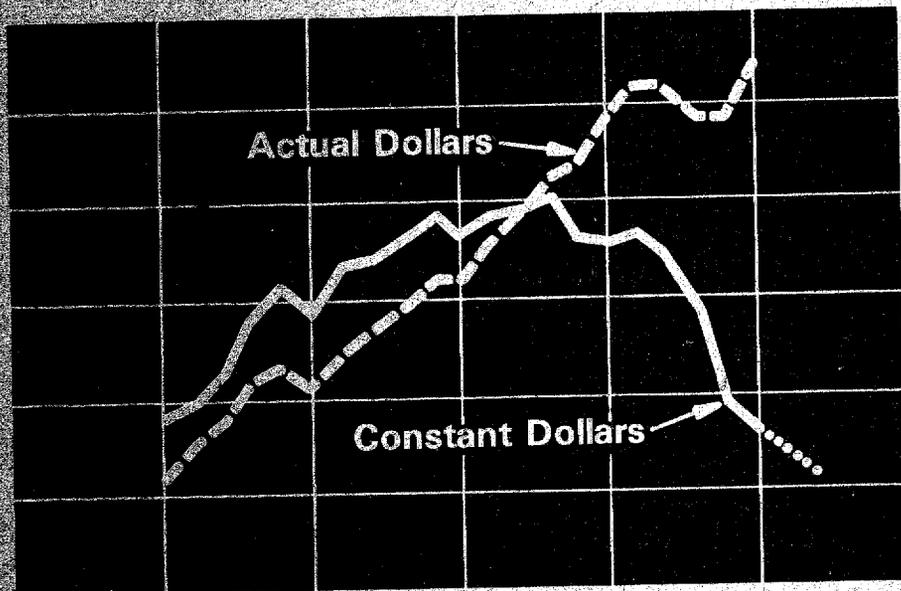
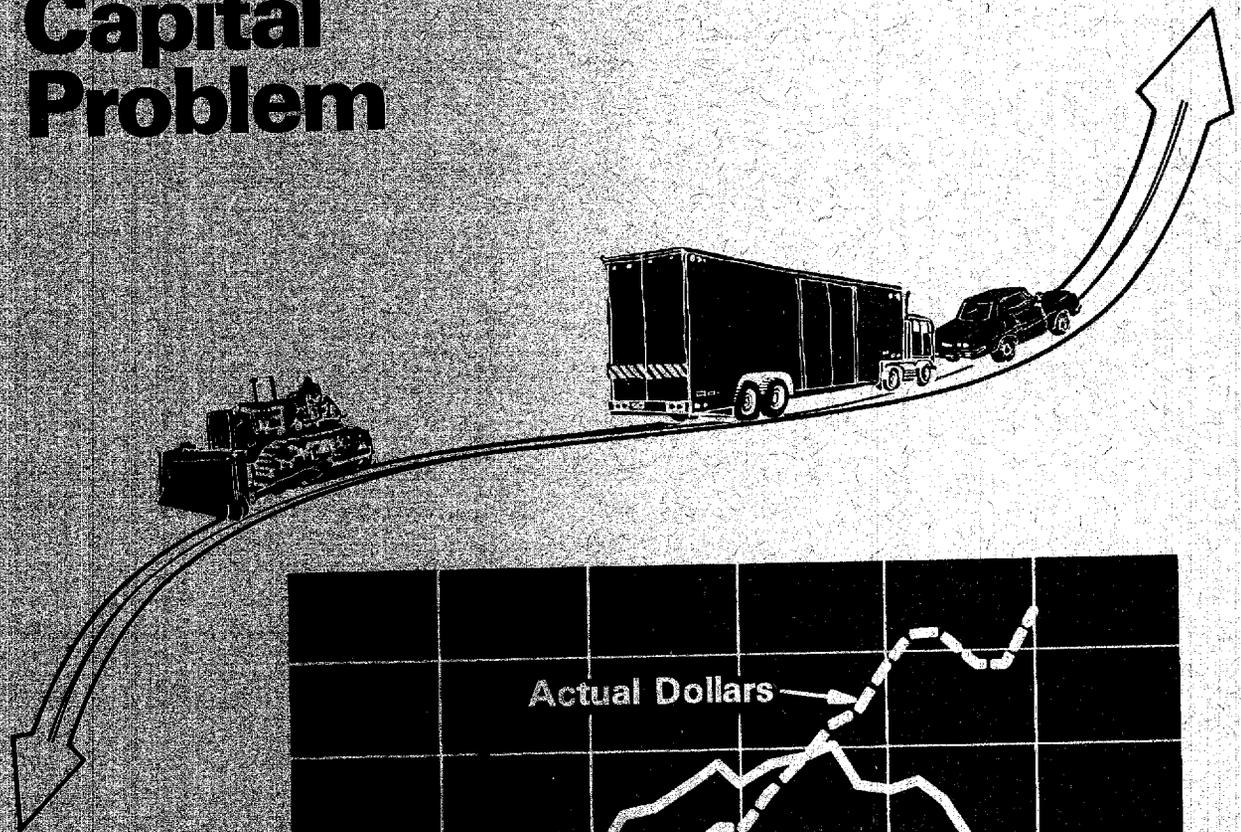
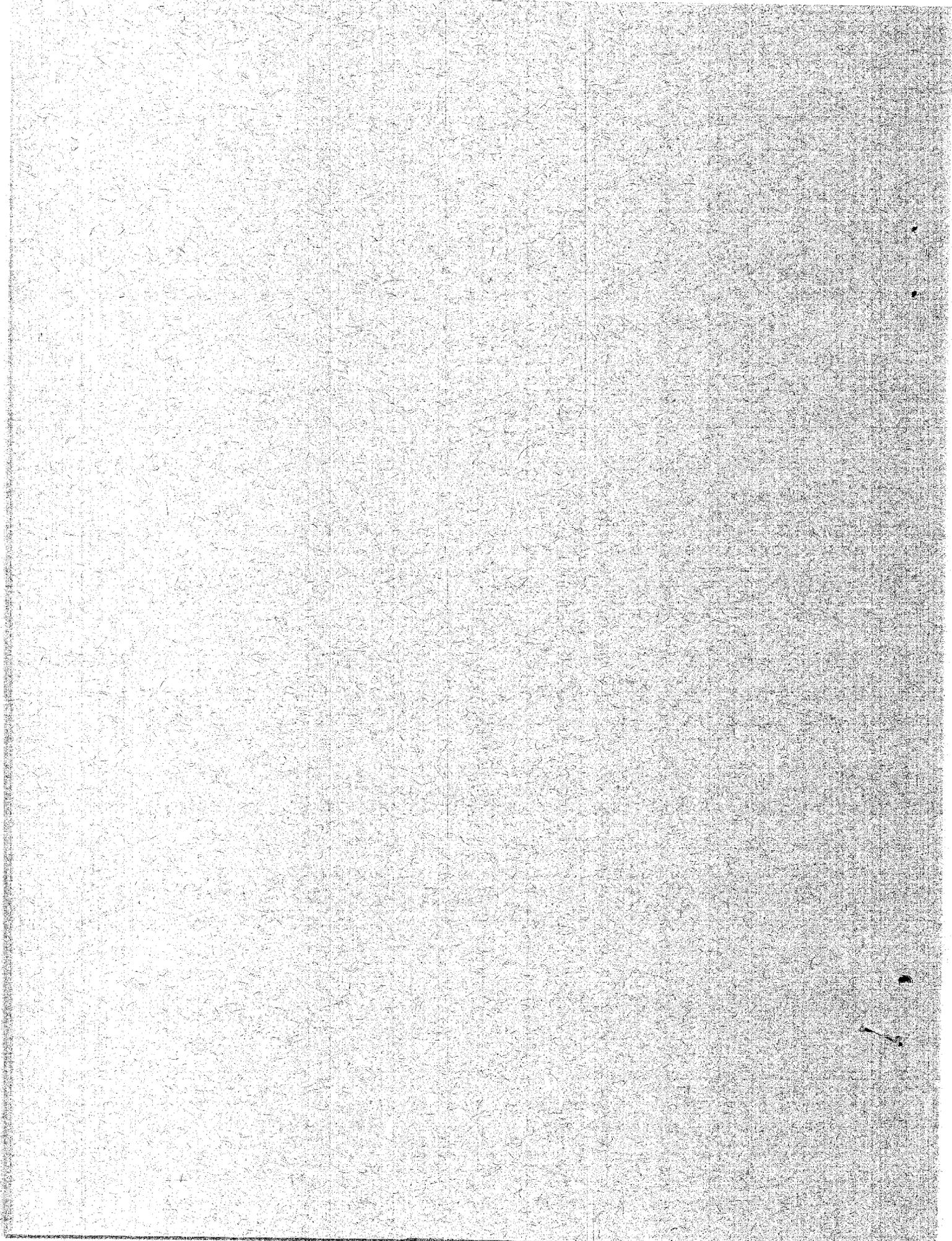


# The Highway Capital Problem



August 1975

U.S. Department of Transportation  
Federal Highway Administration  
Office of Program and Policy Planning



**THE HIGHWAY CAPITAL PROBLEM**

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Federal Highway Administration

August 1975

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## FOREWORD

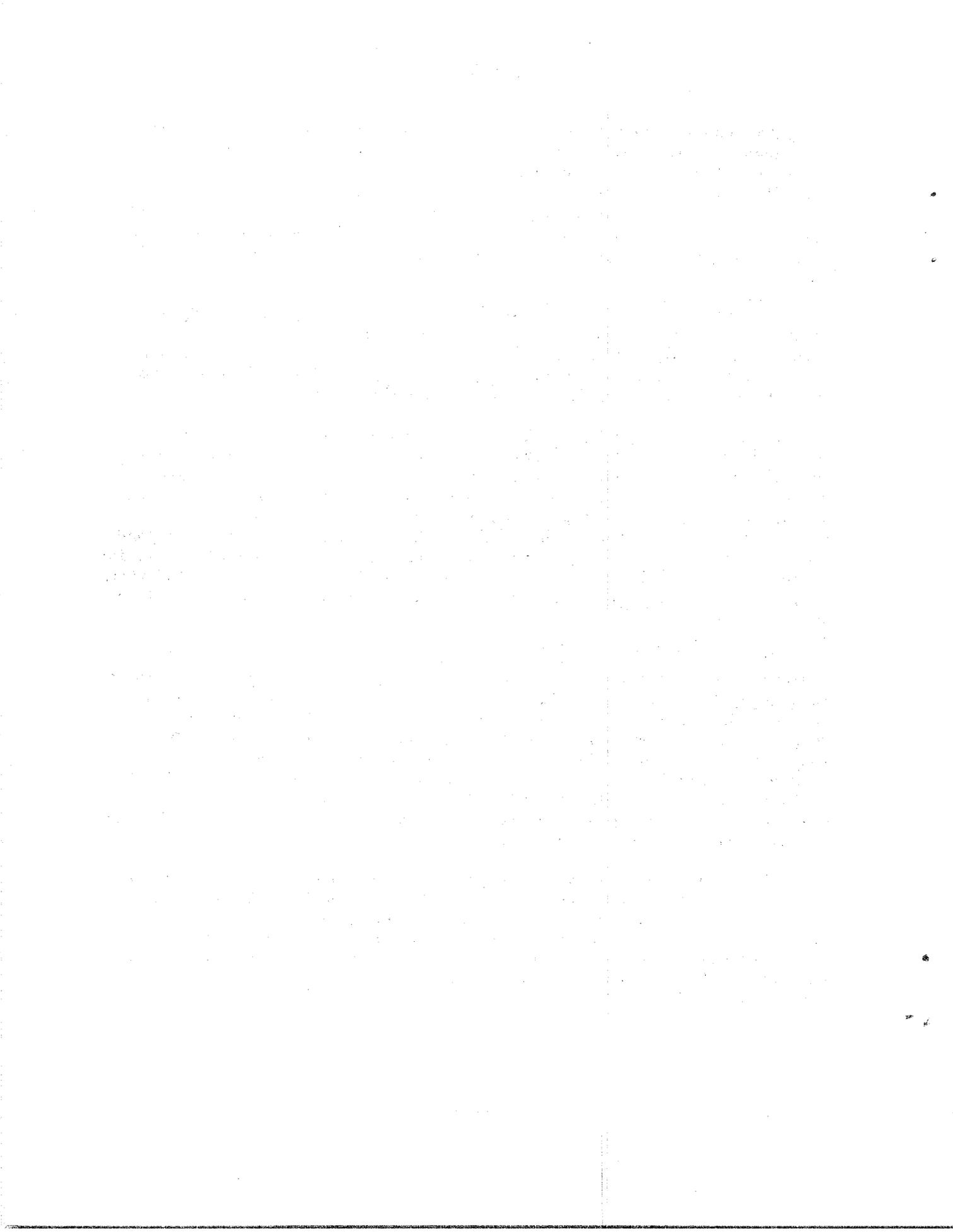
This paper attempts to illustrate a current dilemma with respect to highway capital investment: while current investment in highways is maintaining a relatively high dollar volume, inflation has significantly eroded its effectiveness. Thus, in terms of constant dollars, all units of government are expending a decreasing amount for improvements. This problem is intensified when the decreasing capital expenditures are accompanied by increasing rates of travel on the Nation's highways.

The intent here is not to attempt to prescribe specific programs or program levels for counteracting the observed decline in real capital investments in highway transportation. Instead, the report focuses on current conditions based on actual experience and illustrates relationships with various economic and transportation indexes.

Program formulation must consider a wide range of factors in addition to the impact of inflation on current capital authorizations. Such factors include the overall needs for transportation and other programs, energy conservation, environmental considerations, the state of the economy, and the fiscal capacity generated by the Nation's resources to alter present conditions. These issues are clearly beyond the scope of this study. Highway needs must be put in proper perspective in response to general policy and legislative direction by relating them to the total needs of the Nation as they are tempered by changing times and conditions.

This report presents graphic comparisons and illustrations with a minimum of narrative. A brief background description traces developments in highway financing, highlighting capital investments in highways by Federal, State, and local governments. In the third section, relationships between highway capital outlay and various economic and performance indicators are shown. The effects of inflation on highway needs are examined in the fourth section, as well as the relationships between highway capital expenditures and GNP. The final section summarizes observations. The appendix contains several tables exhibiting background information directly related to the report.

The authors wish to acknowledge the assistance and guidance extended by W. R. McCallum, G. R. Tyndall, W. F. Reulein, D. R. McElhaney, and other officials and staff of the Federal Highway Administration. In addition, staff of the American Association of State Highway and Transportation Officials, the Highway Users Federation for Safety and Mobility, and others who reviewed early drafts of the report and provided helpful comments.



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## THE HIGHWAY CAPITAL PROBLEM

In recent years, a number of studies have been undertaken to aid decisionmakers in developing programs to improve certain highways and highway systems of the Nation. A few of the more prominent are (1) the periodic cost to complete the Interstate System 1/, (2) the 1972 and 1974 National Highway Needs Report, and (3) the Priority Primary Route Cost Study.3/

The total costs required to improve all highways of the Nation to the standards outlined in these studies involves a level of investment that is unlikely to be attained, because the cost of such an undertaking would drain public revenues away from other pressing Federal, State, and local programs. On the other hand, if all needs were to be met, the resulting quality of performance would be far superior to today's level.

### I. The Problem

Because highways carry major portions of the Nation's freight and passenger traffic, adequate highway improvement programs are essential to provide a safe and efficient ground transportation network. Although the level of investment is an open issue, it must be adequate to meet the critical needs for highways equitably in the context of total transportation needs and in a manner consistent with other public needs of the Nation.

Total annual disbursements for highways by the public sector (Federal, State, and local governments) have expanded from meager beginnings of less than \$2 billion in the 1920's to over \$26 billion in 1975. Historically, capital costs have represented the major share of these expenditures. But with increasing noncapital demands due to such related requirements as highway safety, highway and vehicle law enforcement, higher interest rates on indebtedness and most importantly maintenance and operation of the highway plant, the proportion of public funds available for capital improvements has declined by 1975 to less than one-half of all dollars expended. Thus, in spite of increased overall dollars for highways, capital improvement funds have actually declined in recent years as a percentage of total highway disbursements, as well as a percentage of the gross national product.

For several years inflation has had a serious impact on the Nation's economy. The construction industry has been particularly affected. For example, the cost of highway construction has doubled

in the last 7 years. (Since 1967 the Composite Bid Price Index for Federal-aid highway construction has increased from 100 to 201.8 for 1974.) The miles of highways put in place per dollar are shrinking--most precipitously in the last few years. To illustrate, total capital outlay estimated for 1974 was slightly less than \$12 billion. But in constant dollars (1967 base), the capital improvement program amounted to only \$5.9 billion, a figure approximately equal to the 1967 constant dollar outlay in 1955, when our population was smaller and travel on our highways was less than half of that for 1974.

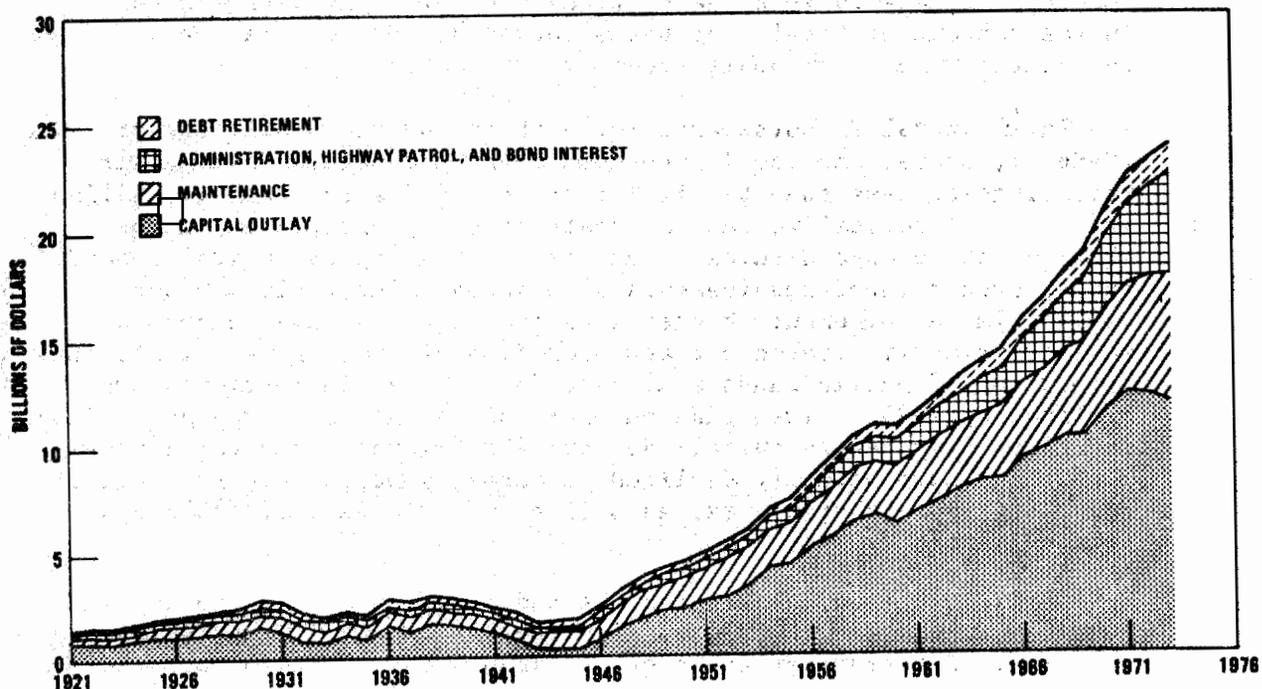
In sum, concern is expressed that the level of public investments for highways is not keeping pace with the requirements to maintain an adequate level of service.

## II. Background

The Nation's total expenditures for highways have exhibited a pattern of steady growth since the end of World War II, as shown in figure 1. Prior to the war, total annual disbursements

Figure 1

### TOTAL DISBURSEMENTS FOR HIGHWAYS, BY FUNCTION 1921-1973



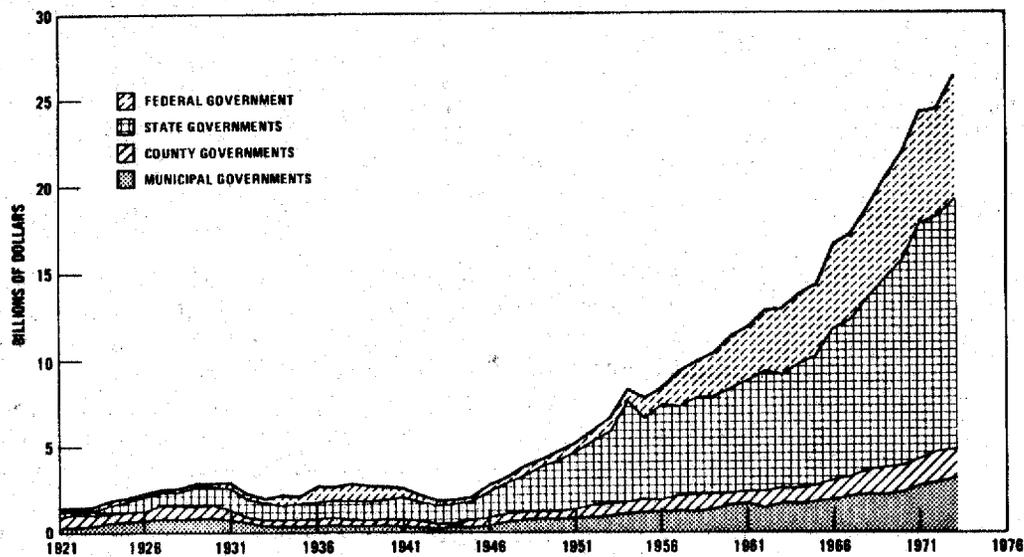
Source: Highway Statistics Division

did not exceed \$3 billion; in fact, in only 2 years (1930 and 1938) did total disbursements for highways approximate this level. After the war highway disbursements grew from \$1.7 billion in 1945 to \$4.5 billion in 1950, \$10.8 billion in 1960, and to \$20.8 billion in 1970, or 36 percent faster than the Gross National Product (GNP).<sup>\*</sup> For 1973, the latest year for which complete data are available, total highway expenditures by all units of government (Federal, State, and local) were nearly \$24 billion.

The Federal Government has expended only modest sums of money directly for highways since 1921 according to figure 2a. These are primarily for forest and park roads, etc. Noteworthy in the chart is the Federal Government's direct expenditures during the depression of the 1930's principally through the emergency public works programs. Rather than constructing highways directly, the Federal Government has carried out its interest through a reimbursement program with the States whereby the latter contracts for highways. The States are primarily responsible for the development and preservation of highways. Federal aid for highways, channeled through State highway agencies, increased significantly since the passage of the Federal-Aid Highway Act of 1956 as shown in figure 2.

Figure 2

### TOTAL RECEIPTS FOR HIGHWAYS, BY GOVERNMENTAL UNITS 1921-1973

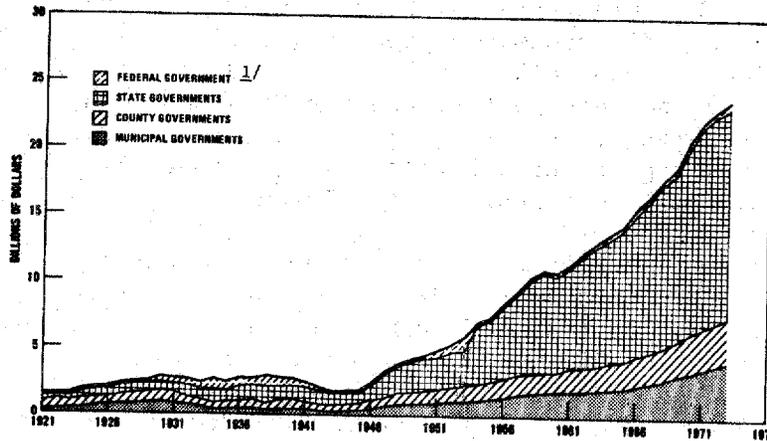


Source: Highway Statistics Division

\* Comparison period 1950 to 1970.

Figure 2a

**TOTAL DISBURSEMENTS FOR HIGHWAYS, BY GOVERNMENTAL UNITS  
1921-1973**



Source: Highway Statistics Division

1/ Federal share shown here represents direct expenditures for highways. Federal grants-in-aid, e.g. Highway Trust Fund, Forest Reserve Funds, shared revenues, etc., are included with State and local government shares. See figure 2 for total Federal share of highway receipts.

Receipts for 1973 for highways came from the following sources and agencies:

1973 Receipts for Highways

(In billions of dollars)

	<u>Federal</u>	<u>State</u>	<u>Local</u>	<u>Total</u>	<u>Percent</u>
Highway-user imposts	6.1	12.2	0.4	18.7	71
Other income*	1.0	0.8	3.8	5.6	21
Bond proceeds	-	1.2	0.8	2.0	8
<b>Total</b>	<u>7.1</u>	<u>14.2</u>	<u>5.0</u>	<u>26.3</u>	<u>100</u>
 Percent across	27	54	19	100	

What is Capital Outlay for Highways? Capital outlay consists of those costs associated with highway improvements, including land acquisition, relocation assistance and other related right-of-way costs, preliminary and construction engineering, construction costs of roadway and structure, and installation of traffic service facilities such as guardrails, fencing, signs and signals, etc.4/ It does not include maintenance of highways.

Highway Capital Improvement--As indicated in figure 1, total highway disbursements have increased at a faster rate than capital outlay for highways. In recent years, current capital outlay has even declined. According to data compiled by FHWA, the annual

\* General Fund Appropriation, other taxes, investment income, property taxes, etc.

expenditures for highway capital improvement by all units of government since 1970 are reported as follows:

<u>Year</u>	<u>Capital Outlay (In \$ Millions)</u>	<u>Percent of Total Disbursements</u>
1970	11,575	55
1971	12,324	55
1972	12,403	53
1973	11,932	50
1974 estimate	11,959	48
1975 forecast	12,827	48

Thus, in terms of annual expenditures since 1970, capital improvement is receiving a smaller share of total highway disbursements.

Subsequent to the passage of the 1956 Federal-Aid Highway Act, most of the increase in total capital outlay for highways to 1965 is attributable to the Interstate System. Since 1965 however, annual Interstate investments have stabilized while non-Interstate expenditures increased from \$5.5 billion to \$8.4 billion per year in current dollars, are shown below.

(In millions of dollars)

<u>Year</u>	<u>Total Capital Outlay</u>	<u>Interstate</u>	<u>Non-Interstate</u>
1956	5,005	1,282	3,723
1960	6,290	2,224	4,066
1966	9,246	3,718	5,528
1968	10,346	4,000	6,346
1970	11,575	4,033	7,542
1974	11,959	3,544	8,415

Since the mid-sixties the Office of Management and Budget (OMB) has deferred portions of Federal aid for highways which may have constrained the total program level. However, there is no conclusive evidence that States would have maintained their 100 percent State programs at the recorded levels during this period if full Federal-aid authorizations were available.

More recently, President Ford on February 11, 1975, released an additional \$2 billion of Federal-aid funds for FY 1975 as an employment stimulative. In April (1975) the Congress disapproved continued deferral of the remaining funds thus permitted States to obligate greater sums immediately (within State's unobligated balances of apportioned and allocated funds).

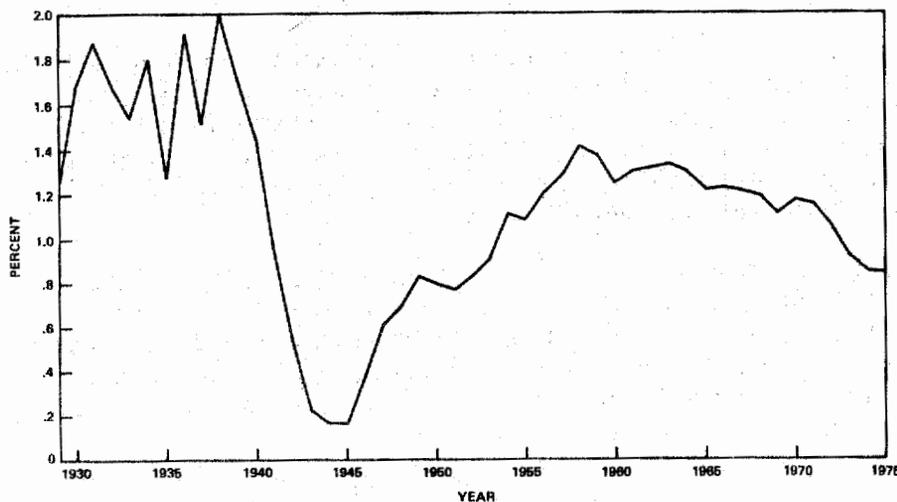
Further, the Congress passed and the President approved a measure allowing temporary suspension of the Federal-aid matching requirement and removed restrictions on transferability among non-Interstate program funds. These measures resulted in the obligation of \$7.6 billion of Federal-aid highway funds in fiscal year 1975, the highest level of obligation in the history of the Federal-aid programs.

Whether or not the program levels for fiscal year 1976 and beyond could be maintained at this level would depend on the utilization of current unobligated balances of apportioned and allocated funds, the authorization levels set by future Federal-aid highway legislation, and the States' ability to raise matching funds.

Highway Improvements as a Percent of GNP--Prior to World War II, highway construction represented a more significant share of GNP than it has in any year since the war. In 1939, highway construction equalled 1.72 percent of that year's GNP, whereas for 1974 it represents less than one-half of that share (0.85 percent). The following tabulation, and figure 3, trace the highway capital record as a percent of GNP over nearly half a century:

<u>Year</u>	<u>Percent</u>	<u>Year</u>	<u>Percent</u>
1930	1.68	1965	1.22
1935	1.27	1970	1.18
1940	1.45	1971	1.16
1950	0.80	1972	1.06
1955	1.09	1973	0.92
1960	1.25	1974	0.85

FIGURE 3  
HIGHWAY CAPITAL OUTLAY AS A PERCENT  
OF GROSS NATIONAL PRODUCT  
1929 TO 1976  
(CURRENT DOLLARS)



The highest post-war percentage was recorded in 1958 when highway construction reached 1.42 percent of GNP. A gradual decline took place thereafter, until the 1970's when a precipitous drop occurred. Moreover, the average percent per 5-year period shows an upward movement from 0.58 percent for the 1945-1950 period to 0.92 for 1950-55, to 1.27 for 1955-60, and peaking at 1.28 for the period ending in 1965. In the 1965 to 1970 period, highway construction as a percent of GNP averaged 1.19 percent. The average rate dropped to 1 percent for the 1970 to 1974 period, and, in fact, is only 0.85 percent for 1974!

Clearly highway construction is experiencing a declining role as a share of the national economy. Any investment level that fails to maintain a historic relationship in an era of high needs may create an investment shortfall. For illustrative purposes, highway capital investments, as expressed in terms of a stable percent of GNP, might approximate 1.2 percent of GNP. Based on this assumption, the 1975 projected investment level by all units of government is estimated to result in a \$5 billion shortfall as computed below and shown in figure 19.

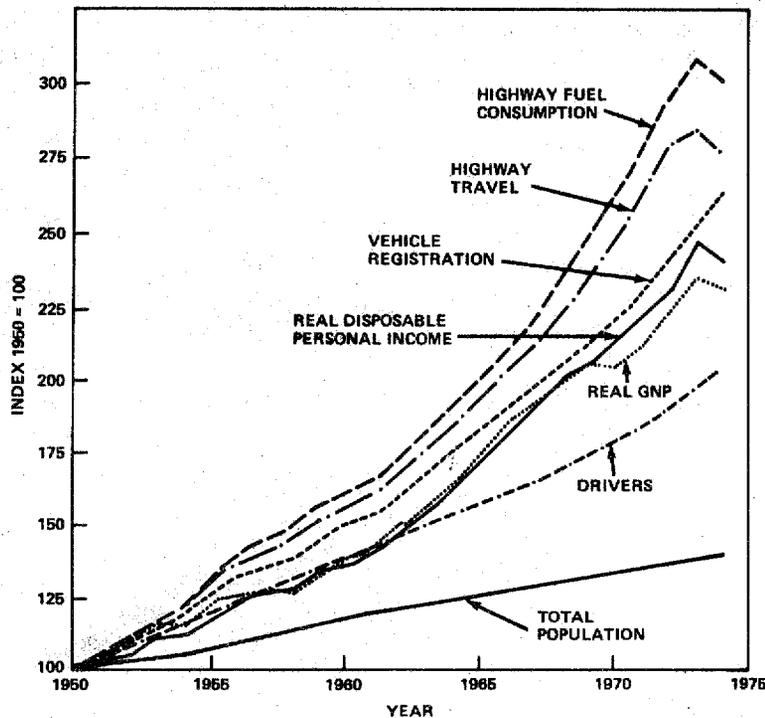
1975 GNP estimated at	=	\$1,498 billion
Highway Investment Share (1.2 percent)	=	18 billion
1975 highway capital outlay (estimate)	=	13 billion
Shortfall	=	5 billion

### III. Relationship of Highway Finance and Usage to Various Indicators

In recent years highway construction has declined relative to various economic indicators. During this period demand for travel increased and is expected to continue increasing in the future, though at a reduced rate, despite constraints on travel such as increased fuel costs, conservation efforts in the form of lower highway speeds and reduced fuel allocations, and modal shifts from automobile travel to various forms of mass transit. It is indeed possible that performance of the highway system, which is directly affected by investment, has been deteriorating and is not keeping pace with demand.\* It would appear, therefore, that while the demand for highway services has been accelerating, there has not been a corresponding increase in either the supply or the quality of highway facilities. The tables and figures below will illustrate graphically some of the relationships between highway construction, highway use and various economic trends.

As figure 4 shows, highway usage and fuel consumption have

FIGURE 4  
INDEX OF HIGHWAY USE OF MOTOR FUEL,  
REGISTERED MOTOR VEHICLES, LICENSED  
DRIVERS, U.S. POPULATION, GNP AND  
DISPOSABLE PERSONAL INCOME



Source: Updated from Highway Travel Forecasts, FHWA, November, 1974

\* The 1976 National Highway Inventory and Performance Study is designed to investigate and quantify highway performance change since 1970.

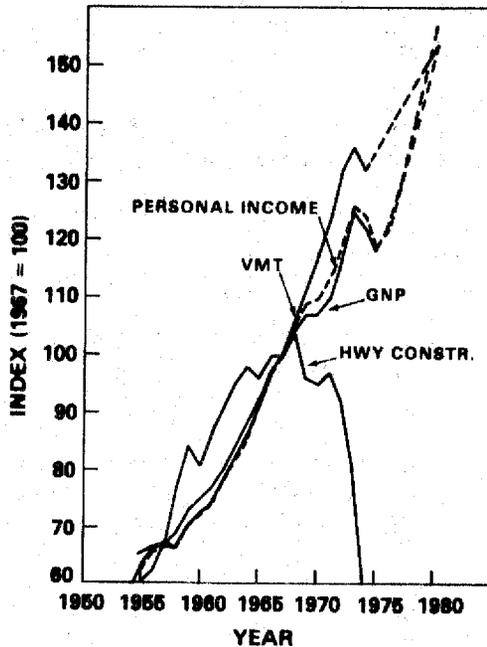
closely followed GNP and disposable income but far exceeded population growth during the 1950-1973 period. After 1973, however, the number of vehicle registrations and licensed drivers continued to rise despite a downturn in GNP, disposable income and the other highway measures shown in figure 4. The divergence in growth rates between population and measures of highway usage since 1950 is primarily due to the high birth rate of the post-World War II period that resulted in a large portion of today's population being under age 25. Today's population is not only younger than in previous years, but also a larger percentage is licensed to drive. This is significant because of the higher travel per licensed driver today, particularly in the younger age group.<sup>57</sup>

Expenditures for highways since the late 1960's do not fare well in current--and more importantly constant--dollars. In particular, inflation in highway construction has absorbed more and more of the funds available for highway construction.

At the same time demand for highway facilities has increased, highway construction in constant 1967 dollars has fallen off sharply in relation to GNP, personal income and travel. As figure 5 shows, highway construction (by all units of government)

Figure 5

**INDEX OF HIGHWAY CONSTRUCTION,  
VEHICLE-MILES OF TRAVEL, GNP, AND  
PERSONAL INCOME**  
(In Constant Dollars)



in 1974 was no greater than it was 2 decades earlier in 1955 in terms of actual capital outlays.

Figure 6 illustrates the relationship between actual and constant dollars of total highway construction and maintenance. The impact of inflation is evident where the curves intersect in 1967. Even though expenditure of actual dollars on construction and maintenance was accelerating, the total value of the work was declining in terms of 1967 dollars.

FIGURE 6  
TOTAL HIGHWAY CONSTRUCTION  
AND MAINTENANCE  
1967 BASE YEAR = 100

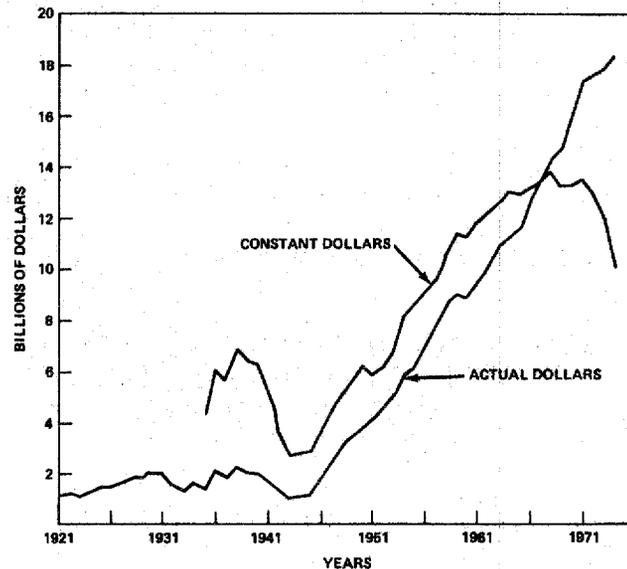


Table 1 illustrates a similar trend for highway capital improvement expenditures. Using 1967 as the base period,

Table 1--Highway Capital Improvement Expenditures

Year	Current Dollars (millions)	Bid Price Index (1967=100)	Constant Dollars (millions)	Index (1967 = 100)
1955	4,334	74.3	5,833	60
1956	5,015	84.0	5,970	62
1957	5,654	87.7	6,447	67
1958	6,368	85.6	7,416	77
1959	6,657	82.0	8,118	84
1960	6,290	80.1	7,853	81
1961	6,800	80.7	8,426	87
1962	7,386	83.8	8,762	91
1963	7,893	86.4	9,135	95
1964	8,252	86.9	9,496	98
1965	8,368	90.3	9,267	96
1966	9,246	96.1	9,621	100
1967	9,661	100.0	9,661	100
1968	10,346	103.4	10,006	104
1969	10,373	111.8	9,278	96
1970	11,575	125.6	9,216	95
1971	12,306	131.7	9,344	97
1972	12,275	138.2	8,882	92
1973	11,940	152.4	7,835	81
1974	11,968	201.8	5,921	61
1975	12,818			

Sources: Table HF-12 "Highway Statistics," FHWA  
"Price Trends of Federal-Aid Highway Construction," FHWA

expenditures for capital improvements have generally increased or held steady year to year in current dollars but generally declined since 1967 when measured in constant dollars.

Total authorizations for Federal-aid highway projects, in constant 1967 dollars, have declined relative to GNP since the late 1960's as indicated in figure 7. Table 2 gives a breakdown of Federal-aid highway authorizations among Interstate, ABCD, and other programs in current and constant dollars.

Figure 7

## FEDERAL HIGHWAY AUTHORIZATIONS AS RELATED TO GNP (In Constant Dollars)

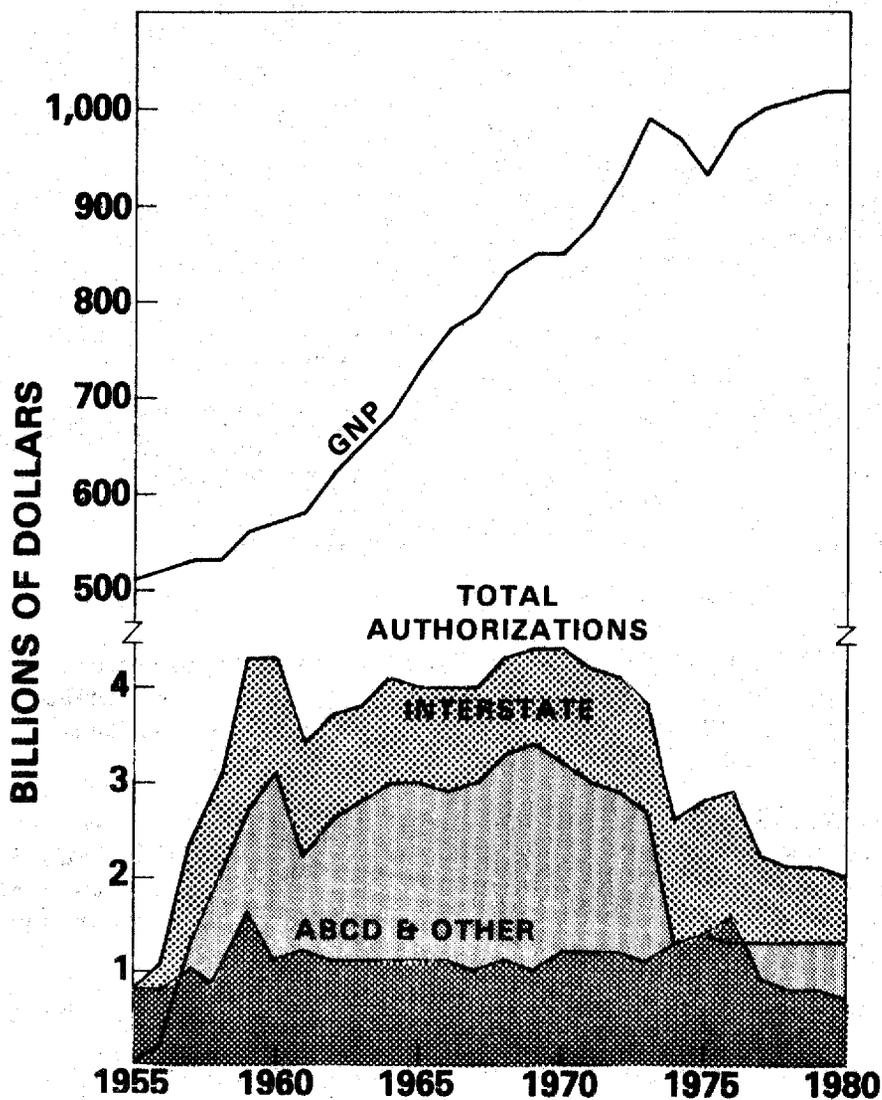


Table 2--Federal Highway Authorizations  
(In millions of dollars)

Year	Inter- state	ABCD	Other <u>1/</u>	Total	Bid Price Index	Constant Dollars	Index (1967 = 100)
1955	25	550	11	586	74.3	789	19.9
1956	175	700	9	884	84.0	1,052	26.6
1957	1,175	825	12	2,012	87.7	2,294	57.9
1958	1,700	850	32	2,582	85.6	3,016	76.2
1959	2,200	1,275	24	3,499	82.0	4,267	107.8
1960	2,500	900	19	3,419	80.1	4,268	107.8
1961	1,800	925	9	2,734	80.7	3,388	85.6
1962	2,200	925	5	3,130	83.8	3,735	94.3
1963	2,400	925	--	3,325	86.4	3,848	97.2
1964	2,600	948	--	3,548	86.9	4,083	103.1
1965	2,700	953	--	3,653	90.3	4,045	102.1
1966	2,800	1,000	52	3,852	96.1	4,008	101.2
1967	3,000	1,000	40	4,040	100	3,959	100.0
1968	3,400	1,000	86	4,486	103.4	4,338	109.6
1969	3,800	1,000	78	4,878	111.8	4,363	110.2
1970	4,000	1,425	61	5,486	125.6	4,368	110.3
1971	4,000	1,425	104	5,529	131.7	4,198	106.0
1972	4,055	1,425	225	5,705	138.2	4,128	104.3
1973	4,055	1,425	237	5,717	152.4	3,751	94.7
1974	2,650	2,207	499 <u>2/</u>	5,356	201.8	2,654	67.0
1975	3,050	2,265	939 <u>2/</u>	6,254	225.6 <u>4/</u>	2,772	70.0
1976	3,050	2,415 <u>2/</u>	1,344 <u>2/</u>	6,809	242.6 <u>4/</u>	2,808	70.9
1977	<u>3/</u> 3,250	2,250	--	5,500	258.3 <u>4/</u>	2,129	53.8
1978	<u>3/</u> 3,400	2,250	--	5,650	271.4 <u>4/</u>	2,082	52.6
1979	<u>3/</u> 3,550	2,250	--	5,800	282.4 <u>4/</u>	2,054	51.9
1980	<u>3/</u> 3,700	2,250	--	5,950	293.8 <u>4/</u>	2,025	51.1

1/ Includes Forest Highways, Public Land Highways, Priority Primary, Alaska Assistance, National Scenic Highways; Title II highway safety funds for railroad grade crossings, bridge replacement, pavement markings, high-hazard locations, elimination of roadside obstacles, and safer roads program.

2/ Includes highway capital authorizations contained in 1974 Federal-Aid Amendments, i.e., FAP and FAS-Rural, Off Systems, Bridge Replacement, Access to Recreation areas, and overseas highway (Florida).

3/ Department of Transportation proposal, H.R. 8430 and S-2078.

4/ Based on GNP deflator in 1976 U.S. Budget.

Although Federal highway authorizations have followed an upward trend since the late 1950's (figure 8), their measurement in constant dollars (figure 9) shows that relative to GNP they have lost ground dramatically since the late 1960's.

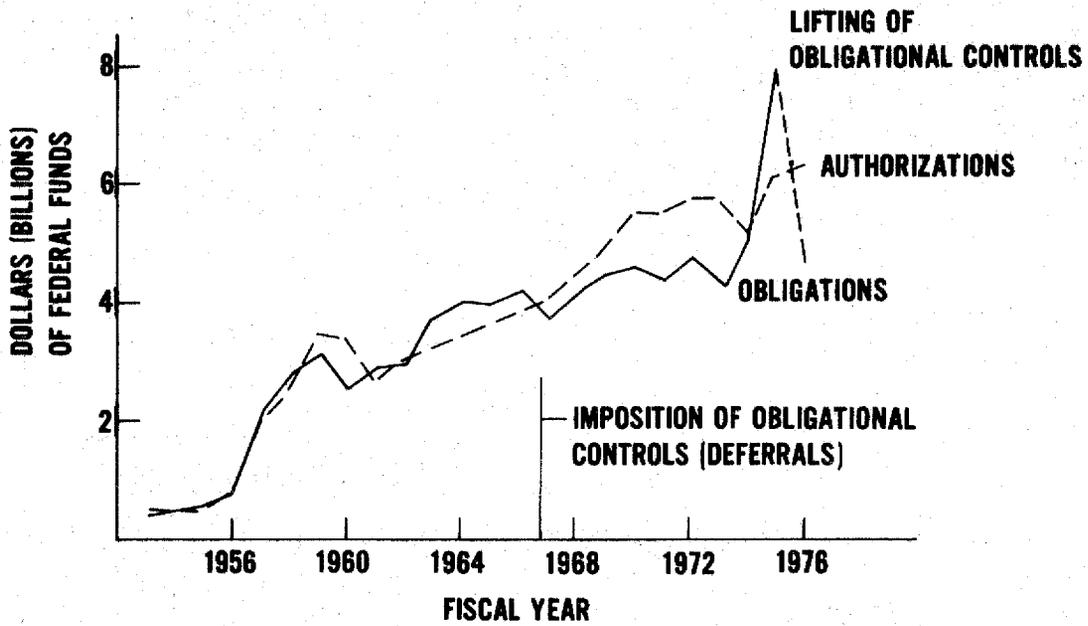
Federal-aid obligations follow a similar pattern and had fallen behind authorizations since the imposition of obligational controls by the Office of Management and Budget in 1967 (figure 8). However, recent lifting of controls on deferred funds have caused a recent surge in obligations (see figure 8 and 9).

The restrictions placed on the use of these funds plus the impact of inflation have made it impossible for Federal authorizations to compensate for the increases in highway construction costs, resulting in the decline in constant dollars of highway construction relative to other economic indicators.

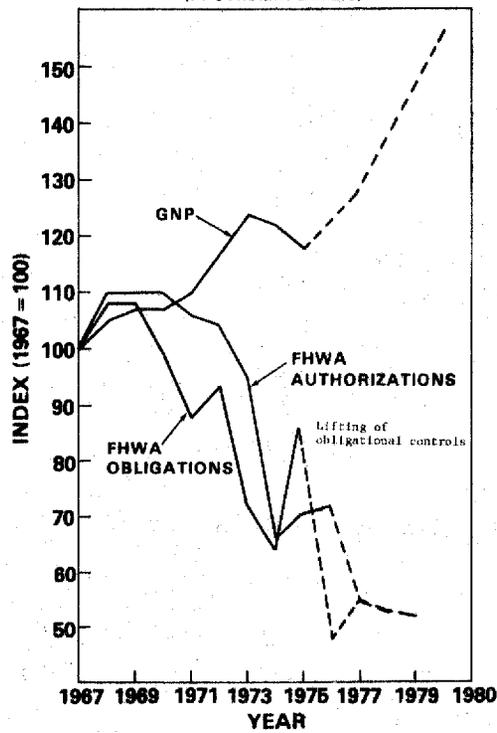
FIGURE 8

*program description ...*

### FEDERAL-AID PROGRAM TRENDS



INDEX OF FEDERAL HIGHWAY AUTHORIZATIONS, OBLIGATIONS AND GNP (In Constant Dollars)



In addition, expenditures from the Highway Trust Fund, as a percentage of total U.S. Government outlays, have been declining since 1965 (see table 3 and figure 10).

Contractor employment, while normally a widely fluctuating indicator, has experienced a deep slide since the late 1960's as shown in figure 11. At the same time, the Bid Price Index, a composite of construction material and labor costs, has risen sharply, indicating the escalating cost of highway construction. Thus, not only does the highway dollar buy less today than it did in the past, it also results in less employment.

Table 3

Comparison of Expenditures from the Highway Trust Fund with Total Unified Budget Outlays, Fiscal Years 1964 to 1976 (dollars in billions)

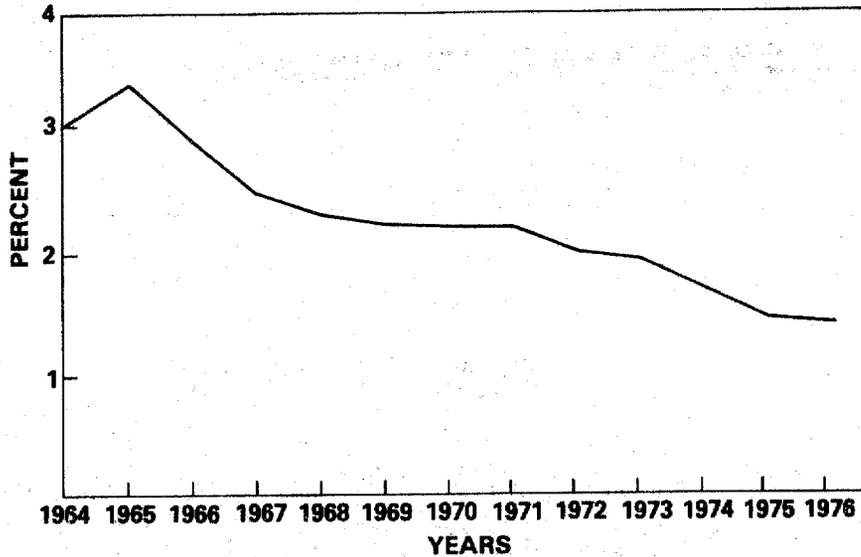
Fiscal Year	Unified Budget Outlays <u>1/</u>	Expenditures from Highway Trust Fund <u>2/</u>	Highway Trust Fund Expenditures as a percent of Budget Outlays
1964	\$118.6	\$3.645	3.07
1965	118.4	4.026	3.40
1966	134.7	3.965	2.94
1967	158.3	3.974	2.51
1968	178.8	4.171	2.33
1969	184.5	4.151	2.25
1970	196.6	4.378	2.23
1971	211.4	4.685	2.22
1972	231.9	4.690	2.02
1973	246.5	4.811	1.95
1974	268.4	4.599	1.71
1975 (est.)	313.4	4.578	1.46
1976 (est.)	349.4	4.932	1.41

1/ The Budget of the United States Government Fiscal Year 1976.

2/ The Eighteenth Annual Report on the Financial Condition and Results of Operations of the Highway Trust Fund February 28, 1974, House Document No. 93-224 for Fiscal Years 1964-73; Fiscal Year 1974, Status of Highway Trust Fund June 30, 1974; Fiscal Years 1975 and 1976 are estimates made by FHWA for the Nineteenth Annual Report on the Trust Fund.

Figure 10

### RATIO OF HIGHWAY TRUST FUND EXPENDITURES TO TOTAL UNIFIED BUDGET OUTLAYS, FISCAL YEARS 1964-1976

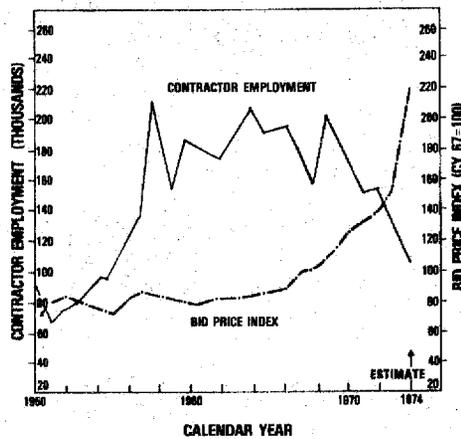


The value of Federal-aid contract awards, although increasing in current dollars since the 1950's, have fallen off since the late 1960's in constant dollars (figure 12). The rapid decline of Federal-aid contract awards since the late 1960's in constant dollars (figure 12) is mirrored in the similar decline in contractor employment during the same period (figure 11).

Figure 11

### current program issues... THE ECONOMY

#### EMPLOYMENT/BID PRICE INDEX

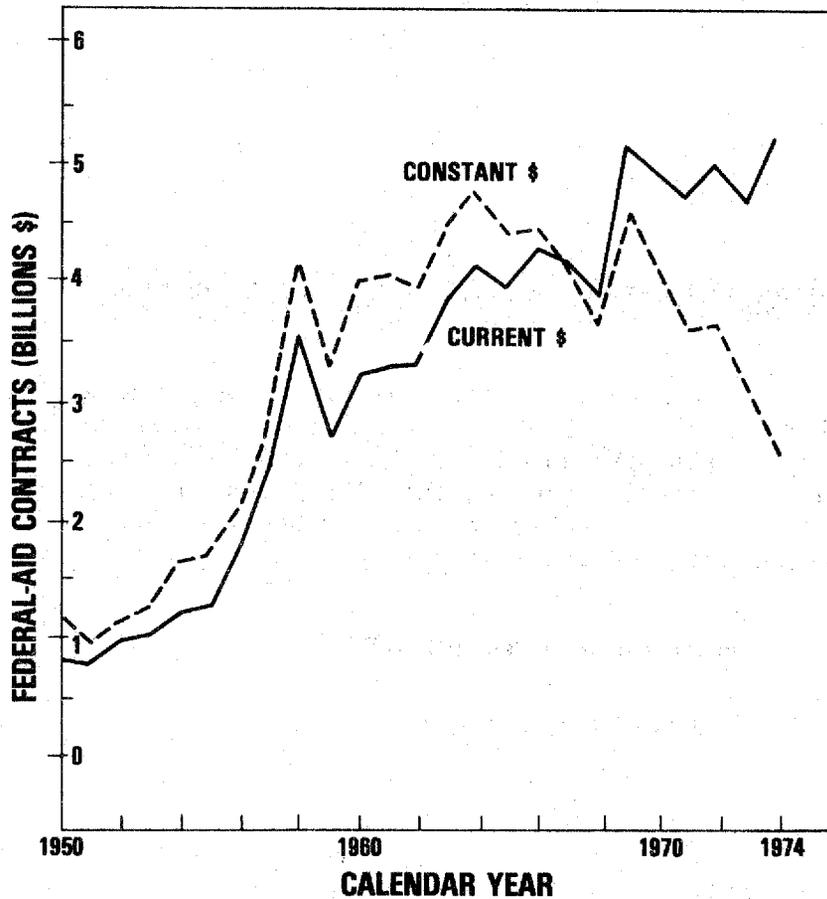


Source: Program Coordination Division

Figure 12

## current program issues... THE ECONOMY

### FEDERAL-AID CONTRACT AWARDS



Source: Program Coordination Division

Total disbursements for highways, divided among Federal, State, and local governments and in relation to the number of registered vehicles and vehicle miles traveled, are shown in the following figures and tables.

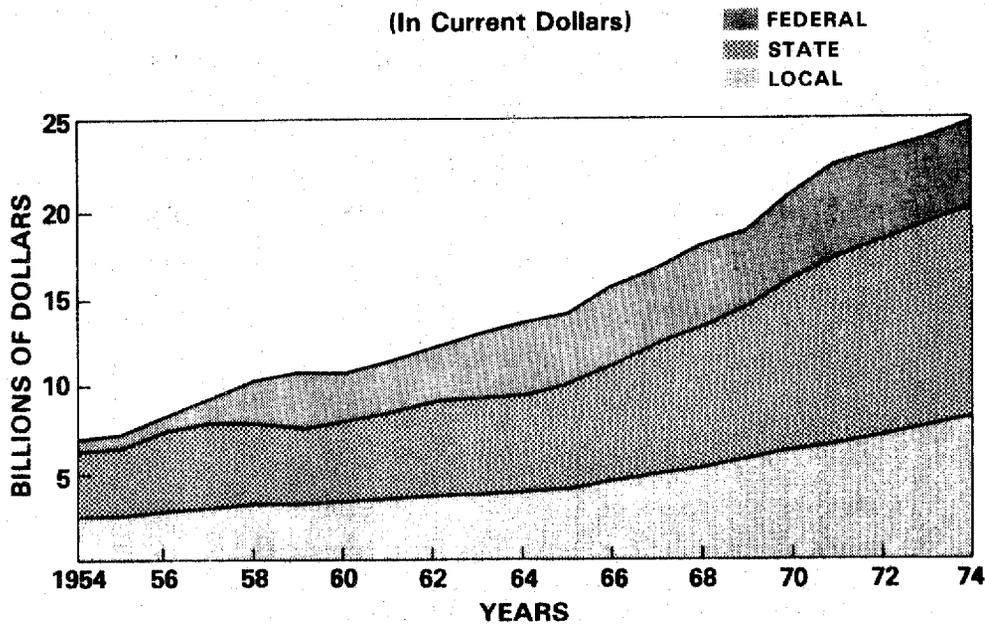
Figure 13 shows the data contained in table 4 concerning the disbursements for highways by Federal, State, and local governments in current dollars.

Table 4  
 TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 1954-74  
 (In Millions of Dollars)

Year	Federal	State	Local	Total
1954	701	3,803	2,482	6,986
1955	784	3,983	2,588	7,355
1956	904	4,628	2,822	8,354
1957	1,455	4,830	3,048	9,333
1958	2,454	4,596	3,286	10,336
1959	3,238	4,329	3,319	10,886
1960	2,753	4,574	3,435	10,762
1961	2,941	4,947	3,604	11,492
1962	3,173	5,413	3,716	12,302
1963	3,759	5,446	3,847	13,052
1964	4,278	5,419	4,040	13,737
1965	4,137	5,923	4,251	14,311
1966	4,610	6,513	4,575	15,698
1967	4,390	7,317	4,962	16,669
1968	4,822	7,853	5,308	17,983
1969	4,557	8,426	5,791	18,774
1970	5,200	9,331	6,304	20,835
1971	5,658	10,084	6,738	22,480
1972	5,428	10,648	7,123	23,199
1973	5,295	10,999	7,589	23,883
1974 Est.	5,252	11,445	8,086	24,783

Figure 13

**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 1954-74**  
 (In Current Dollars)



Source: Highway Statistics Division

Figure 14 and table 5 portray the same information in constant dollars. It is evident that in terms of constant dollars, the total value of highway disbursements by all levels of government have been declining since 1971.

Table 5

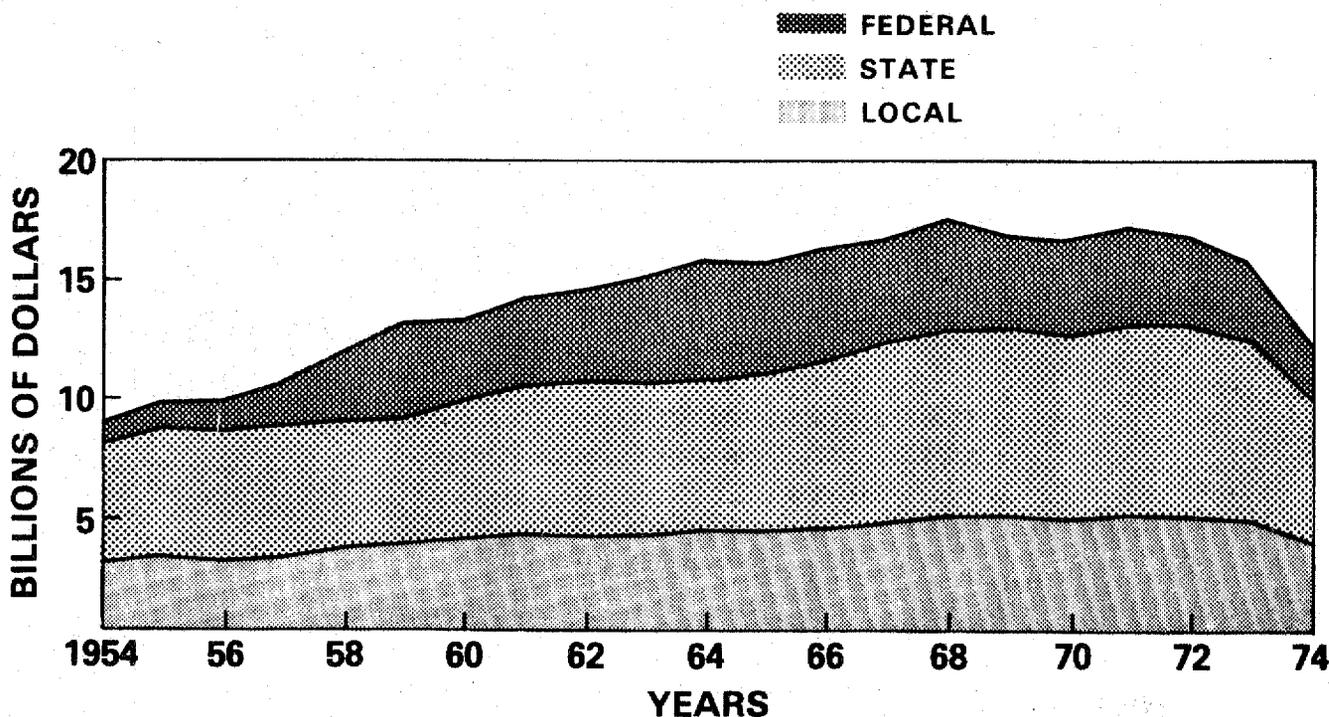
TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
FEDERAL, STATE, AND LOCAL GOVERNMENTS  
1954-74  
(In Millions of Constant Dollars<sup>1/</sup>)

Year	Federal	State	Local	Total
1954	917	5,143	3,605	9,665
1955	1,055	5,448	3,740	10,243
1956	1,076	5,779	3,831	10,686
1957	1,659	5,754	3,949	11,362
1958	2,867	5,513	4,201	12,581
1959	3,949	5,247	4,246	13,442
1960	3,437	5,538	4,333	13,308
1961	3,644	5,929	4,478	14,051
1962	3,764	6,303	4,490	14,557
1963	4,351	6,191	4,514	15,056
1964	4,923	6,065	4,380	15,368
1965	4,581	6,414	4,754	15,749
1966	4,797	6,630	4,821	16,248
1967	4,390	7,200	5,079	16,669
1968	4,663	7,465	5,266	17,394
1969	4,076	7,493	5,365	16,934
1970	4,140	7,616	5,449	17,205
1971	4,296	7,853	5,573	17,722
1972	3,928	7,898	5,600	17,426
1973	3,474	7,583	5,545	16,602
1974	2,603	6,702	5,096	14,401

<sup>1/</sup> Based on composite bid price index, maintenance and operation cost trends, and GNP deflator using 1967 dollars as 100.

Figure 14

## TOTAL DISBURSEMENTS FOR HIGHWAYS BY FEDERAL, STATE, AND LOCAL GOVERNMENTS 1954-74 (In Constant Dollars)



Source: Highway Statistics Division

The relationship between total highway disbursements and the number of registered motor vehicles is shown in figures 15 and 16 and tables 6 and 7.

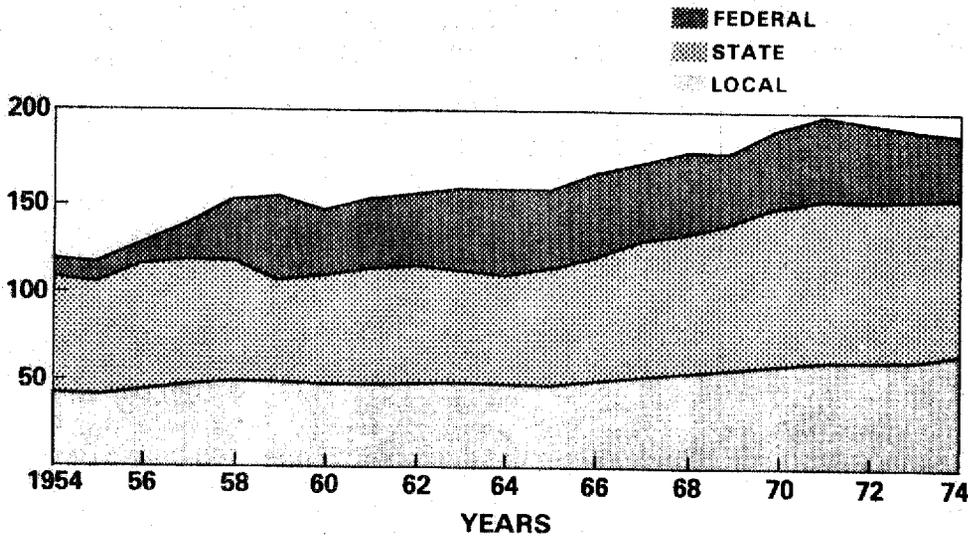
As figure 15 indicates, the total disbursements per registered motor vehicle in current dollars has declined from \$199 in 1971 to an estimated \$189 in 1974 (table 6). Table 7 shows a decline, in constant dollars, from \$161 per registered vehicle in 1969 to an estimated \$110 in 1974. Figure 16 is a graphic representation of table 7.

Table 6  
**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 PER REGISTERED MOTOR VEHICLE  
 1954-74  
 (In Dollars)**

Year	Federal	State	Local	Total
1954	12	65	42	119
1955	12	64	41	117
1956	14	71	43	128
1957	22	72	45	139
1958	35	68	48	151
1959	46	61	46	153
1960	38	62	46	146
1961	38	66	47	151
1962	40	68	47	155
1963	46	66	46	158
1964	50	63	46	159
1965	46	66	46	158
1966	47	71	49	167
1967	44	77	51	172
1968	45	80	53	173
1969	40	83	55	173
1970	45	89	58	192
1971	47	92	60	199
1972	43	92	60	195
1973	38	92	60	190
1974 Est.	37	90	62	189

Figure 15

**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 PER REGISTERED MOTOR VEHICLE  
 1954-74  
 (In Current Dollars)**



Source: Highway Statistics Division

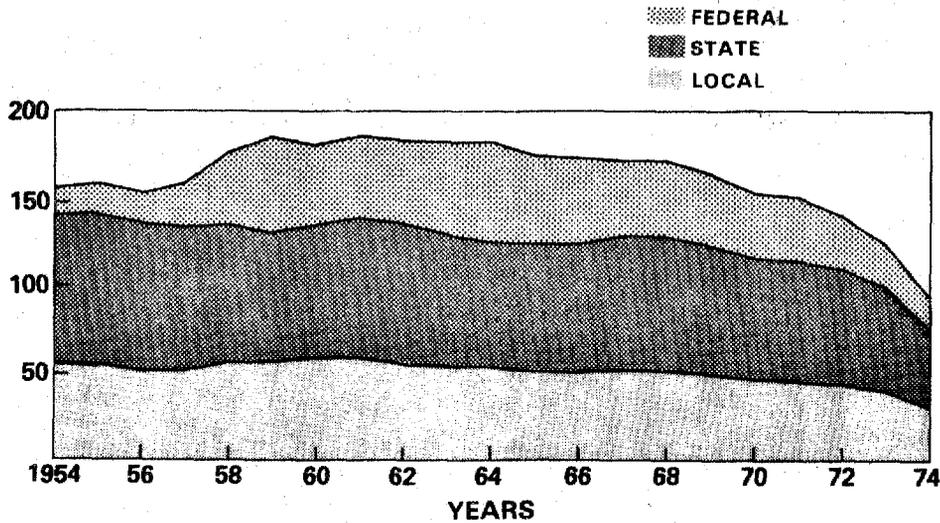
Table 7  
**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 PER REGISTERED MOTOR VEHICLE**  
 1954-74  
 (In Constant Dollars)<sup>1/</sup>

Year	Federal	State	Local	Total
1954	16	86	62	166
1955	17	87	60	164
1956	17	89	59	165
1957	25	86	59	170
1958	42	81	61	184
1959	55	73	59	187
1960	47	75	59	181
1961	48	78	59	185
1962	48	80	57	185
1963	53	75	55	183
1964	57	70	51	178
1965	51	71	53	175
1966	51	71	51	173
1967	45	74	52	171
1968	46	74	52	172
1969	39	71	51	161
1970	38	70	50	158
1971	38	69	49	156
1972	33	66	47	146
1973	28	60	44	132
1974 Est.	20	51	39	110

<sup>1/</sup> Based on composite bid price index, maintenance and operation cost trends, and GNP deflator using 1967 dollars as 100.

Figure 16

**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 PER REGISTERED MOTOR VEHICLE**  
**1954-74**  
 (In Constant Dollars)



Source: Highway Statistics Division

Tables 8 and 9 show total highway disbursements by Federal, State, and local governments by vehicle miles traveled in current and constant dollars respectively. In current dollars the total disbursements per 1 million VMT have fluctuated since 1971 and are now on the rise (table 8). However, as expressed in constant dollars in (table 9) total disbursements per 1 million VMT have declined since 1961. Figure 17 illustrates table 8.

Table 8  
**TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
 FEDERAL, STATE, AND LOCAL GOVERNMENTS  
 PER 1 MILLION VEHICLE-MILES TRAVELED  
 1954-74**  
 (In Thousands of Dollars)

Year	Federal	State	Local	Total
1954	1.2	6.8	4.4	12.4
1955	1.3	6.6	4.3	12.2
1956	1.4	7.4	4.5	13.3
1957	2.2	7.5	4.7	14.4
1958	3.7	6.9	4.9	15.5
1959	4.6	6.2	4.7	15.5
1960	3.8	6.4	4.7	14.9
1961	4.0	6.7	4.8	15.5
1962	4.1	7.1	4.8	16.0
1963	4.7	6.8	4.7	16.2
1964	5.0	6.5	4.7	16.2
1965	4.7	6.7	4.6	16.0
1966	4.7	7.2	4.9	16.8
1967	4.4	7.8	5.2	17.4
1968	4.5	7.9	5.2	17.7
1969	4.0	8.1	5.4	17.5
1970	4.3	8.7	5.6	18.6
1971	4.5	8.8	5.7	19.0
1972	4.0	8.5	5.5	18.0
1973	3.6	8.8	5.8	18.2
1974	3.8	9.3	6.4	19.5

Table 9

TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
FEDERAL, STATE, AND LOCAL GOVERNMENTS  
PER 1 MILLION VEHICLE-MILES TRAVELED  
1954-74

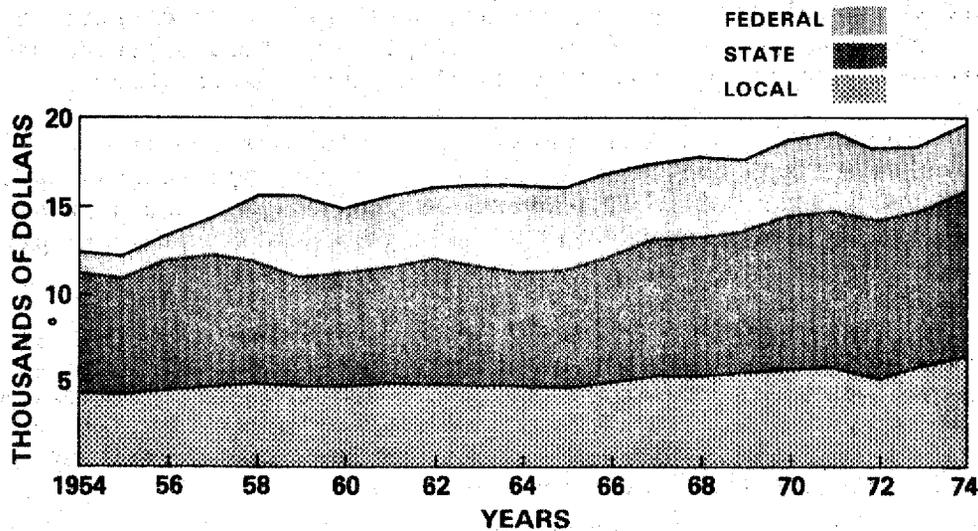
(In Thousands of Constant Dollars, 1967 = 100)<sup>1/</sup>

Year	Federal	State	Local	Total
1954	1.6	9.2	6.4	17.2
1955	1.7	9.0	6.2	16.9
1956	1.7	9.2	6.1	17.0
1957	2.6	8.9	6.1	17.6
1958	4.3	8.3	6.3	18.9
1959	5.6	7.5	6.1	19.2
1960	4.8	7.7	6.0	18.5
1961	4.9	8.0	6.1	19.0
1962	4.9	8.2	5.9	19.0
1963	5.4	7.7	5.6	18.7
1964	5.8	7.2	5.2	18.2
1965	5.2	7.2	5.4	17.8
1966	5.2	7.1	5.2	17.5
1967	4.7	7.5	5.3	17.5
1968	4.6	7.3	5.2	17.1
1969	3.8	7.0	5.0	15.8
1970	3.7	6.8	4.9	15.4
1971	3.6	6.6	4.7	14.9
1972	3.1	6.2	4.4	13.7
1973	2.7	5.8	4.2	12.7
1974 Est.	2.0	5.3	4.0	11.3

<sup>1/</sup> Based on composite bid price index, maintenance and operation cost trends, and GNP deflator using 1967 dollars as 100.

Figure 17

TOTAL DISBURSEMENTS FOR HIGHWAYS BY  
FEDERAL, STATE, AND LOCAL GOVERNMENTS  
PER 1 MILLION VEHICLE-MILES TRAVELED  
1954-74  
(In Current Dollars)

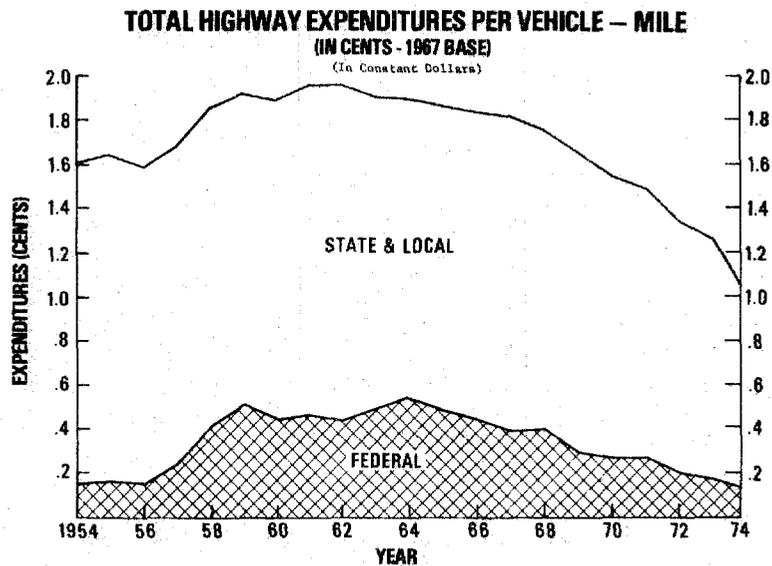


Source: Highway Statistics Division

Figure 18 illustrates, in cents per vehicle mile traveled, the total amount of highway expenditures by the various levels of government from 1954-1974 in constant dollars. It is obvious that although the amount of travel has greatly increased during this time period, the expenditures for highway facilities in relation to this travel has declined.

Figure 18

**program operations... FINANCE**



Source: Program Coordination Division

In summary, it appears that inflation along with restrictions on the obligation of highway funds have significantly reduced the amount of highway construction in recent years. At the same time that the total value of highway projects has declined relative to the 1967 base period, the cost of completing these projects has soared due to the increased costs of highway construction.

Authorization, expenditures, and employment are also declining from the 1967 base period. Highway expenditures as a percentage of total U.S. Government budget outlays and highway expenditures in relation to vehicle registration and travel are also declining.

These observed trends indicate that as travel has increased, capital investments in 1967 dollars have decreased. Thus, as stated earlier, highway performance, in terms of dollar investments may indeed be declining.\* Chapter IV will examine highway needs in the light of inflation impacts and the possible effect of program levels on highway performance.

\* As mentioned earlier, the 1976 National Highway Inventory and Performance Study will investigate this issue.

#### IV. Future Investment and Commitments

##### What are Highway Needs

In recent years, several studies have been undertaken to determine the total estimated cost of improving all roads, or selected roads, in the United States for selected time spans, so that by a given year no road or highway in America would have physical or traffic characteristics below certain operating and physical conditions. These conditions were uniform within functional groups and consistent with condition and design standards for safety, performance, and economy.

Specifically, these studies are the periodic Interstate System Cost Estimate<sup>1/</sup> and the 1972 and 1974 National Highway Needs Reports;<sup>2/</sup> all of which were required by the Congress. Each of these reports is briefly described in the following:

Interstate Cost Estimate: Periodically, a complete review is made of the cost to complete the Interstate System of highways. The latest report to Congress estimates such cost at \$32 billion, and it will not be completed before 1980.

National Highway Needs Reports (NHNR): The 1972 NHNR estimated 20-year needs for the period ending in 1990 totaling an estimated \$562 billion for all roads except the completion of the Interstate System. These costs, incidentally, are in 1969 dollars. The 1974 NHNR updated arterial and collector needs, in 1971 dollars, which totaled \$428 billion.

Although local road needs are substantial, totaling \$183.0 billion for the period 1970 to 1990, the following analysis will focus exclusively on non-Interstate arterial and collector needs.

##### A. Effect of Inflation on Needs

Inflation impacts severely on all goods and services but the construction industry has been particularly hard hit in recent years. As shown in the Federal-Aid Highway Construction Bid Price Index, highway costs for these contracts have doubled since 1967. Although unit prices are not expected to increase at this rate into the future, still the effect of inflation cannot be ignored when considering program magnitude.

Arterial and collector highway capital investment required to meet accruing needs\* during the 1975-1990 period is estimated to be \$231 billion or an average of \$15.4 billion per year in 1974 dollars. An annual investment of this amount should insure that a national composite measurement of highway system performance attributes in 1990 would be similar to such a measurement in 1975. Investments above this average annual figure would improve overall system performance and lower investments would cause deteriorating performance. If it is assumed that our highway systems are in reasonably good condition, it is also reasonable to make present performance of the systems the standard to gauge future program needs. Assuming, then, that we wish to have, in 1990, national systems of roads and streets functioning as they do today, our goal would be to maintain the level of performance as it exists in 1975.

Having established the basis upon which the annual needs over a 15-year period of \$15.4 billion is estimated, the impact of inflation on these needs can be assessed. Annual performance dollar needs assume stable construction unit prices. Yet, few responsible public officials are willing to hold program formulation at this point for historically inflation has played havoc with the performance of past authorizations. Hence, several assumed inflation rates are applied to the estimated annual needs mentioned above.

If inflation averages 5 percent per year between 1975 and 1990, the \$15.4 billion, in 1974 dollars, would increase expenditure needs to approximately \$32 billion in 1990 dollars. At a 7 percent rate per year, \$42 billion would be required to perform the same level of improvements in 1990. For an 8 percent rate, nearly \$50 billion would be required by 1990, and a 10 percent inflation rate per year would result in \$67.3 billion in 1990.

Highway performance refers to the level of service afforded by highway systems. Performance is effected by: 1) the physical condition of the highway plant in terms of deterioration, and 2) its ability to provide sufficient capacity to accommodate traffic. Thus highway performance may decline due to one or both of two reasons: the physical deterioration of routes presently accommodating existing and

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\* Highway needs developed in the 1972 NHNR and updated in the 1974 NHNR assume that by 1990 no road would have physical or traffic characteristics below certain operating and physical conditions. Investment requirements estimated in these reports also serve as the basis for projecting future annual needs cited in this analysis. The estimate of 1975-1990 highway needs does not include the cost to complete the Interstate System.

anticipated traffic, or routes, although in sound physical condition, are now inadequate in design capacity to handle present or anticipated traffic. Any low public investment level will, it is assumed, react adversely on the performance of the systems in the future. Highway design criteria vary directly with anticipated capacity and traffic operation requirements in order to maintain average speeds, congestion levels, safety, comfort, convenience, etc. If the level of investment fails to provide for minimum amounts then one or more of these attributes will likely suffer, thus reducing performance.

Future programs for arterial and collector highway systems might consider this method in determining expenditure levels. To maintain today's performance, systemwide, under the stated conditions, would require an average annual funding level of \$22 to \$32 billion, depending upon assumed rates of inflation. For example, at 5 percent rate of inflation, the mid-point in the 1975 and 1990 period would require \$22 billion. Other suggested funding levels vary according to the rate of inflation, as follows:

<u>Assumed Rate of Inflation</u>	<u>Range of Annual Needs in Billions (1975 and 1990)</u>		<u>Mid-point Annual Funding *</u>
7	\$15.4	\$42.0	25.5
8	15.4	49.5	27.6
10	15.4	67.3	32.2

B. Highways and GNP

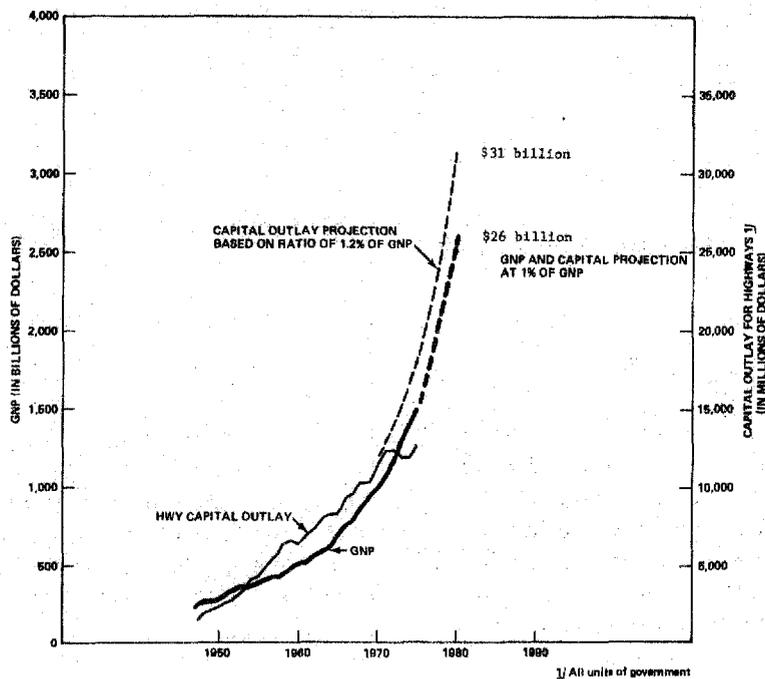
The level of investment needed according to the above analysis is obviously greatly in excess of present program levels. One measure of program level is the highway share of GNP. Or the Federal contribution might correspond to past levels, or to proportions of total Federal outlays. At least these ratios give a benchmark for evaluating future commitment levels.

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\* By all units of governments.

Earlier it was mentioned that highway capital outlay had declined from 1.2 percent of GNP in 1965 to 0.85 percent for 1975. Based on the GNP projection of \$2.6 trillion in 1980 given in "The Budget of the United States Government, Fiscal Year 1976" (figure 19), highway capital improvement, if continued at the earlier level of 1.2 percent of GNP, would total \$31 billion annually by 1980. However, Gross National Product projections given in the 1976 Federal Budget and shown on table A-1 are not wholly based on probable economic conditions (except FY 1975 and 1976); but, rather, are projections consistent with a gradual movement toward relatively stable prices and maximum possible employment.\* Mindful of these limitations, one could undertake an examination of conditions under less optimistic criteria. Thus, using 1975 and 1976 GNP projections, as they reflect expected short-run conditions, and thereafter projecting growth in GNP at an annual rate of 4.3 percent which was used in the 1974 NTR<sup>6/</sup> and FEA's "Project Independence," a more "realistic" projection of GNP to 1980 may be developed along with attendant highway capital calculations.

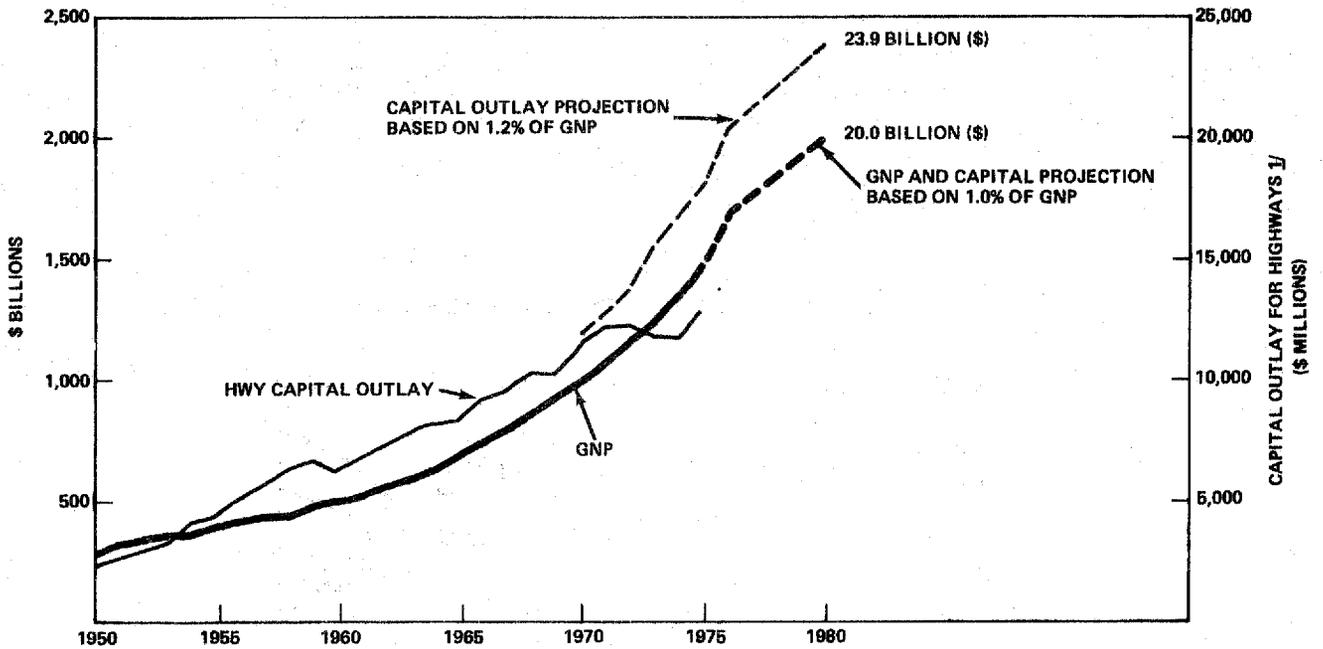
FIGURE 19  
HIGHWAY CAPITAL OUTLAY RELATIVE TO GNP  
GNP BASED ON U.S. BUDGET FOR FY 1976  
(CURRENT DOLLARS)



\* As used in the 1976 Budget, this term means a gradual declining level of unemployment yet still less than full employment by 1980.

The latter GNP projection is shown in figure 20, whereby 1980 GNP would equal \$2.0 trillion, a \$500 billion increase over 1975. Under these assumptions, highway capital outlay at 1.2 percent of GNP would equal \$23.9 billion annually, and at 1.0 percent of GNP, would equal \$20 billion annually. As mentioned earlier, arterial and collector highway systems mid-point annual investment would require \$22 billion to maintain 1975 performance if inflation averaged 5 percent.

FIGURE 20  
 HIGHWAY CAPITAL OUTLAY RELATIVE TO GNP  
 GNP BASED ON 4.3% ANNUAL GROWTH  
 FROM 1977 TO 1980  
 (CURRENT DOLLARS)

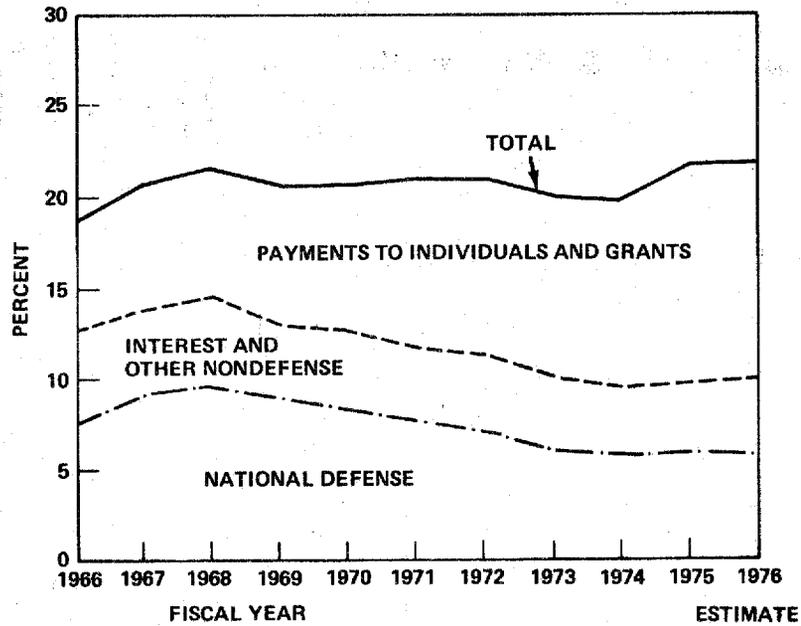


1/ All units of government

C. Federal Aid for Highways<sup>7/</sup>

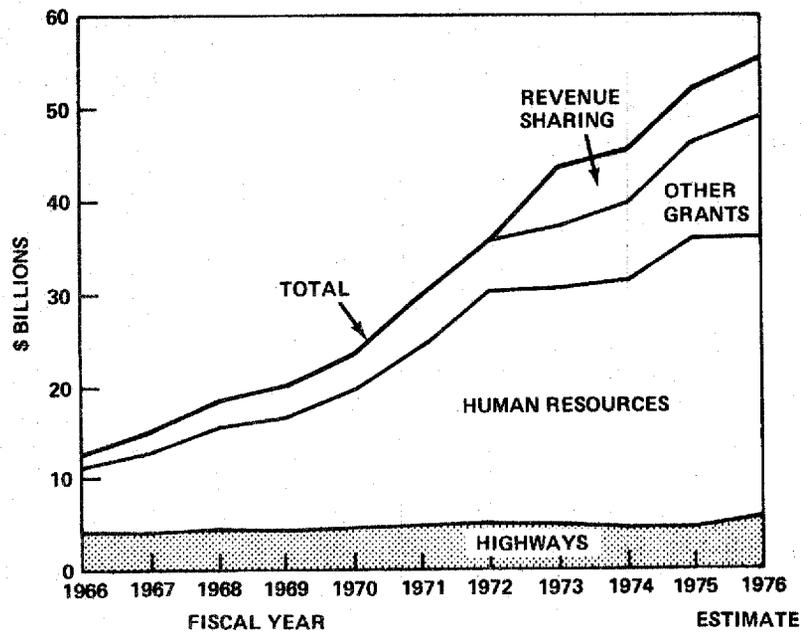
Since 1966 overall Federal outlays have maintained a constant relationship to GNP of approximately 20 percent as shown in figure 21. Increasingly these outlays has been skewed toward grants-in-aid to State and local governments. Human resources type payments, and more recently revenue sharing, consume most of these funds (see figure 22).

FIGURE 21  
FEDERAL OUTLAYS AS A PERCENT OF GNP



Source: Fy 1976 U.S. Budget, current dollars

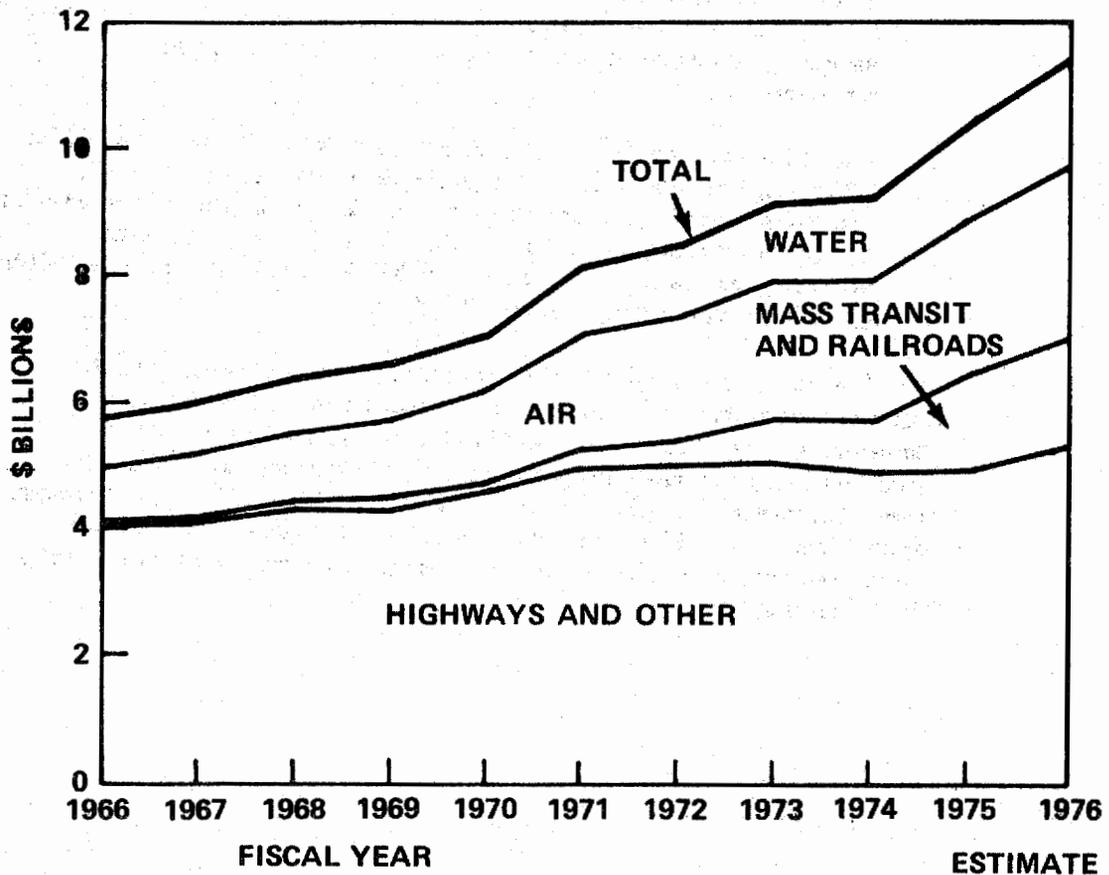
FIGURE 22  
FEDERAL GRANTS TO STATE AND LOCAL GOVERNMENTS



Source: Fy 1976 U.S. Budget, current dollars

The big four categories of budget outlays, defense, income security, interest on debt, and health, in sum, do not change appreciably from 1974 to 1976 accounting for 79 percent in fiscal years 1974, 1975, and 1976. The respective shares shift slightly, whereby defense is down and income security is up, but in total they tend to offset each other. Total Federal aid for transportation as a percent of total outlays has declined, however, from 3.5 percent for FY 1974 to 3.3 percent for FY 1976. Federal aid for highways increases marginally from \$4.6 billion in FY 1974 to \$5.1 billion for FY 1976; however, the highway share of the total budget decreases from 1.61 percent in 1974 to 1.35 percent in 1976. Highways in relation to total transportation outlays account for half of all Federal outlay for 1976, down from more than two-thirds in 1966, as shown in figure 23.

**FIGURE 23**  
**FEDERAL OUTLAYS FOR TRANSPORTATION**



Source: Fy 1976 U.S. Budget, current dollars

V. Summary

Several observed trends have been described in this paper; they include:

- A. Although total annual highway disbursements have increased since World War II, the portion allocated for capital improvements has declined to less than one-half.
- B. In recent years highway construction has declined relative to various economic and usage indicators. Moreover, inflation has had a devastating impact on the productivity of the construction dollar. As a result of these and other constraints, doubts are raised regarding maintenance of highway performance.
- C. Several recent highway needs studies report vast sums of money needed to improve all of the Nation's highways to certain minimum standards. Limiting analysis to selected portions of these needs would still require substantial annual investment in order to maintain highway performance.
- D. Finally, noted is the current investment level of \$13 billion for 1975 which equals 0.85 percent of GNP; whereas, earlier investment levels in highways as recently as 1970 averaged 1.2 percent of GNP. If the same proportion were allocated in 1975, current capital funding would be increased by \$5 billion.

In sum, this paper has attempted to illustrate the current dilemma in highway construction. For while investment in highways has declined relative to most indicators, highway needs, due principally to inflation, have increased dramatically. If this situation continues, many feel, it will lead to a marked decline in highway performance which may have serious economic repercussions for the Nation.

Table A-1--Gross National Product

Year	Current Dollars (billions)	Deflator (1967 = 100)	Constant Dollars (billions)	Index (1967 = 100)
1955	398.0	77.3	514.9	65
1956	419.2	79.9	524.7	66
1957	441.1	82.9	532.1	67
1958	447.3	85.0	526.2	66
1959	483.7	86.5	559.2	70
1960	503.7	87.8	573.7	72
1961	520.1	89.0	584.4	74
1962	560.3	90.0	622.6	78
1963	590.5	91.1	648.2	82
1964	632.4	92.6	682.9	86
1965	684.9	94.3	726.3	91
1966	749.9	96.9	773.9	97
1967	793.9	100.0	793.9	100
1968	864.2	104.0	831	105
1969	930.3	109.0	853	107
1970	977.1	115.0	850	107
1971	1,055.5	120.2	878	110
1972	1,155.2	124.3	929	117
1973	1,295	131.2	987	124
1974	1,397	144.7	965	122
1975	1,498	160.3	934	118
1976	1,686	172.3	979	123
1977	1,896	185.3	1,023	129
1978	2,123	192.9	1,101	139
1979	2,353	200.8	1,172	148
1980	2,606	208.8	1,248	157

Sources: The Budget of the United States Government Fiscal Year 1976, Economic Report of the President - February 1975, Tables C-1 and C-4

Table A-2--Vehicle Miles of Travel

Year	VMT (billions)	Index (1967 = 100)
1955	605.6	63
1956	631.2	66
1957	647.0	67
1958	664.7	69
1959	700.5	73
1960	718.8	75
1961	737.5	77
1962	766.9	80
1963	805.4	84
1964	846.5	88
1965	887.8	92
1966	930.5	97
1967	962.1	100
1968	1,016	105.6
1969	1,071	111.3
1970	1,121	116.6
1971	1,186	123.4
1972	1,268	131.9
1973	1,309	136.1
1974	1,270	132.0
1975	1,305	135.6
1976	1,339	139.2
1977	1,374	142.8
1978	1,409	146.4
1979	1,443	150.0
1980	1,478	153.6

Sources: "Highway Travel Forecasts,"  
 FHWA  
 Table VM-1 "Highway Statistics,"  
 FHWA

Table A-3--Personal Income

Year	Current Dollars (billions)	Deflator (1967 = 100)	Constant Dollars (billions)	Index (1967 = 100)
1955	310.9	80.2	387.7	62
1956	333.0	81.4	409.1	65
1957	351.1	84.3	416.5	66
1958	361.2	86.6	417.1	66
1959	383.5	87.3	439.3	70
1960	401.0	88.7	452.1	72
1961	416.8	89.6	465.2	74
1962	442.6	90.6	488.5	78
1963	465.5	91.7	507.6	81
1964	497.5	92.9	535.5	85
1965	538.9	94.5	570.3	91
1966	587.2	97.2	604.1	96
1967	629.3	100.0	629.3	100
1968	688.9	104.2	661.1	105
1969	750.9	109.8	683.9	109
1970	808.3	116.3	695.0	110
1971	864.0	121.3	712.3	113
1972	944.9	125.3	754.1	120
1973	1,055	133.1	792.6	126
1974	1,150	147.7	778.9	124
1975	1,232	164.4	749.4	119
1976	1,365	177.2	770.3	122
1977	1,536	188.9	813.1	129
1978	1,717	198.7	864.1	137
1979	1,900	206.8	918.8	146
1980	2,102	215.1	977.2	155

Sources: The Budget of the United States Government Fiscal Year 1976, Economic Report of the President, February 1975, Tables C-17, C-44.

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7. The Budget of the United States Government: Fiscal Year 1976

