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Federal Highway Administration

Federal Transit Administration

PB98-156029

1997 Status of the Nation's Surface Transportation System:

Condition & Performance

A Summary

This publication is a summary of the 1997 report to Congress entitled *Status of the Nation's Surface Transportation System: Condition and Performance*. A copy of the complete report can be obtained by contacting the Federal Highway Administration, HPP-22, Room 3318, 400 Seventh Street, SW, Washington, DC 20590.

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16. Abstract

This document is a summary of the Report to Congress titled *1997 Status of the Nation's Surface Transportation System: Condition and Performance* (C&P report). The C&P report provides current information on highway and transit assets, trends in system condition, performance, and finance, and estimated investment requirements from all sources to meet the anticipated demands in both highway travel and transit ridership. The C&P report is the third in the series that combines information on the Nation's highway and transit systems. This edition include an initial perspective on system performance and investment requirements for the National Highway System. It also provides an overview of the Nation's freight industry, highlighting the role that the transport system plays in supporting mobility requirements of the Nation's economic sector. As in previous edition, this report contains a *Maintain* and an *Improve scenario* for highways, bridges, and transit systems. Both transit investment scenarios were developed using the Transit Economic Requirements Model, an economic analysis tool which integrates National Transit Database information and other data about transit assets, future changes in transit travel, and benefit-cost analysis. The average annual investment required under the Cost to Maintain scenario is estimated at $9.7 billion. The average annual investment required under the Cost to Improve scenario is estimated at $14.2 billion.

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Introduction

This document is a summary of the report to Congress titled: "1997 Status of the Nation's Surface Transportation System: Condition and Performance", (C&P report). The C&P report provides current information on highway and transit assets, trends in system condition, performance, and finance, and estimated investment requirements from all sources to meet the anticipated demands in both highway travel and transit ridership.

This C&P report is the third in the series that combines information on the Nation's highway and transit systems. This edition includes an initial perspective on system performance and investment requirements for the National Highway System. It also provides an overview of the Nation's freight industry, highlighting the role that the transport system plays in supporting the mobility requirements of our Nation's economic sectors.

As in previous versions, this C&P report contains a *maintain* and an *improve* scenario for highways, bridges, and transit systems. Both highway scenarios were developed using the Highway Economic Requirements System (HERS), an economic analysis tool introduced in the 1995 report. This tool seeks to minimize highway user costs, including vehicle operating costs, travel time, and crash costs, as it achieves the defined scenario objective. Bridge estimates for both scenarios continue to be based on engineering analyses.

Both transit investment scenarios were developed using the Transit Economic Requirements Model (TERM), an economic analysis tool which integrates National Transit Database information and other data about the nation's transit assets, future changes in transit travel, and benefit-cost analysis.

All investment scenarios are expected to substantially transition to an economics-based approach for the next report cycle. When this milestone is achieved, this congressionally required report will be fully compliant with Executive Order 12893, "Principles for Federal Infrastructure Investments", issued January 26, 1994. Executive Order 12893 directs all Federal infrastructure agencies responsible for transportation, water resources, energy, and environmental protection, to use economic analyses in administering their programs and developing annual budgets.

Highway and Bridge System and Usage Characteristics

The rural principal arterial system accounted for 4.2 percent of rural mileage and 3.3 percent of total mileage in 1995, while accounting for 47 percent of rural travel and 18 percent of total travel.

The urban principal arterial system accounted for 9 percent of urban mileage and 1.9 percent of total mileage in 1995, while accounting for 58 percent of urban travel and nearly 56 percent of total travel.

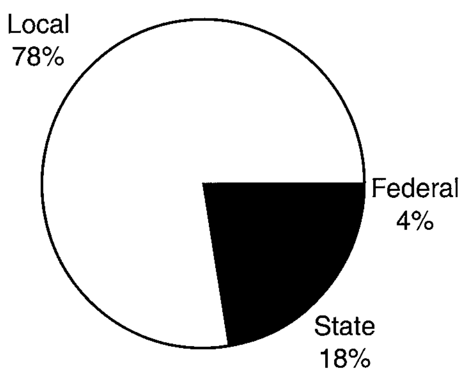
The share of total miles in rural areas decreased from 82 percent to 79 percent between 1985 and 1995, because of the expansion of Federal-aid urban and urbanized area boundaries and the reclassification of certain U.S. Forest Service roads as nonpublic roadways.

Urban highway lane-mileage increased 1.7 percent annually between 1985 and 1995.

Percent Highway Miles, Lane Miles, and Vehicle-Miles Traveled By Functional System - 1995

Functional System	Miles	Lane-miles	VMT
Rural Highways			
Interstate	0.8	1.6	9.2
Other Principal Arterials	2.5	3.0	8.9
Minor Arterial	3.5	3.5	6.3
Major Collector	11.0	10.7	7.7
Minor Collector	7.0	6.7	2.1
Local	54.1	51.9	4.3
Subtotal	**78.9**	**77.4**	**38.5**
Urban Highways			
Interstate	0.3	0.9	14.1
Other Freeways & Expressways	0.2	0.5	6.2
Other Principal Arterials	1.4	2.2	15.3
Minor Arterial	2.3	2.8	12.1
Collector	2.2	2.3	5.3
Local	14.6	13.9	8.5
Subtotal	**21.0**	**22.6**	**61.5**
Total Highway	**100.0**	**100.0**	**100.0**

Highway Mileage by Jurisdiction - 1995



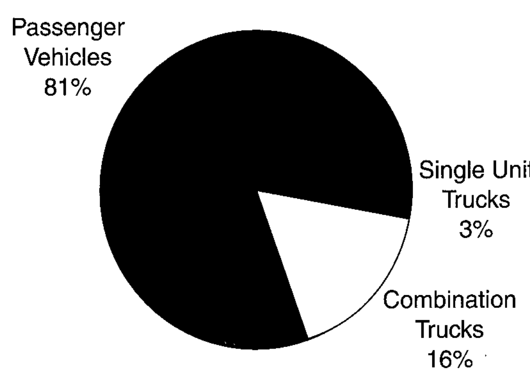
Total National public road and street center-line mileage reached 3.9 million miles in 1995, an increase of only 1.3 percent from 1985.

Local governments control 78 percent of total mileage, and 51 percent of the 581,862 highway bridges. State governments control 18 percent of total mileage and 47 percent of bridges.

Total highway travel reached 2.4 trillion vehicle miles in 1995. Vehicle miles traveled increased in all highway categories between 1985 and 1995, with urban travel increasing 3.6 percent per year and rural travel increasing 2.5 percent per year.

Combination trucks (trailers and semitrailers) **accounted for 16.5 percent of total travel on rural Interstate highways** but only 5.4 percent of travel on urban Interstate highways in 1995.

Rural Interstate VMT by Vehicle Type - 1995



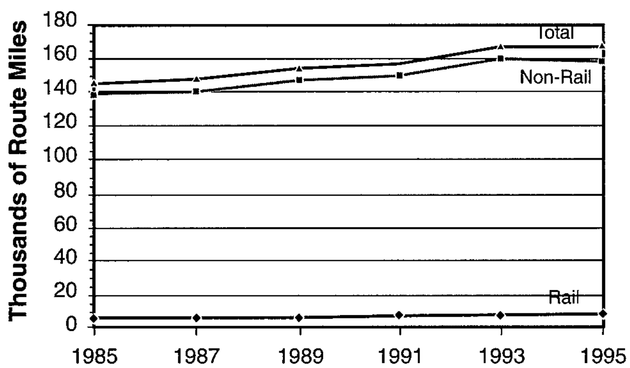
Transit System Usage Characteristics

Public transit performs three public policy functions: managing traffic congestion, providing access through affordable transportation, and supporting transit and pedestrian oriented development. As illustrated in the adjacent chart, a single transit trip can perform more than one of these functions.

There were 537 local public transit operators which provided transit services in 316 urbanized areas in 1995. An additional 5,010 organizations provided transit services in rural and small urban areas.

There were 135,564 transit vehicles, 9,582 miles of track, 2,620 rail stations, and 1,165 maintenance facilities in 1995.

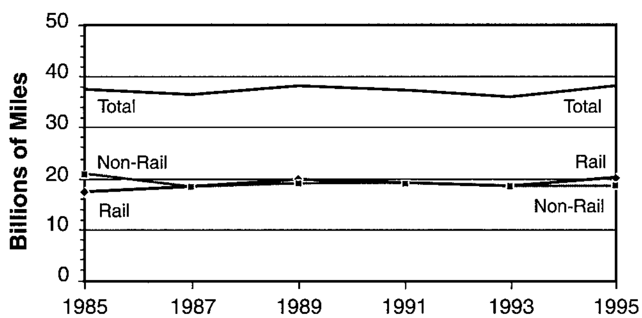
Urban Transit Route Miles 1985-1995



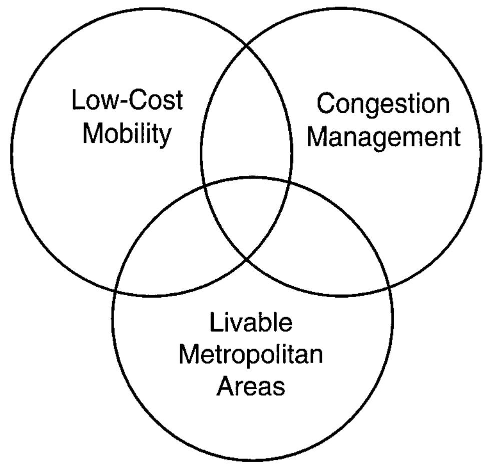
The urban transit fleet increased 32 percent from 1985 to 1995, an annualized growth rate of 3.2 percent.

In 1995, transit rail capacity consisted of 16,729 rail passenger vehicles providing 1.6 million equivalent vehicle miles, an annualized increase of 2.4 percent since 1985. Nonrail capacity provided 1.7 million vehicle miles in 1995, an annualized increase of 1.2 percent since 1985.

Transit Passenger Miles 1985-1995



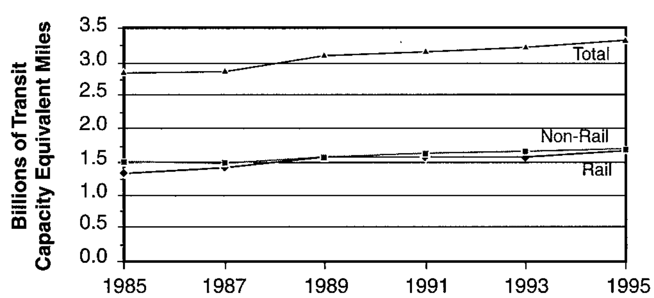
Public Policy Functions of Transit



The combined route miles of rapid rail, commuter rail, and light rail (or streetcar) transit services reached 8,206 miles in 1995. The comparable reported rail figure in 1985 was 5,761 route miles, and the average annual increase since 1985 was 3.6 percent.

Nonrail route miles including buses, ferry boats, vans, and other conveyances reached 158,078 miles in 1995. The comparable figure in 1985 was 138,973 route miles, and the average annual increase was 1.3 percent.

Transit Capacity 1985-1995



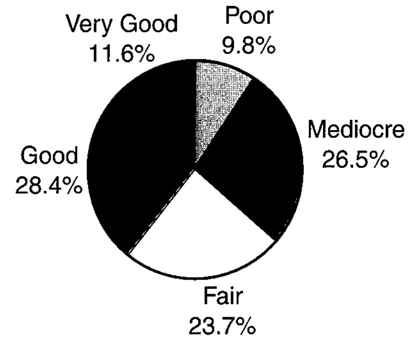
Total transit travel equaled 38 billion passenger miles traveled (PMT) **in 1995**, about the same as in 1985. Rail transit patronage totaled 19.7 billion PMT, an average increase of 1.4 percent per year since 1985. Bus transit patronage was 18.3 billion PMT in 1995, down 1.1 percent per year since 1985.

Highway Conditions and Operational Performance

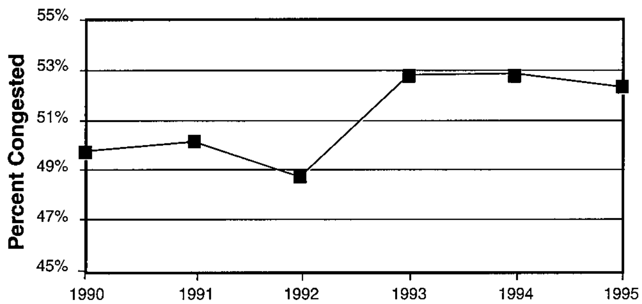
The pavement ride quality of the Nation's urban and rural highways as measured by the International Roughness Index has improved overall, and on most individual functional systems.

The percentage of poor pavement on rural Interstates declined from 6.9 percent to 5.1 percent and on urban Interstates increased from 9.5 percent to 9.8 percent from 1993 to 1995.

Percent Miles of Urban Interstate by Pavement Roughness Category



Percentage of Congested Travel on Urban Principal Arterial Highways
(Peak-hour miles and travel with V/SF over 0.80 Based on 1994 Highway Capacity Manual)

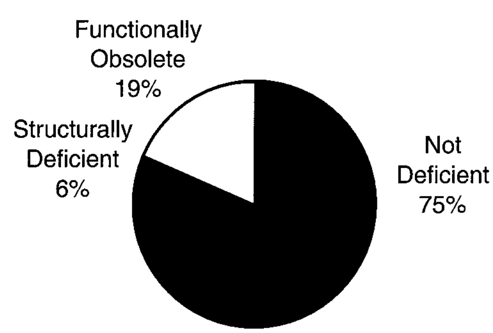


Congestion as measured by peak hour on arterial highways in urban areas has become slightly worse since 1990. The percent of peak hour Urban Interstate travel that occurs under congested conditions has increased from 49.7 percent in 1990 to 52.2 percent in 1995. This volume service flow (VSF) ratio measures only the severity of peak-hour congestion, not its extent or duration.

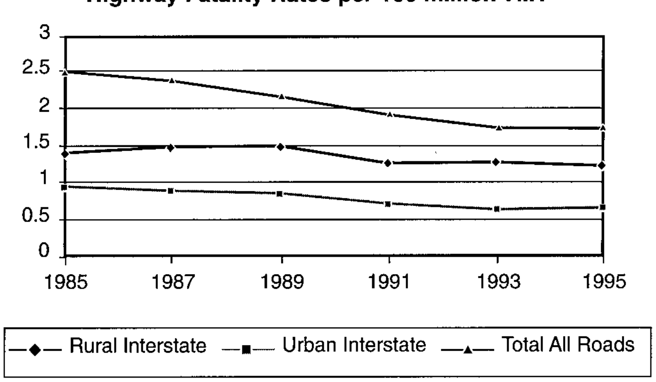
The volume of urban Interstate travel per lane mile has increased at an average rate of 2.4 percent per year since 1985. Congestion increases with increases in travel per lane.

The condition of the Nation's bridges as measured by the percentage of deficient bridges on public roads has improved since 1990. The percentage of deficient bridges on Interstates declined from 28.6 percent in 1990 to 24.8 percent in 1996. The percent of deficient bridges on other arterials declined from 31.7 to 27.6 percent. The percentage of deficient bridges on collectors dropped from 34.5 to 27.1 percent.

Interstate Bridge Deficiencies - 1996



Highway Fatality Rates per 100 million VMT



While the overall highway fatality rate declined from 2.47 to 1.73 per 100 million vehicle miles of travel between 1985 and 1995, the rate of decline has slowed. Since 1993, the fatality rate on rural Interstates declined from 1.25 to 1.20. Fatality rates on urban Interstates, urban other arterials, and rural other arterials rose. Fatality rates on collectors and local roads declined.

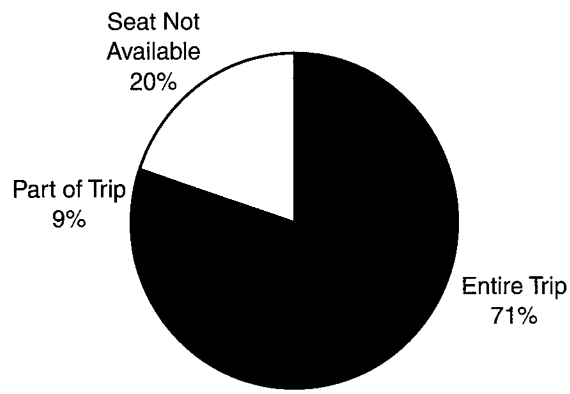
Transit Condition and Performance

Transit system performance measures include speed of transit service, waiting time, the number of transfers required, seat availability, and travel time.

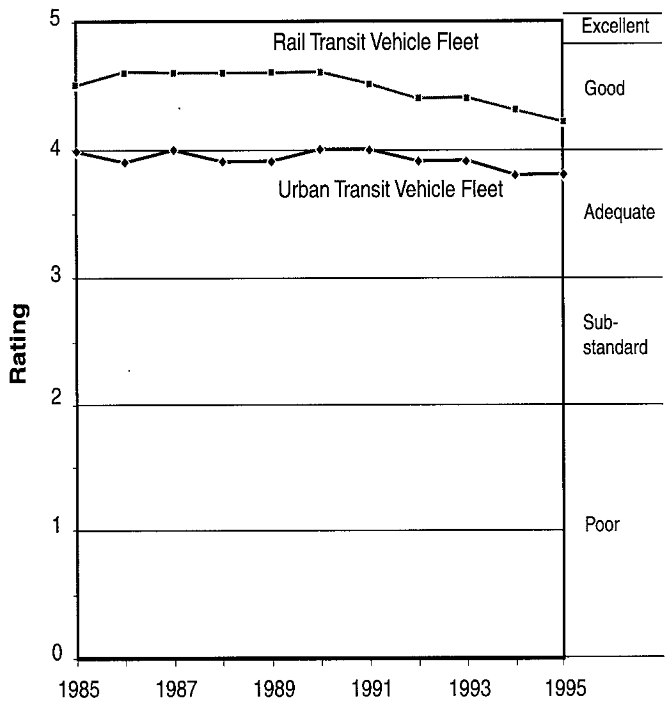
The average speed of rail transit increased 9 percent from 1985 to 1995 to 27 MPH. Bus transit speed increased 1.5 percent over this period to 14 MPH.

The majority of transit riders (59 percent) wait five minutes or less for a transit vehicle, and 80 percent wait less than 10 minutes. Once onboard, 71 percent of riders have a seat for the entire trip, and 80 percent have seats for part of the trip.

Transit Riders with Available Seat



Urban Transit Vehicle Fleet and Rail Transit Vehicle Fleet Condition



The overall weighted condition of the bus and urban paratransit fleet in 1995 was at a condition level of "adequate", reflecting a slightly declining bus condition trend since 1985. Nearly 70 percent of the urban bus fleet consists of full-size buses, which were also at an overall condition rating of adequate in 1995.

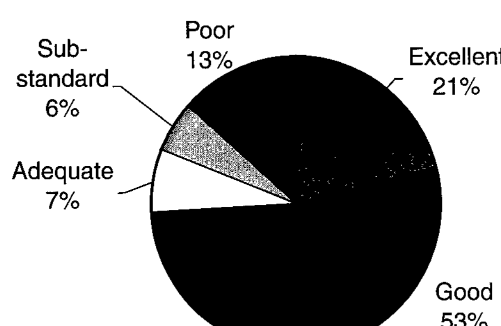
In 1995, the average weighted condition of all rail vehicles was at a condition level of "good". Rapid-rail cars comprise 61 percent of the total urban rail fleet and were also at an overall condition rating of good in 1995. The average condition of the commuter rail and rapid rail fleets declined between 1985 and 1995 while the light rail fleet condition improved.

The average fleet age for all classes of buses and urban paratransit vehicles in 1995 was greater than one-half the useful-life guideline. The same was true for all classes of rail vehicle types. As a result, **there is a backlog of overage vehicles in need of replacement**.

Seventy-four percent of the urban bus maintenance facilities are in good or excellent condition. Nineteen percent are in substandard or poor condition.

Forty-five percent of bus maintenance facilities are less than 20 years old. Thirty-four percent are between 20 and 30 years old, and 21 percent are more than 30 years old.

Condition of Urban Bus Maintenance Facilities



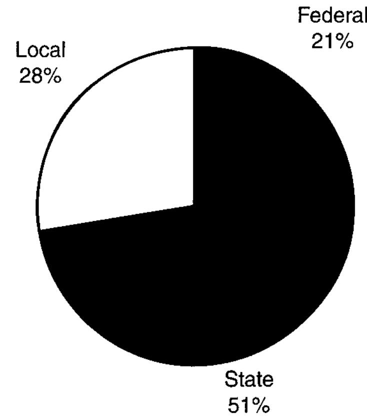
Highway Finance

Of total 1995 highway expenditures of $92.5 billion, the Federal Government funded $20.0 billion; the States $46.8 billion; and counties, cities and other local government entities, $25.8 billion.

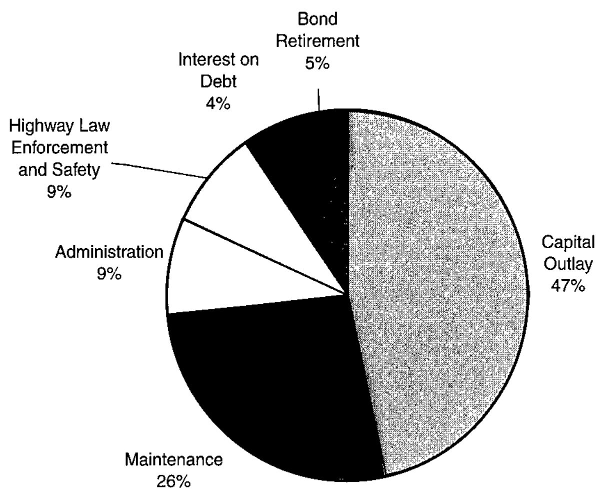
Highway-user revenues — the total amount generated from motor-fuel taxes, motor-vehicle fees, and tolls—were $84.1 billion in 1995 with $59.6 billion of this total going to highway programs. This represented 62 percent of total funding for highways.

Highway-user revenues would have been sufficient to cover 91 percent of all highway expenditures if the full amount had been used for highways.

Highway Funding by Governmental Unit - 1995



Highway Expenditures by Type - 1995



Since 1985, capital outlay's share of total spending has varied from 46 to 48 percent. Maintenance's share has declined from 29 to 26 percent since 1985.

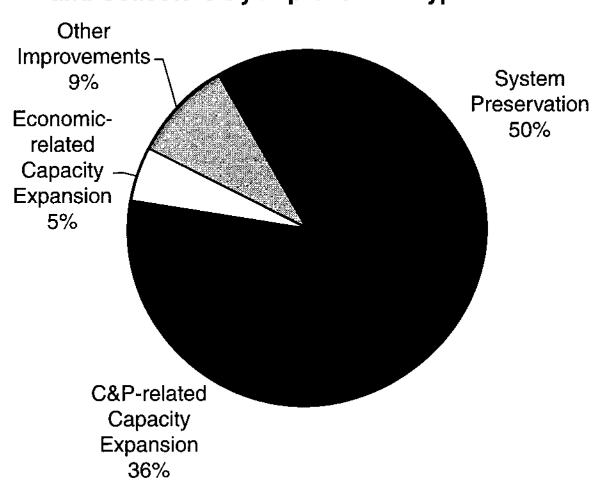
Highway spending has risen faster than inflation over time, growing 31.3 percent in constant dollars, between 1975 and 1995.

Federal funds accounted for $19.2 billion, or 44 percent of the $43.1 billion in total capital outlay. Since 1987, the Federal share has remained in a range from 41 to 46 percent.

There has been a shift in the types of highway capital improvements being made, with the portion of highway capital outlay used for system preservation growing from 45 percent in 1993 to 50 percent in 1995; the portion used for capacity expansion falling from 49 percent to 41 percent.

Of the $43.1 billion invested in capital improvements, $38.0 billion (88 percent) was related to the investment requirements outlined in this report. Five percent went for construction of new roads intended primarily to encourage economic development rather than to address existing capacity deficiencies. The remaining 9 percent was used for environmental enhancements and some safety and traffic operations improvements, for which investment requirements are not currently modeled.

Distribution of Highway Capital Outlay on Arterials and Collectors By Improvement Type - 1995



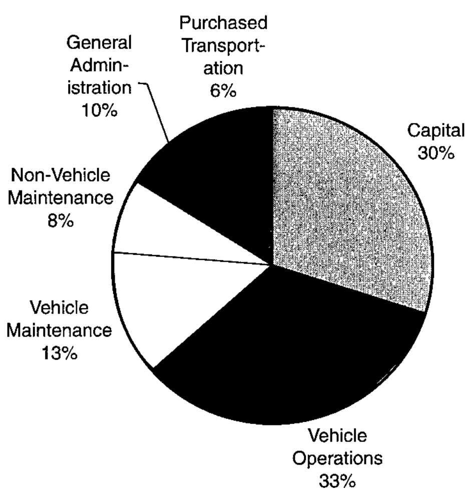
Transit Finance

All levels of government provided $16.5 billion for public transit funding in 1995, with the Federal Government contributing $4.1 billion or 25 percent.

After reaching a low of 45 percent in 1980, the State and local share of public sector revenue for transit has increased steadily. Since 1991, the State and local share has remained stable, accounging for approximately 75 percent of total public transit funding.

Federal capital assistance to transit remained relatively stable between 1988 and 1995, while the level of State and local contributions increased. The Federal share of capital funds decreased from 58 percent to 47 percent over this period.

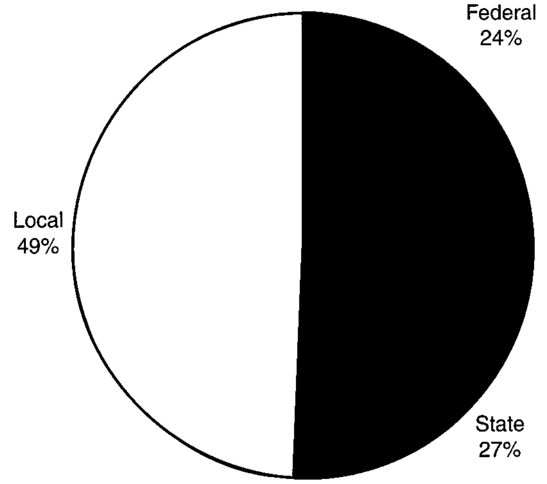
Transit Expenditures by Type - 1995



Operating expenditures for bus services were $9.0 billion in 1995, 55 percent of total operating expenditures. Operating expenses for heavy, commuter, and light rail services totaled $6.1 billion in 1995, 38 percent of the total.

Capital expenditures for buses and bus facilities in 1995 were $1.9 billion, 27 percent of total capital expenditures. Capital expenditures for rail totaled $4.9 billion, 70 percent of the total, reflecting the long-term trend of investment in rail transit capacity.

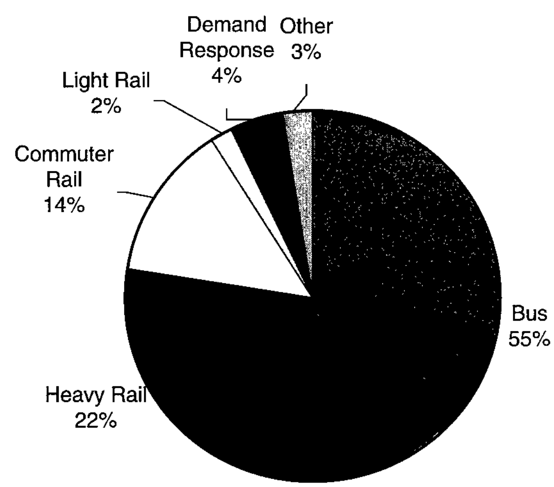
Transit Funding by Level of Government - 1995



Of the $23.2 billion in expenditures for transit in 1995 from all sources, $7 billion was used for capital, and $16.2 billion for operating expenses. In addition to public sector funding, approximately $7 billion of transit expenditures were funded from fare-boxes and other system-generated revenue.

The largest single component of transit capital expenditures was rail facilities, at $2.9 billion, or 42 percent. Twenty percent of total capital expenditures were for rolling stock, such as buses and railcars.

Transit Operating Expenditures by Mode



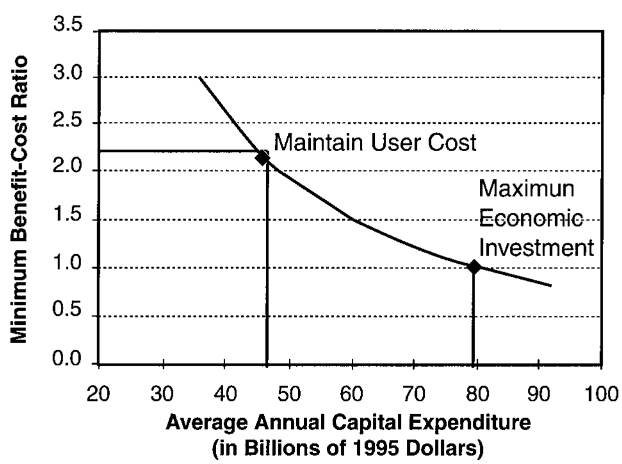
Highway and Bridge Investment Requirments

This report uses two scenarios to estimate investment requirements for the 20-year period 1996-2015. The Maximum Economic Investment (MEI) scenario represents the highest level of investment that is economically justifiable. The Maintain User Costs (MUC) scenario represents the minimum level of investment needed to maintain user costs (delay, vehicle operating and crash costs) at 1995 levels.

Average annual investment requirements under the MEI scenario are $79.6 billion, including $9.3 billion for bridges. **Average annual requirements under the MUC scenario are $46.1 billion,** including $5.6 billion for bridges.

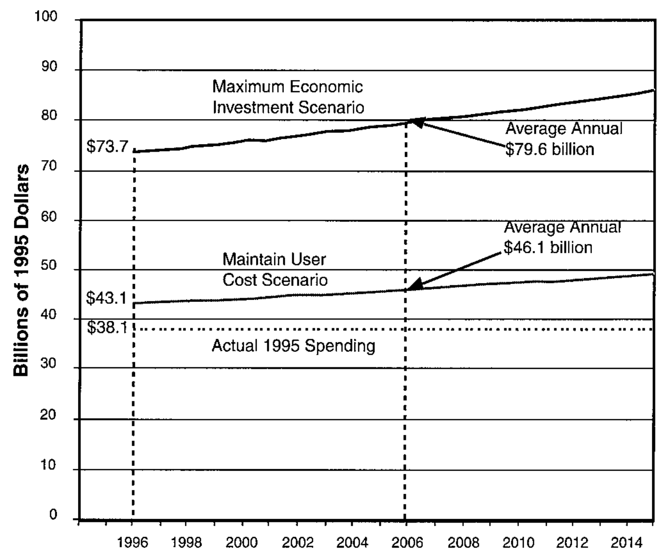
Highway capital expenditures related to condition and performance were $38.1 billion in 1995. **Spending would have to increase 13 percent to reach the MUC level** of $43.1 billion for 1996, and by 93 percent to reach the MEI level of $73.7 billion for 1996.

Performance vs. Expenditure



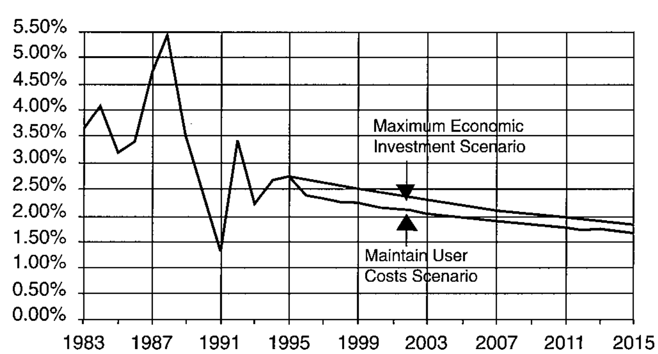
The investment requirements for the MEI and MUC scenarios are based on an assumption that average annual growth rate in VMT from 1996-2015 will be 1.96 percent under the MUC scenario and 2.25 percent under the MEI scenario. (The MEI rate is higher, because it is assumed that reductions in user costs will induce more travel.) It is assumed that VMT growth rates will gradually decline over this period from the 1995 level of 2.77 percent. If these projected rates are too low, then the investment requirements may be understated.

Investment Requirement 1996-2015
Compared to 1995 C&P Report-related Spending
(stated in constant 1995 dollars)



The MEI and MUC levels are determined using a benefit/cost analysis, comparing the potential benefits of individual highway improvements (reducing highway user costs and agency maintenance costs) with the costs of making them. Assuming the projects with the highest benefit cost ratios (BCR) are implemented first, for every additional dollar invested, total returns will increase up until the MEI level of $79.6 billion where the marginal BCR = 1.0, but the marginal and average rates of return will decline. At the MEI level, the average BCR would be 3.1, meaning that an average of $3.1 dollars of benefits would be obtained from every dollar invested. **At the MUC level, an average of $5.4 dollars of benefits would be obtained from every dollar invested.**

Annual VMT Growth Rates



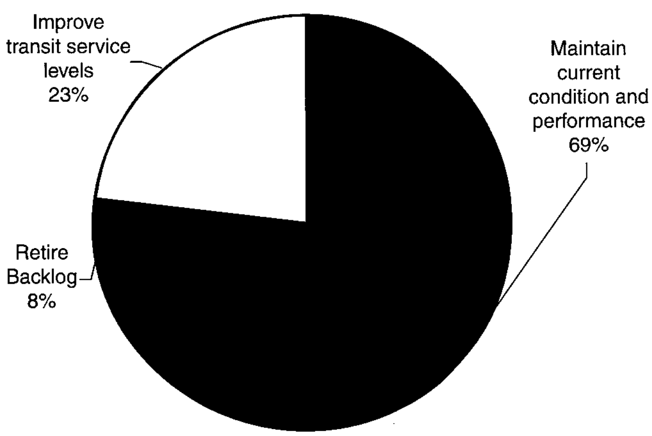
Transit Investment Requirements

This report uses two scenarios to estimate investment requirements for the 20-year period 1996-2015. The Maintain scenario would maintain equipment and facilities in the current state of repair, while accommodating future transit travel growth. The Improve scenario would make additional investments to improve the condition of transit assets to "good", and to improve the performance of transit operations.

The average annual investment required under the Cost to Maintain scenario is estimated at $9.7 billion. The average annual investment required under the Cost to Improve scenario is estimated at $14.2 billion.

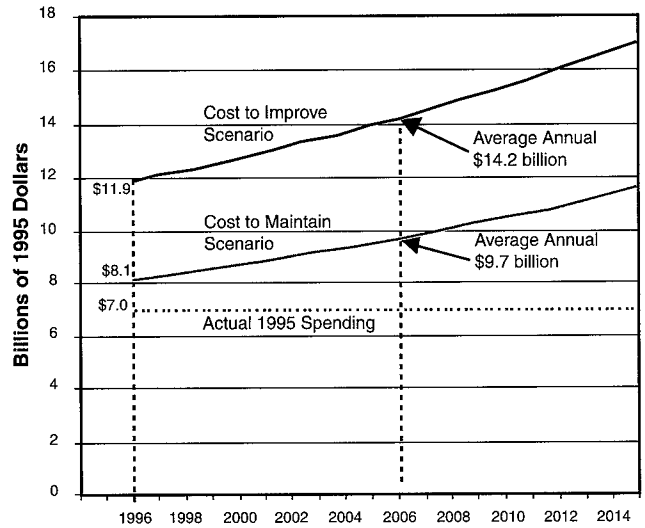
Transit capital spending would need to increase 16 percent above the 1995 level of $7.0 billion to reach the Cost to Maintain scenario level of $8.1 billion for 1996, and by 69 percent to reach the Cost to Improve scenario level of $11.9 billion for 1996.

Breakdown of Cost to Improve scenario



The investment requirements for the two transit scenarios are based on forecasts from Metropolitan Planning Organizations of a 2.3 percent average growth rate in Passenger Miles Traveled (PMT). While overall PMT has remained almost constant since 1985, from 1993 to 1995, PMT grew 2.4 percent annually. If PMT were to grow at a rate 20 percent lower, (e.g., 1.8 percent) the Cost to Improve scenario investment requirement would be 7 percent lower.

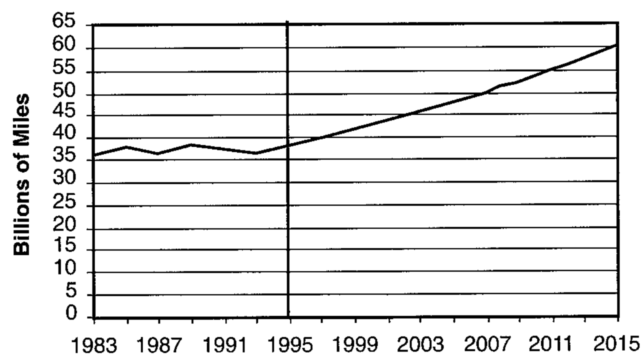
Investment Requirement 1996-2015
Compared to 1995 Capital Spending
(stated in constant 1995 dollars)



Of the $14.2 average annual investment requirements under the Improve scenario, 69 percent is for measures to maintain current transit condition and performance. An additional $1.2 billion is required to retire the existing backlog of required rehabilitations and replacements, and $3.3 billion is required to improve transit service levels in terms of speed and convenience.

Potential transit investments are evaluated using a benefit/cost analysis, comparing the potential benefits of individual investments (travel time savings, reduced automobile costs, improved mobility, reductions in agency operating costs, and reductions in roadway congestion) with the costs of making them. Only those investments with a benefit/cost ratio greater than 1.0 are made.

Projected Passenger Miles of Travel



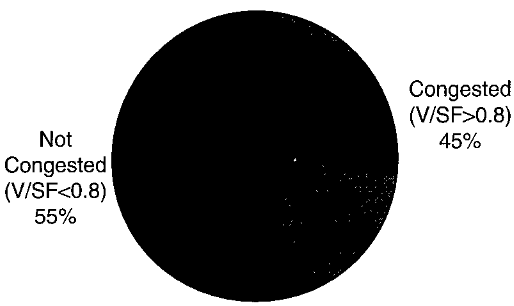
National Highway System

The National Highway System (NHS) consists of 156,986 miles, 4.0 percent of total mileage. The NHS includes both the Interstate system and other highways of national significance as specified in the National Highway System Designation Act of 1995.

The percentage of poor pavement on the rural portion of the NHS was 2.8 percent; on the urban portion of the NHS 9.2 percent of the mileage was poor.

Of the 127,736 bridges on the NHS, 32,920, or 25.8 percent are deficient. This includes 9,690 structurally deficient bridges, 7.6 percent of the total, and 23,230 functionally deficient bridges, 18.2 percent of the total.

Percent of Congested Travel on Urban NHS routes

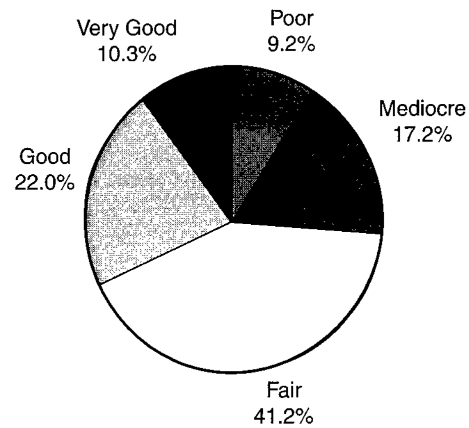


In 1995, all levels of government spent $20.3 billion for capital outlay on the NHS. This represents 47.2 percent of total capital outlay of $43.1 billion. Of the $20.3 billion, $17.1 billion was related to the investment requirements outlined in this report.

An estimated $12.5 billion of Federal grants to States and local governments was used for capital outlay on the NHS in 1995. This is the equivalent of 61.7 percent of the total capital outlay, and represents 66.7 percent of total Federal grants to State and local governments of $18.8 billion.

	Highway	Bridge	Total
MEI scenario	$31.2	$5.6	$36.8
MUC scenario	$16.2	$3.7	$19.9
1995 spending			$17.1

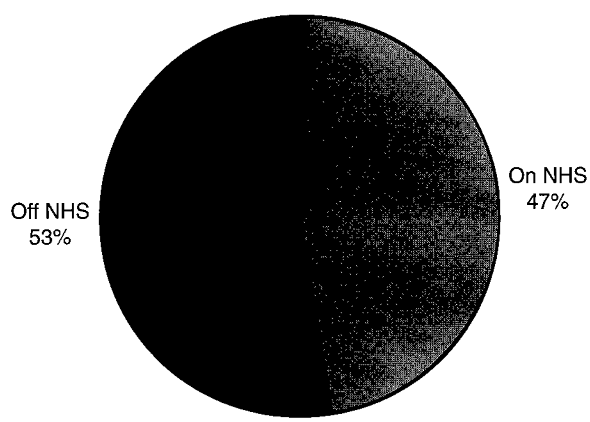
Percent Miles of Urban NHS by Pavement Roughness Category



Total VMT on the NHS was 1.0 trillion in 1995, 43.0 percent of total VMT.

Using the traditional measure of highway congestion, the ratio of the volume of traffic using a road in the peak hour to the capacity or service flow of that road (V/SF), 45.1 percent of peak-hour urban travel on the NHS occurs in congested conditions (V/SF more than 0.80). Above 0.80, travelers on the road experience significant interference with free traffic flow.

Percent of Capital Outlay on the NHS



The average annual investment required to maintain user costs on the NHS at the 1995 level for the next 20 years (Maintain User Costs scenario) is $19.9 billion; to accomplish all improvements on the NHS that are economically justified (Maximum Economic Investment scenario) would require an average of $36.8 billion.

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