reports.

The difference between current spending and the Cost to Maintain Highways and Bridges has shrunk in recent years. While the 1995 C&P report did not directly compare average annual investment requirements for the Cost to Maintain Highways and Bridges with 1993 report-related capital outlay, the difference would have been 57.5 percent. As shown in Exhibit 8-8, a comparable analysis of the data in the 1997 C&P report would have shown a 21.0 percent difference between the average investment requirements to Maintain User Costs, and 1995 spending. As indicated in Exhibit 8-6, the trend is expected to continue, as this difference is projected to close from 16.3 percent in 1997 to an average of 5.7 percent from 1998 through 2003.

Exhibit 8-8

Average Annual Investment Requirements Versus Current Spending: 1995, 1997 and 1999 C&P Reports

Report Year	Relevant Comparison	Percent Above Current Spending	
		Cost to Maintain Highways & Bridges (Low Scenario *)	Cost to Improve Highways & Bridges (High Scenario *)
1995	Average Annual investment requirements for 1994-2013 compared to 1993 spending	57.5%	112.6%
1997	Average Annual investment requirements for 1996-2015 compared to 1995 spending	21.0%	108.9%
1999	Average Annual investment requirements for 1998-2017 compared to 1997 spending	16.3%	92.9%

* The investment requirement scenarios are not fully consistent between reports. See Chapter 7.

Based on the information in the 1995 C&P report, the difference between the Cost to Improve Highways and Bridges would have been 112.6 percent. This difference would have fallen to 108.9 percent based on the 1997 C&P report. As indicated earlier, the difference is projected to close further, from 92.9 percent in 1997 to an average of 75.3 percent from 1998 through 2003.

Transit Capital Spending Versus Investment Requirements

This section compares transit capital spending to the investment requirements estimated by TERM and presented in Chapter 7. The first point of comparison is the actual total transit capital spending in 1997, which was discussed and reported in Chapter 6. A second point of comparison, to estimated capital expenditures for the period 1998-2003, is warranted given the dramatic growth in Federal funding for mass transit that is authorized by TEA-21.

Average Annual Investment Requirements Versus 1997 Capital Spending

Capital expenditures for transit in 1997 totaled \$7.636 billion (Exhibit 6-23). This sum is well below the required investment amounts in each of the scenarios estimated by TERM, with the exception of the pure rehabilitation and replacement necessary solely to maintain current conditions. This “gap” between funding and investment requirements is presented in Exhibit 8-9. The estimates from TERM

Exhibit 8-9

	Billions of Dollars	Percent Above Actual Spending
1997 Capital Spending	7.6	---
Cost to Maintain Conditions & Performance	10.8	41.0%
Cost to Maintain Conditions & Improve Performance	14.4	88.7%
Cost to Improve Conditions & Maintain Performance	11.1	45.5%
Cost to Improve Conditions & Performance	16.0	110.2%

imply that simply maintaining the current physical condition and operating performance of the Nation’s transit system over the next 20 years would require expenditures 41 percent above actual transit capital spending in 1997. The difference between actual expenditures and the cost of improvements to conditions and performance is much greater: improving both conditions and performance would cost more than double the amount actually spent in 1997.

Exhibit 8-10 disaggregates investment requirements and 1997 capital funding into vehicle and non-vehicle expenditures. For the **Maintain Conditions and Performance** scenario, the percent difference between spending and needs is much greater for vehicles (58 percent) than it is for non-vehicle expenditures (34 percent). For the **Improve Conditions and Performance** scenario, however, the percent difference for non-vehicle spending (116 percent) is somewhat larger than for vehicle spending (95 percent).

Q. Why does moving from the Maintain Conditions and Performance scenario to the Improve Conditions and Performance scenario have a much greater impact on investment requirements for non-vehicle expenditures than it does on vehicle expenditures?

A. The larger impact on non-vehicle investment requirements is due primarily to the performance improvements that TERM makes. In order to alleviate crowding and improve operating speeds, TERM will often build new or expand existing rail systems relative to bus system expansion, as rail transit generally has a greater capacity and speed. Since rail investments require relatively more non-vehicle capital (such as guideways) than bus system expansions do, the relative share of estimated non-vehicle capital investment will also increase.

Exhibit 8-10**Average Annual Transit Investment Requirements Versus 1997 Capital Spending by Asset Type**

	Vehicles		Non-Vehicles	
	Billions of \$	Percent Above Actual Spending	Billions of \$	Percent Above Actual Spending
1997 Capital Spending	2.2	---	5.4	---
Cost to Maintain Conditions & Performance	3.5	58%	7.2	34%
Cost to Improve Conditions & Performance	4.4	95%	11.7	116%

Investment Requirements Versus Projected 1998-2003 Spending

As is the case with highway funding, TEA-21 substantially increases the authorized funding levels for Federal Transit Administration programs relative to the past levels of Federal assistance. It is therefore useful to compare the projected transit capital funding levels over the period of the TEA-21 authorization, 1998-2003, to the investment requirements estimated by TERM.

Exhibit 8-11 shows projected transit capital funding levels for 1998-2003 (see sidebar for an explanation of how these levels were computed). Transit capital spending is expected to grow well in excess of the rate of inflation throughout the period, with an especially large increase in the 1999 fiscal year. The expected inflation rates are projections of the Consumer Price Index used in the Federal budgeting process.

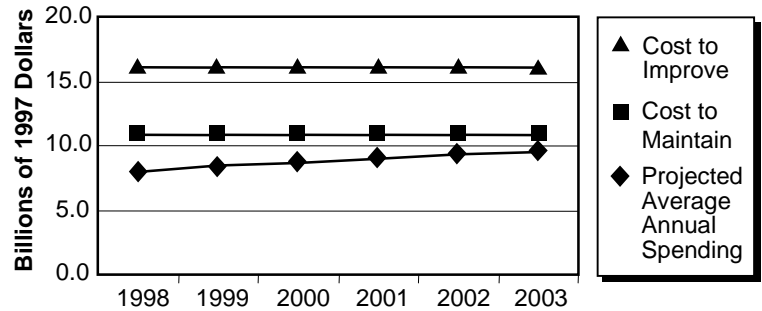
Exhibit 8-11**Projected Transit Capital Expenditures 1998-2003, All Levels of Government (Billions of Dollars)**

Year	Expenditures in Nominal Dollars	Increase Over Prior Year	Projected Rate of Inflation	Expenditures in Constant 1997 Dollars	Increase Over Prior Year
1997	7.6			7.6	
1998	8.1	5.7%	1.6%	7.9	4.1%
1999	9.2	13.6%	2.1%	8.8	11.3%
2000	10.0	8.6%	2.4%	9.4	6.1%
2001	10.8	7.9%	2.4%	9.9	5.4%
2002	11.5	7.3%	2.5%	10.4	4.7%
2003	12.3	6.9%	2.6%	10.8	4.3%

Exhibit 8-12 compares projected cumulative average annual funding levels for 1998-2003 to the average annual investment requirements for both the **Maintain Conditions and Performance** and **Improve Conditions and Performance** scenarios. The considerable bump in projected capital expenditures has a corresponding effect in lowering the investment gap. By 2003, transit capital spending is projected to reach \$10.8 billion in constant 1997 dollars, matching the average annual investment required to maintain conditions and performance. However, over the full six-year period 1998-2003, projected average annual capital expenditures would rise only to \$9.5 billion from \$7.6 billion in 1997. Average annual spending would need to increase an additional 12.9 percent to reach the level of the average annual investment requirements under the maintain scenario. Six-year spending would need to increase 68.3 percent above projected levels to reach the level of the improve scenario.

Exhibit 8-12

Projected Capital Expenditures Versus Investment Requirements, 1998-2003



Year	Projected Capital Expenditures (Billions of 1997 Dollars)		Cost to Maintain Conditions and Performance		Cost to Improve Conditions and Performance	
	Annual	Average Annual	Average Annual	Percent Above Projected Average Annual Spending	Average Annual	Percent Above Projected Average Annual Spending
1997	7.6	---	10.8	41.0%	16.0	110.2%
1998	7.9	7.9	10.8	35.4%	16.0	101.9%
1999	8.8	8.4	10.8	28.2%	16.0	91.1%
2000	9.4	8.7	10.8	23.4%	16.0	84.0%
2001	9.9	9.0	10.8	19.4%	16.0	78.0%
2002	10.4	9.3	10.8	15.9%	16.0	72.9%
2003	10.8	9.5	10.8	12.9%	16.0	68.3%

Q. How were the projected transit capital expenditures for the period 1998-2003 calculated?

A. TEA-21 includes guaranteed funding level caps for all Federal Transit Administration programs. Three of these programs, the Section 5308 Clean Fuels Formula Grant Program, the Section 5309 Capital program and the Section 5310 Formula Program (Elderly and Individuals With Disabilities) are exclusively for capital needs (see 49 U.S.C. 5308, 5309, 5310). Two others, the Section 5307 Urbanized Area and 5311 Nonurbanized Area Formula Programs, are used for both capital and operating expenses (see 49 U.S.C. 5307, 5311). To estimate Federal capital funding for each year, the guaranteed funding levels for Sections 5308, 5309, and 5310 funding were added to the capital share of the guaranteed funding levels for Sections 5307 and 5311. These shares were based on the capital shares of the 1998 obligations made for these two programs. This method provides a reasonable upper bound on what Federal capital expenditures are expected under TEA-21.

Unlike FHWA, FTA has no model for forecasting State and local transit capital expenditures. In 1997, the Federal share of capital spending was 54 percent (Exhibit 6-24), which represented an increase from recent years, when the share was slightly below one-half. While it is possible that State and local governments may decrease their matching of Federal capital funds as those funds increase substantially, there is no way to clearly predict how much “crowding out” of State and local funds there will be. Therefore, it was assumed that State and local governments would match the increased Federal funding levels at a 1:1 ratio, approximating recent experience. These calculations yielded the projected amounts shown in Exhibits 8-11 and 8-12.

The Timing of Investment

Exhibit 8-13 shows how the investment requirements over the entire 20-year horizon are distributed among each 5-year period. Investments under the Maintain scenario are relatively backloaded, with 54 percent of investment in the latter 10 years. This largely reflects the need for greater capital investments in later years to accommodate transit passenger travel growth. Under the improve

scenario, investments in the initial period are equal in the first and last periods. This is due primarily to the larger investment under this scenario during the early period that is necessary to eliminate the initial backlog of deficiencies.

Exhibit 8-13

Distribution of Transit Investment Requirements by Five-Year Periods

Period	Cost to Maintain Conditions and Performance (Billions of 1997 Dollars)			Cost to Improve Conditions and Performance (Billions of 1997 Dollars)		
	5-Year Total	Annual Average	Percent of 20-Year Total	5-Year Total	Annual Average	Percent of 20-Year Total
1998-2002	52.5	10.5	24.4%	83.4	16.7	26.0%
2003-2007	46.5	9.3	21.6%	72.8	14.6	22.7%
2008-2012	58.1	11.6	27.0%	81.4	16.3	25.4%
2013-2017	58.2	11.6	27.0%	83.4	16.7	26.0%
Total	215.3	10.8	100.0%	321.0	16.0	100.0%

Comparison with Previous Reports

Exhibit 8-14 compares the percent difference between current spending and investment requirements to the same differences calculated in the 1995 and 1997 Conditions and Performance Reports. Due to changes in methodology, especially between 1995 and 1997, estimated investment requirements are not directly comparable. However, the figures here do indicate that the investment requirements relative to spending have remained relatively constant under both scenarios, with investment needs to maintain conditions and performance roughly 40 percent above spending, and investment needs to improve conditions and performance between 100 and 125 percent above actual spending. As noted above, if the increases in funding authorized by TEA-21 are realized, and states continue to match the federal transit capital funding, expenditures on transit capital should increase sharply. Thus, it is expected that future reports will show considerable improvement toward closing the investment gaps.

Exhibit 8-14

Average Annual Transit Investment Requirements Versus Current Spending: 1995, 1997 and 1999 Conditions and Performance Reports

Report Year	Spending Year	Investment Requirements Forecast Years	Percent Above Current Spending	
			Cost to Maintain Conditions and Performance	Cost to Improve Conditions and Performance
1995	1993	1994-2013	37.6%	124.4%
1997	1995	1996-2015	38.3%	102.9%
1999	1997	1998-2017	41.0%	110.2%