

DEPARTMENT OF ECONOMICS, FINANCE AND ADMINISTRATION

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FINANCING A NATION-WIDE HIGHWAY PROGRAM

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SYNOPSIS

The magnitude of the highway finance problem is measured by the disparity between available revenues and the financial requirements of an adequate program. To meet accumulated and current needs in the next 15 years, an annual expenditure of \$4.4 billion for all roads and streets is required. This represents an increase of about \$1.4 billion, or 40 percent, over funds currently available from all sources.

Federal-aid system improvements, primary, secondary, and urban, require, on a 15-yr basis, a total Federal-State program of \$1,595 million a year as against a current program of \$825 million to \$850 million. Expansion of Federal-aid authorizations can be anticipated, but apportionments among States and matching requirements need to be reviewed to assure uniform Nation-wide development. The varying ability of the States to meet the financial requirements of the portions of the road network in which there is a Federal interest should be taken into account in designing the apportionment and matching procedures. This objective could be achieved by requiring, in place of a single matching ratio for all States, a uniform contribution per motor vehicle registered, with the Federal Government making up the difference between the total requirement and the State share so determined. This procedure would result in varying matching ratios but a uniform effort by all States. On a Nation-wide basis the Federal share would remain at 50 percent, or at such value as the Congress would stipulate.

Because of urgent needs on existing Federal-aid systems in which there is an established Federal interest, as well as for other important reasons, it does not appear desirable to have Federal-aid for local rural roads and city streets.

Many States with great needs for highway improvements are currently providing amounts from road user revenues which are much below the level in other States. The need for an increase in support from this source is indicated.

Toll roads and free expressways and parkways have demonstrated the appropriateness of bond financing for controlled access facilities. Bond financing provides the answer in many areas to the need and demand for congestion relief now rather than many years in the future.

In many States, local governments could provide greater financial support for local roads and streets. However, a continuation of past trends will result in increased aid from the State revenues rather than an expansion of local financing.

This paper is intended to present and interpret some of the findings of the recent study of highway finance problems made by a committee of the American Association of State Highway Officials.¹ The growing recognition of the magnitude and the urgency of highway needs, accompanied by irresolute steps to

finance those needs, indicates the desirability of taking stock and of providing such guidance as existing data permit. This, of course, was the reason the AASHO study was made, and why the subject is being treated further here.

Before there is a highway finance problem, there exists a need for physical improvements and maintenance on the street and highway

¹By permission this paper quotes several excerpts from the unpublished preliminary report of a Special Subcommittee for Study of Highway Finance Problems, Committee on

Highway Finance, American Association of State Highway Officials. The full report has not yet been released by the Association.

system, representing costs in excess of available funds. If the disparity between road needs and available funds is small, no one is much concerned. The finance problem is not critical. Possibly maintenance and progress on the improvement program would not be satisfactory to everyone. But, there would be no wide-

requirements and funds. We do have a critical financial problem.

ROAD NEEDS

Establishment of the magnitude of the financial problem—the disparity between available funds and requirements for funds—re-

TABLE 1^a
ESTIMATED EXPENDITURES ON ALL ROAD AND STREET SYSTEMS IN THE UNITED STATES
IN SELECTED YEARS

Highway System and Class of Expenditure	1921	1931	1936	1941	1946	1947	1948
	<i>million dollars</i>	<i>million dollars</i>	<i>million dollars</i>	<i>million dollars</i>	<i>million dollars</i>	<i>million dollars</i>	<i>million dollars</i>
State-administered highways							
Capital outlay ^b	301	746	660	594	518	908	1,143
Maintenance ^b	65	162	221	234	322	370	449
Administration ^d	25	45	61	83	130	178	167
Interest	10	59	66	64	46	46	47
Total	401	1,012	1,008	975	1,016	1,502	1,806
County and local rural roads							
Capital outlay ^b	338	267	505	345	167	254	295
Maintenance	205	261	220	260	407	442	463
Administration ^e	21	39	24	20	36	25	28
Interest	34	86	63	48	33	32	33
Total	698	653	812	673	643	753	819
City and village streets							
Capital outlay ^b	191	350	401	217	87	109	122
Maintenance	108	193	156	164	225	246	302
Administration ^e	18	32	26	26	37	43	47
Interest	20	88	60	58	48	48	46
Total	337	623	643	465	397	446	517
All roads and streets							
Capital outlay	830	1,363	1,566	1,156	772	1,271	1,560
Maintenance	378	616	597	658	954	1,058	1,214
Administration	64	116	111	129	208	246	242
Interest	64	233	189	170	127	126	126
Total	1,336	2,328	2,463	2,113	2,056	2,701	3,142
Estimated travel on all roads and streets in year (Billion vehicle-miles)	55	216	252	333	341	371	398
Expenditures per vehicle-mile of travel	\$0 0243	\$0 0108	\$0 0098	\$0 0063	\$0 0060	\$0 0073	\$0 0079

^a Table 1B in AASHO report

^b Includes expenditures by States on transect connections of State highways, and on county roads in those States (Delaware, North Carolina, Virginia, and West Virginia) that have jurisdiction over them

^c Includes Federal expenditures by Work Projects Administration in 1936 and 1941, as follows (million dollars) 1936, State highways 30, county and local rural roads, 339, city and village streets, 264, total, 633, 1941, State highways, 53, county and local rural roads, 189, city and village streets, 104, total, 346

^d Includes State highway police, as well as engineering and miscellaneous expenses

^e Includes engineering, equipment costs not charged to construction and maintenance, and other miscellaneous expenditures

spread demand for action, no importuning of governors for special sessions to deal with the highway finance problem, no wave of enthusiasm for toll roads, and no concerted demand by local municipalities for greatly increased aid from the State and Federal governments. Contrariwise, since we do have insistent demands, importunings, etc., it is evident that there is a great disparity between financial

quires that there be a determination of road needs. There must be fixed, too, a reasonable program for meeting the needs over a period of years. Fortunately, a great deal has been accomplished in the making of comprehensive road needs studies based on well-established standards of evaluation. Many States have made needs studies of this character. Nationwide data have not been so well established, but various studies give indicative results

As a backdrop against which to view the total road needs program, Table 1 has been pre-

TABLE 2
THE NATION-WIDE PROGRAM OF HIGHWAY NEEDS^a

Item	Primary Rural Roads ^b	Secondary and Local Roads	City Streets	Total
Miles in service (Thousands)	342	2,658	300	3,300
Highway Needs in Million Dollars				
Capital improvement needs at 1948 prices				
Immediate capital needs	18,100	9,300	19,500	46,900
Additional capital needs (next 15 yr) ^c	3,200	1,600	3,400	8,200
Total	21,300	10,900	22,900	55,100
Average annual program at 1948 prices				
Average annual capital needs (15-yr program)	1,420	730	1,530	3,680
Average annual maintenance needs	420	720	260	1,400
Total	1,840	1,450	1,790	5,080
Average annual program, adjusted to probable future price level ^d				
Capital needs	1,100	570	1,200	2,870
Maintenance needs	330	580	200	1,090
Total	1,430	1,130	1,400	3,960
Additional items contributing to total highway expense				
Administration and policing	130	36	37	203
Service of highway debt now outstanding ^e				
Interest	20	12	18	50
Retirement	80	50	70	200
Total	100	62	88	250
Total, additional items	230	98	125	453
Average annual required expenditure	1,660	1,228	1,525	4,413
Estimate of annual travel at midpoint of 15-yr period, in billion vehicle miles	179	56	235	470
Estimate of required annual expenditures per vehicle mile, in dollars	0 0093	0 0219	0 0065	0 0094

^a Estimate as of October 15, 1948, prepared in Highway Cost Section, Public Roads Administration, Fred B. Farrell Chief. This estimate is subject to modification as data on highway needs accumulate to form the basis of a more accurate analysis.

^b Primary rural State highway systems.

^c Stopgap improvements, replacements, etc., established at 17.5 per cent of the immediate needs for a 15 yr period.

^d The 1948 price level is approximately 200 percent of prewar (1937 to 1941). It is estimated that prices will gradually recede to a value 50 percent above prewar.

^e This calculation makes no assumptions as to new borrowing to finance the future program, but highway debt outstanding at the beginning of the program period imposes gradually decreasing interest and redemption charges over the period.

pared to show the total road and street expenditures in selected years since 1921. It will be seen that we had a \$3 142 billion program in

1948. In 1921, it was \$1.336 billion, in 1936, \$2.463 billion.

There are a number of important relationships and trends illustrated in the table. For example, between 1936 and 1948, maintenance expenditures for all highways and streets doubled; and the relationship holds true on State highways, county roads and city streets. It reflects clearly that the basic costs of providing for more traffic at higher unit prices in 1948 required twice the dollar expenditure of 1936. With this in mind, it is significant to note that the capital outlay total for all roads and streets was slightly less in 1948 than it was in 1936. Capital outlay expenditures, of course, reflect funds available and not the desirable rate of making improvements.

At the bottom of Table 1 there is shown for each year the equivalent per vehicle mile of

TABLE 3

	Total Cost	Per Vehicle Mile
	billion dollars	cents
Primary rural	1 660	0 93
Secondary and local rural	1 228	2 19
City streets	1 525	0 65
Totals	4 413	0 94

travel expenditure in each year. It was 0.98 cent in 1936. It was 0.79 cent in 1948 when the cent bought only about one-half what it did in 1936.

In Table 2 there is presented an estimate of the Nation-wide program of highway needs broken down by primary rural, secondary and local, and city streets. As has been the practice in many of the State-needs studies, this program contemplates the meeting of accumulated needs over a 15-yr period. A shorter period would be desirable but probably is not practicable. Cost estimates have been developed at the 1948 price level and then adjusted on a descending scale to a value 50 percent above prewar. Travel on the road systems has been estimated, and annual expenditure values have been related to average traffic.

The estimated total annual cost by road systems and per vehicle mile of travel is summarized in Table 3.

The estimate of \$4.4 billion expenditures required to meet needs compares with the \$3.142 billion program in 1948. The cost per

vehicle mile of 0.94 cent compares with values of 0.93 cent in 1936 and 0.79 cent in 1948.

The estimate presented in Table 2 admittedly is not based on a route-by-route or even a State-by-State evaluation. However, evaluation of road needs data from States where detailed studies have been made indicates

that the percentage values added appears as Table 5

Only regular Federal-aid funds are included. It is believed that inclusion of the special depression allocations confuses the picture. The large WPA program was not a representative part of our total highway program and generally is viewed as an undesirable element in

TABLE 4
ESTIMATED REVENUE CONTRIBUTED FOR HIGHWAYS AND STREETS BY FEDERAL, STATE, COUNTY AND LOCAL GOVERNMENTS IN THE UNITED STATES IN SELECTED YEARS

Source	1921	1931	1936	1941	1946	1947	1948 (preliminary)
	million dollars	million dollars	million dollars	million dollars	million dollars	million dollars	million dollars
Federal Government							
Regular Federal aid	87	242	328	154	145	285	359
Other regular funds ^a	3	24	59	35	23	40	38
Public Works Administration			65	8			
Work Projects Administration			633	346			
Total	90	266	1,085	543	168	325	397
States							
Highway user revenue	119	835	851	1,187	1,450	1,594	1,808
Other	77	56	18	38	155	79	135
Total	196	891	869	1,225	1,605	1,673	1,943
County and local rural agencies	400	493	269	269	311	358	370
Urban places	337	643	348	295	309	315	325
Total, all agencies	1,023	2,293	2,571	2,332	2,393	2,671	3,035

^a Includes funds of Forest Service, National Park Service, and Office of Indian Affairs expended by Bureau of Public Roads as well as funds spent directly by these agencies

TABLE 5

Source	1921		1931		1941		1948	
	million dollars	per cent	million dollars	per cent	million dollars	per cent	million dollars	per cent
Regular Federal-aid	87	9	242	11	154	8	359	12
State	196	19	891	39	1225	63	1943	65
County and local rural	400	39	493	22	269	14	370	12
Urban places	337	33	643	28	295	15	325	11
Totals	1020	100	2269	100	1943	100	2997	100

that the \$4.4 billion a year is a reasonable value.² Provision of funds in this amount must be attained, then, to finance the Nationwide highway program

REVENUE SOURCES

Table 4 is a summary of highway revenue, classified by governmental source and in part by kind, for selected years from 1921 to 1948. The table has too many figures to permit ready interpretation of their significance. A consoli-

² See appended extract from AASHO report. See also appended Commentary on Validity of Road Needs Estimates.

a highway program. The WPA program is noteworthy principally because of the fact that it was countered in the depression period by reductions in financial support from counties, cities and other local governments. And, the support from these levels of government never returned to the predepression level. Had the pattern of support been retained, funds from local governmental units would have had to increase greatly to meet expanding traffic needs and higher costs.

From Table 5 it is clear that regular Federal-aid participation in total highway costs has continued at a more uniform relationship to

the total than has financial support from other sources Regular Federal-aid in 1921 represented 9 percent of the total revenues In 1931 it was 11 percent, in 1941 it was 8 percent, and in 1948 it was 12 percent.

County and local rural support has been fading almost in step with support from urban places. The former source accounted for 39 percent of the total in 1921 and only 12 percent in 1948 For the cities, it was a drop from 33 percent to 11 percent.

The State has been steadily emerging as the main source of funds—from 19 percent in 1921

States these sources provide more than 80 percent of the funds At the same time, in several other States, less than 10 percent comes from these sources Wide extremes in the degree of local support occur between States in the same areas and with presumably comparable economic conditions. It would be easy to assume, from this table, that reasons of politics rather than logic or economics have been responsible for the trend toward diminished financial support from local sources, as shown in Tables 4 and 5.

Coupled with the State to State variations in support from local sources, there are equally striking variations in the degree to which State imposes on road users support county and other local rural roads. States with little support from local sources provide a large part of the funds from road user imposts; and, conversely, in States where local sources are important, lesser amounts are provided from road user imposts

Figure 2 is a map on which the great variability in support of county and other local rural roads from road user imposts is illustrated by symbolic screenings. At the lower left of the figure a bar chart indicates the frequency distribution of the States in percentage groups.

Table 6 is a good illustration of the points described above However, all States are not on an equal basis of comparison as regards the mileage classified as county or other local rural road Some States have greater percentages of the road mileage on the State system; therefore, less mileage and less important roads on the county and local road systems. Table 7 provides a comparison which eliminates differences in road classification by including all rural roads. Figure 3 presents graphically the local funds situation for all rural roads. Symbolization indicates the degree of financial support from county and local tax sources The frequency distribution diagram in the lower left of the figure shows that in 19 States, local sources contribute 10 percent or less. In four States these sources provide 31 to 40 percent

Table 7 gives, State by State, the relative support of all rural roads from all sources. The National totals and percentages by source are shown in Table 8

The foregoing State-by-State comparisons apply only to rural roads. Data were not

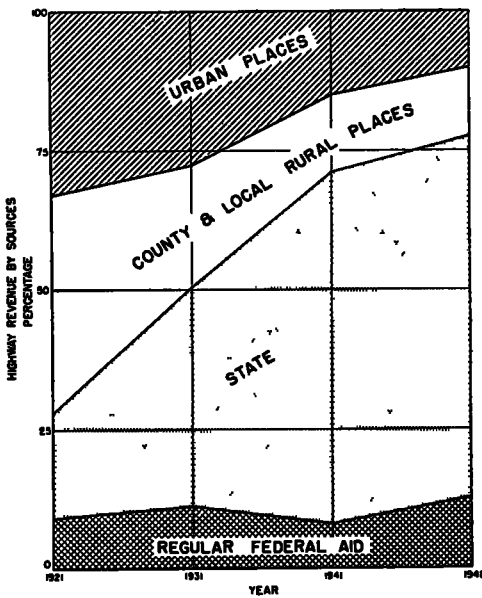


Figure 1. U. S. Highway Revenue by Sources

to 65 percent in 1948 And as Table 4 clearly shows, it is largely highway user revenue that the States provide.

Figure 1 presents the trend of funds from different sources diagrammatically.

Tables 4 and 5 and Figure 1 show what has been happening Nation-wide. In considering the implications of the trend, some significance may be attached to the situation from State to State State-by-State comparisons have been made for the year 1947.

Table 6 presents for 1947, by States, the income for county and local rural roads by source. Extremely striking are the variable percentages of financial support provided from county and local fund sources. In several

TABLE 6^a
INCOME FOR COUNTY AND LOCAL RURAL ROADS IN 1947, CLASSIFIED BY SOURCE^b

Region and State	Federal Funds ^c		State Imposts on Highway Users ^c		Miscellaneous State Revenues ^c		Total Revenues		County and Local Sources		Total	
	Amount	Per-centage	Amount	Per-centage	Amount	Per-centage	A-mount	Per-centage	Amount	Per-centage	Amount	Per-centage
	1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars	
Eastern												
Connecticut	2	0 0	6,675	67 0					3,281	33 0	9,958	100 0
Delaware ^d			417	100 0							417	100 0
Maine			932	30 4					2,129	69 6	3,061	100 0
Maryland	831	14 4	3,294	56 9					1,690	23 7	5,785	100 0
Massachusetts			5,415	72 2					2,077	27 7	7,492	100 0
New Hampshire	4	0 1	804	29 5					1,922	70 4	2,730	100 0
New Jersey	277	1 2	13,242	55 8			256	1 1	9,952	41 9	23,727	100 0
New York			28,911	35 9			2,000	2 5	49,581	61 6	80,492	100 0
Pennsylvania			11,932	37 2	156	0 5			19,981	62 3	32,076	100 0
Rhode Island			85	16 0					445	84 0	530	100 0
Vermont	198	4 0	2,992	61 2					1,703	34 5	4,893	100 0
West Virginia ^d	350	2 1	5,120	30 2	9,568	56 5	321	1 9	1,568	9 3	16,927	100 0
Total	1,669	0 9	79,819	42.4	9,724	5 2	2,577	1 4	94,299	50 1	188,088	100 0
Southern												
Alabama	1,765	6 5	17,874	66 0	15	0 1			7,425	27 4	27,079	100 0
Arkansas	221	3 1	4,216	58 4	632	8 8			2,144	29 7	7,213	100 0
Florida	43	0 3	9,519	59 0	2,608	16 2	25	0 2	3,914	24 3	16,109	100 0
Georgia	936	6 0	5,351	34 4			167	1 1	9,111	58 5	15,565	100 0
Kentucky			6,687	51 2					6,282	48 8	12,869	100 0
Louisiana	20	0 2	4,354	35 8	1,600	13 2			6,189	50 8	12,163	100 0
Mississippi	257	1 3	11,314	58 8	1,400	7 3	397	2 1	5,881	30 5	19,249	100 0
North Carolina ^d	3,078	8 3	29,526	80 0					4,320	11 7	36,924	100 0
Oklahoma	1,568	9 6	10,381	63 7	1,165	7 2			3,177	19 6	18,281	100 0
South Carolina			3,255	55 4					2,702	44 6	6,057	100 0
Tennessee	1,941	10 6	11,631	63 6	24	0 1			4,688	25 7	18,284	100 0
Texas			19,435	52 3					17,714	47 7	37,149	100 0
Virginia ^d	757	3 4	19,642	86 9					2,198	9 7	22,597	100 0
Total	10,576	4 3	153,185	61 9	7,444	3 0	589	0 2	75,745	30 6	247,539	100 0
Central												
Illinois	1,602	3 7	20,415	46 9	4	0 0	250	0 6	21,250	48 8	43,521	100 0
Indiana			12,458	85 1			35	0 2	2,150	14 7	14,643	100 0
Iowa	2,270	5 7	16,900	42 7					20,409	51 6	39,579	100 0
Kansas	1,691	8 1	6,329 ^e	30 1	1,651	7 9	105	0 5	11,200	53 4	20,976	100 0
Michigan	895	3 1	23,971	82 4	2,151	7 4	54	0 2	1,992	6 9	29,064	100 0
Minnesota	2,337	7 9	8,683	29 3	222	0 8			18,355	62 0	29,597	100 0
Missouri			23 ^e	0 2	495	3 7	980	7 4	11,727	88 7	13,225	100 0
Nebraska	5	0 0	7,686	57 0			381	2 9	5,347	40 1	13,119	100 0
North Dakota	157	2 5	1,703	27 3					4,373	70 2	6,233	100 0
Ohio	8	0 0	25,913	75 4	1,893	5 5			6,544	19 1	34,558	100 0
South Dakota	508	5 5	2,225	23 9	82	0 9			6,500	69 7	9,315	100 0
Wisconsin	350	1 1	10,537	34 2					20,513	64 7	31,700	100 0
Total	9,824	3 4	137,043	48 0	6,498	2 3	1,805	0 6	130,360	45 7	285,530	100 0
Western												
Arizona	987	22 4	2,015	45 6	384	8 7			1,029	23 3	4,415	100 0
California	4,316	9 3	29,070	62 5	28	0 1	3,865	8 3	9,229	19 8	46,508	100 0
Colorado			3,246	72 1					1,253	27 9	4,499	100 0
Idaho	1,028	15 6	3,269	49 7					2,287	34 7	6,584	100 0
Montana	57	1 0	1,600	27 2					4,234	71 8	5,891	100 0
Nevada	15	1 9							757	98 1	772	100 0
New Mexico	64	7 9	358	44 2					388	47 9	810	100 0
Oregon	128	1 2	5,494	52 1					4,933	46 7	10,555	100 0
Utah	28	1 4	686	30 0					1,343	68 6	1,957	100 0
Washington	882	4 0	10,634	48 7	6,007	27 5	54	0 2	4,282	19 6	21,589	100 0
Wyoming	148	9 0	1,169	71 1					327	19 9	1,644	100 0
Total	7,653	7 3	57,441	54 4	6,419	6 1	3,919	3 7	30,082	28 5	105,494	100 0
Grand Total	29,722	3 6	427,488	51.7	30,085	3 6	8,690	1 1	330,466	40 0	826,651	100 0

^a Table 3A in AASHO report.

^b For a number of states, county, and local finance reports for the year 1947 had not been received at the time this was prepared, and it was necessary to make estimates, based on reports for previous years and other available data.

^c Discrepancies will be found between the amounts listed in these three columns and amounts reported in public roads secondary funds reported by the states as having been used on county and local roads, and Tables SF-5 and DF, 1947, as state income allocated to county and local roads. The chief reasons for these discrepancies are as follows: (1) Small amounts of federal funds were reported by counties and local units in addition to the regular Federal-aid secondary funds reported by the states as having been used on county and local roads, and (2) Tables SF-5 and DF are based on calendar year reports by states, whereas counties and local units report for various fiscal years.

^d Income for expenditure on former county roads, now under state control in these 4 states, included here to afford comparison with county and local road income in other states. In Delaware only the debt service on county road bonds could be segregated from primary road expenditures.

^e Includes \$915,000 in Kansas and \$23,000 in Missouri paid by these states to counties and townships as reimbursement for costs of roads now on the state systems, as these funds are available for county and township road work.

available in shape which would permit similar comparisons for urban streets and highways. Although revenue from urban sources has declined pretty much as has the revenue from county and other local rural places, the urban situation is somewhat different. In only a few States are the cities participating to an important degree in road-user revenues. In 1947, out of \$484 million allocated for local roads and streets, the cities received only \$93 million. The trend is toward further increases, however. Even though we now have acceptance of responsibility for transcity connectors

frequency distribution of the States according to the allocation amounts

In general, States that have high per vehicle allocations of road user imposts to highways have a small percentage of support from county and other local rural places. Table 10 lists the States according to the magnitude of these values, and illustrates the statement just made. It is noteworthy, however, that many States appear relatively low on both lists. Also, that some States—Iowa, Alabama, and Vermont, for example—hold well above average places on both lists. Such States,

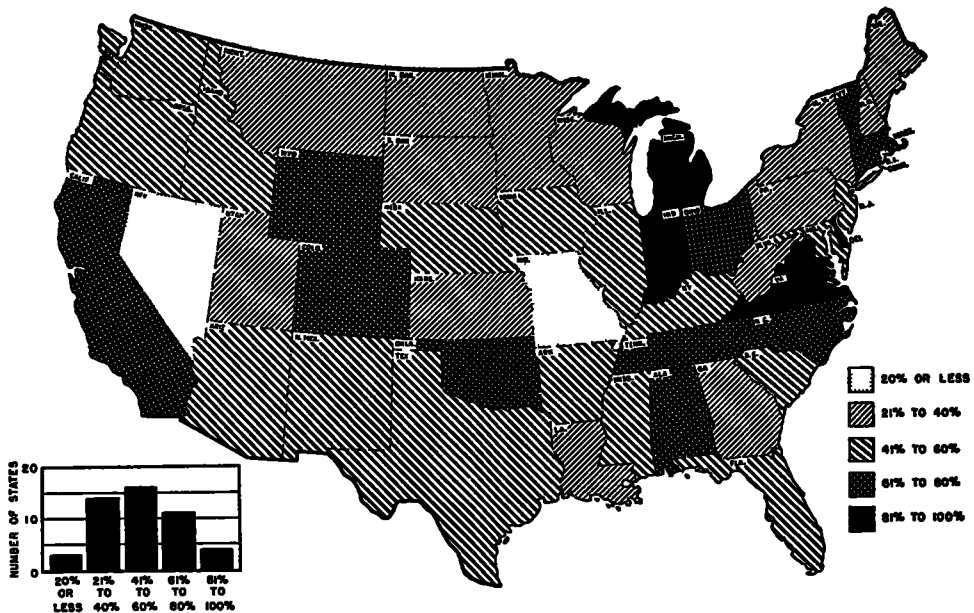


Figure 2. Percentages of 1947 Income for County and Local Rural Roads Derived from State Imposts on Highway Users

by many States, there is every indication that greater and greater demands will be made on State revenues for the improvement and maintenance of other city streets and highways

State imposts on highway users provide the greater part of highway revenue. However, the rates of taxes and fees vary from State to State, giving significant differences in the cost to, and return from, individual road users. Table 9 gives receipts per vehicle for 1947, both in total and as allocated for highway purposes. The national average allocated for highway purposes is \$42.67 per vehicle. The lowest value is for Rhode Island, \$17.28. The highest is North Carolina, \$71.05. Figure 4 shows the

widely separated geographically and with greatly different characteristics, show that loss of local financial support does not have to be the price for higher State road user imposts

WHAT OF THE FUTURE?

The need for large scale highway and street improvements is now so well established and so generally recognized that additional financing with a resultant acceleration of the road program is inevitable. The \$4.4 billion a year need and the currently available \$3 billion indicate that additional funds of \$1.4 billion should be provided. The approximate amounts

TABLE 7^a
INCOME FOR ALL RURAL ROADS IN 1947, CLASSIFIED BY SOURCE^b

Region and State	Federal Funds		State Imposts on Highway Users		Miscellaneous State Revenues		Total Revenues		County and Local Sources		Total	
	Amount	Per-centage	Amount	Per-centage	Amount	Per-centage	A-amount	Per-centage	Amount	Per-centage	Amount	Per-centage
	1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars		1,000 dollars	
Eastern												
Connecticut	2,847	8 7	23,881	72 8	494	1 5	2,149	6 5	3,456	10 5	32,827	100 0
Delaware	841	14 6	3,923	68 1	995	17 3			1,660	6 4	5,759	100 0
Maine	1,962	9 4	14,762	70 8	213	1 0	191	1 0	3,709	17 8	20,837	100 0
Maryland	2,445	9 4	18,759	72 5	488	1 8	2,552	9 9	1,660	6 4	25,874	100 0
Massachusetts	4,021	12 3	26,543	80 9	171	0 5			2,077	6 3	32,812	100 0
New Hampshire	785	7 1	7,534	68 5	58	0 5	415	3 8	2,209	20 1	11,001	100 0
New Jersey	6,407	9 5	50,324	74 7	437	0 6	256	0 4	9,952	14 8	67,378	100 0
New York	8,771	5 4	93,978	58 1	4,262	2 6	5,318	3 3	49,639	30 6	161,968	100 0
Pennsylvania	16,420	10 6	105,924	68 2	2,802	1 8	8,708	5 6	21,391	13 8	155,245	100 0
Rhode Island	302	6 5	3,587	77 0	54	1 2	227	4 9	485	10 4	4,655	100 0
Vermont	1,361	13 4	6,839	67 1					1,980	19 5	10,190	100 0
West Virginia	5,250	12 4	28,933	56 5	10,346	24 4	1,267	3 0	1,568	3 7	42,364	100 0
Total	51,412	9 0	379,987	66 5	20,290	3 6	21,083	3 7	98,136	17 2	590,908	100 0
Southern												
Alabama	6,126	13 4	31,481	69 1	525	1 2			7,425	16 3	45,557	100 0
Arkansas	5,359	17 4	22,641	73 4	708	2 3			2,144	6 9	30,850	100 0
Florida	3,970	8 4	35,869	75 6	2,711	5 7	448	1 0	4,419	9 3	47,417	100 0
Georgia	8,508	20 3	23,782	56 8	25	0 1	167	0 4	9,854	22 4	41,836	100 0
Kentucky	5,569	12 8	30,975	70 9	230	0 5	568	1 3	6,327	14 5	43,667	100 0
Louisiana	3,131	7 4	27,723	65 0	5,448	12 8			6,827	14 8	42,639	100 0
Mississippi	5,381	14 9	22,306	63 4	1,487	4 1	397	1 1	5,927	16 5	35,998	100 0
North Carolina	7,609	11 6	54,441	81 2	499	0 7			4,320	6 5	67,069	100 0
Oklahoma	6,962	18 3	26,665	70 0	1,272	3 3			3,177	8 4	38,076	100 0
South Carolina	5,235	16 6	23,459	74 2	230	0 7			2,702	8 5	31,626	100 0
Tennessee	6,167	13 1	35,560	75 4	60	0 1	109	0 2	5,278	11 2	47,154	100 0
Texas	27,499	21 1	82,229	63 0	429	0 3	72	0 1	20,210	15 5	130,439	100 0
Virginia	5,245	10 2	42,479	82 4	118	0 2	1,436	2 8	2,264	4 4	51,542	100 0
Total	96,951	14 8	460,100	70 4	13,740	2 1	3,195	0 5	79,874	12 2	653,860	100 0
Central												
Illinois	6,227	7 2	59,001	67 9	97	0 1	250	0 3	21,345	24 5	86,920	100 0
Indiana	5,414	10 8	42,166	84 5	126	0 3	35	0 1	2,183	4 3	49,864	100 0
Iowa	5,416	8 1	36,350	54 6	4,416	6 6			20,409	30 7	66,591	100 0
Kansas	9,321	19 8	24,730	52 4	1,785	3 8	105	0 2	11,232	23 8	47,173	100 0
Michigan	7,964	10 7	58,487	79 0	2,175	2 9	1,450	2 0	3,962	5 4	74,068	100 0
Minnesota	9,581	15 1	34,578	54 5	678	1 1			16,579	29 3	65,416	100 0
Missouri	5,845	11 6	30,980	61 6	645	1 3	980	2 0	11,760	23 5	50,220	100 0
Nebraska	3,333	12 5	17,316	64 7	-2		381	1 4	5,729	21 4	26,767	100 0
North Dakota	2,880	17 7	7,477	46 0	1,471	9 1			4,416	27 2	16,244	100 0
Ohio	6,918	7 4	72,012	77 4	2,365	2 6	519	0 6	11,160	12 0	92,984	100 0
South Dakota	4,377	22 2	8,407	42 5	481	2 4			6,500	32 9	19,765	100 0
Wisconsin	4,188	6 4	38,710	58 9	216	0 3			22,611	34 4	65,725	100 0
Total	71,464	10 8	430,194	65 2	14,473	2 2	3,720	0 6	139,806	21 2	659,747	100 0
Western												
Arizona	4,727	28 7	10,293	62 6	400	2 4			1,029	6 3	16,449	100 0
California	24,931	18 4	88,810	65 5	497	0 4	11,845	8 7	9,634	7 0	135,617	100 0
Colorado	3,186	12 5	19,245	75 6	527	2 1			2,498	9 8	25,456	100 0
Idaho	3,703	22 4	10,418	62 9	62	0 5			2,360	14 2	16,550	100 0
Montana	4,143	23 4	9,090	51 2	273	1 5			4,234	23 9	17,740	100 0
Nevada	3,286	44 9	3,255	44 5					773	10 6	7,314	100 0
New Mexico	4,462	31 3	9,374	65 6	29	0 2			417	2 9	14,262	100 0
Oregon	6,772	18 2	25,405	68 0			197	0 5	4,971	13 3	37,345	100 0
Utah	3,710	30 3	7,158	58 4	1				1,378	11 3	12,245	100 0
Washington	5,160	10 8	30,127	63 4	6,320	13 3	1,636	3 5	4,282	9 0	47,515	100 0
Wyoming	4,574	42 8	5,616	62 5	168	1 6			327	3 1	10,665	100 0
Total	68,643	20 1	218,787	64 1	8,297	2 5	13,678	4 0	31,793	9 3	341,198	100 0
Grand Total	288,460	13 0	1,489,068	66 9	56,800	2 5	41,676	1 9	349,709	15 7	2,225,713	100 0

^a Table 4A in AASHO report

^b Includes income for expenditure on transect connections of State highways, as a great many states fail to segregate these funds from income for rural state highways. See also footnotes to Table 6

from different sources in 1948 were as follows.

	<i>million dollars</i>
Federal-aid (Authorization)	428
States	1,943
County and local rural	370
Cities	325
Total	3,066

authorizations, the extent of the road network for which they are made available, and the requirements for matching will determine a very significant part of the Nation-wide program. It is important that this be done by the Congress on a long-term program basis. If authorizations are to be made only for two-year periods, the amounts authorized should be

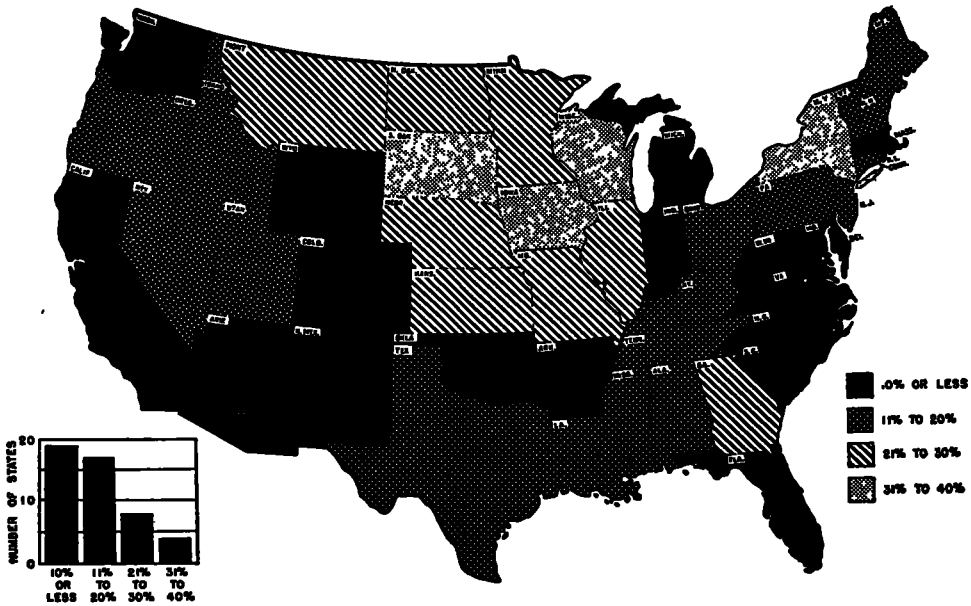


Figure 3. Percentages of all Rural Road Income in 1947 Derived From County and Local Sources

TABLE 8

	Amount	Percentage of Total
	<i>thousand dollars</i>	
Federal funds	288,480	13.0
State imposts on road users	1,489,068	66.9
Miscellaneous State revenues	56,800	2.5
Toll revenues	41,676	1.9
County and local sources	348,709	15.7
Grand Totals	2,225,713	100

Among the States there are vast differences in financial practices—the extent of local support, use of general State revenues, tolls, etc. These differences, without doubt, will continue. The financial picture locally can be discussed in relation to the total Nation-wide problem, but it must be recognized that only in the Federal-aid portion of the program will the approach be uniform throughout the country. The magnitude of future Federal-aid

established to represent a specific portion of a definite long-range program. Only thus will the States and local governments be in a position to arrange appropriate financing of long-range programs in their respective jurisdictions.

FEDERAL-AID

The Federal government, through the authorizations that have been made to the States for many years and through the system designations made by the States and approved by the Federal government, has an established interest in a part of the total street and highway network. In 1947 the AASHO developed an estimate of the needs on the Federal-aid systems based on reports from the States.³

³ The AASHO is currently revising this estimate based on very much better data now available in many States

TABLE 11*
SUMMARY OF IMPROVEMENTS NEEDED AS OF DECEMBER 31, 1947, ON FEDERAL-AID PRIMARY, SECONDARY AND URBAN SYSTEMS, BY STATES, ABSTRACTED FROM A COMPILATION BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

State	Total Miles, all Federal and Systems	Total Miles, Needing Improvement	Total Cost of Needed Improvements				Average Annual Capital Outlay Requirements ^b			Annual Federal-aid Authorizations of Present Program			
			Federal-aid Systems	Federal-aid Primary System	Federal-aid Secondary System	Federal-aid Urban System	If Completed in a 5-year Program	If Completed in a 10-year Program	If Completed in a 15-year Program	Amount, all Federal-aid Systems	5-year program	10-year program	15-year program
			1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama	15,306	9,389	295,973	109,815	147,480	45,678	69,594	33,849	9,539	13 7	32 5	28 2	
Arizona	5,188	2,737	150,046	108,469	29,447	18,422	13,990	6,800	17 3	17 3	40 0		
Arkansas	16,937	15,499	537,592	251,684	34,162	34,162	113,771	37,352	6 5	11 7	15 7		
California	15,763	10,432	1,061,753	703,894	337,769	632,130	323,214	21,723	21,723	6 2	14 4	11 4	
Colorado	7,918	7,518	377,417	158,842	187,575	77,008	78,063	43,864	7,480	9 5	17 1	22 8	
Connecticut	2,174	1,951	463,998	150,820	284,178	224,038	68,221	40,388	4,645	4 7	8 5	11 4	
Delaware	1,774	1,317	89,785	36,748	19,885	4,153	12,732	5,000	1,080	15 6	29 1	36 4	
Florida	9,480	7,075	275,350	110,358	64,159	64,159	60,063	25,384	6,823	11 4	20 2	26 9	
Georgia	18,680	11,459	496,733	184,349	172,672	139,712	102,016	48,927	11,377	11 4	19 0	23 8	
Illinois	6,408	5,432	171,984	120,352	45,693	4,067	35,010	14,873	4,394	13 4	24 5	35 1	
Indiana	16,370	8,244	1,188,647	396,714	122,914	689,019	284,868	142,811	22,497	8 8	15 8	20 5	
Iowa	13,185	9,438	610,314	296,198	256,996	57,120	128,367	70,567	11,784	9 2	16 7	22 5	
Kansas	26,372	19,709	589,688	358,100	174,933	28,635	131,085	61,136	10,633	7 9	13 4	17 0	
Kentucky	12,210	6,601	346,077	178,330	141,134	23,713	72,878	30,875	10,791	11 8	21 1	25 2	
Louisiana	8,264	7,666	305,342	128,960	96,968	89,424	63,106	34,025	7,439	11 8	21 5	29 3	
Maine	3,844	2,188	105,908	50,297	41,707	13,904	33,178	10,134	2,813	10 6	28 8	37 6	
Maryland	4,224	1,963	896,929	229,654	83,356	613,910	185,583	100,197	4,675	5 4	10 1	13 7	
Massachusetts	17,916	11,269	832,315	416,335	182,172	273,808	180,940	68,628	10,076	9 0	16 5	22 5	
Michigan	21,250	16,317	628,242	196,178	228,766	203,308	133,469	74,077	12,234	9 1	16 3	21 8	
Minnesota	11,652	10,503	441,654	220,251	207,812	13,581	11,870	49,880	17,795	8 5	18 0	21 3	
Missouri	31,542	24,854	589,544	258,982	90,000	193,582	113,774	44,905	14,007	12 3	22 7	31 2	
Montana	8,813	7,606	267,984	216,754	43,746	7,484	57,028	31,708	2,780	20 2	24 4	32 6	
Nebraska	15,395	6,140	144,327	94,629	37,782	12,016	40,531	28,123	8,194	20 2	29 1	33 8	
Nevada	4,125	3,036	86,284	56,013	24,698	6,533	29,092	11,210	8,078	24 5	42 1	54 4	
New Hampshire	1,752	1,618	140,500	79,408	64,431	12,663	39,082	11,612	2,244	7 7	14 3	19 5	
New Jersey	3,897	1,208	623,671	267,640	98,727	287,304	162,018	106,374	89,091	5 7	8 0	10 3	
New Mexico	8,000	7,313	249,524	146,629	84,756	16,139	28,731	18,189	6,243	12 0	21 8	25 7	
New York	14,761	5,534	729,700	360,000	185,800	182,500	219,343	161,070	128,313	31 4	21 8	27 7	
North Carolina	13,136	7,568	405,000	250,000	95,000	60,000	89,000	40,129	11,104	12 4	25 6	33 8	
North Dakota	18,136	10,251	188,589	128,410	58,779	4,400	394,766	174,444	8,802	14 3	25 5	36 8	
Ohio	19,461	13,383	1,577,053	897,708	116,884	562,440	182,360	72,825	19,838	6 0	11 2	16 4	
Oklahoma	17,678	12,870	626,556	444,234	129,303	83,017	30,280	63,644	9,864	7 6	13 9	28 2	
Pennsylvania	8,343	3,542	243,680	133,680	81,544	31,097	80,222	31,097	6,907	13 8	22 9	28 4	
Rhode Island	18,472	8,660	1,156,100	739,000	114,800	302,300	244,483	135,017	100,621	24,332	9 9	18 0	
South Carolina	7,443	3,333	140,352	53,082	46,300	42,000	30,856	17,695	2,875	10 3	18 5	24 8	
South Dakota	9,068	6,614	140,352	53,082	46,300	42,000	30,856	17,695	6,097	19 7	34 3	44 8	
Tennessee	11,046	10,620	623,578	314,570	221,071	87,937	130,789	52,788	9,792	7 5	13 7	18 1	
Texas	27,575	9,563	355,700	93,043	154,295	184,295	138,636	82,711	26,064	20 2	33 9	43 1	

Utah	4,907	3,995	161,034	102,226	37,998	20,810	33,648	18,553	13,784	4,543	13 4	24 4	33 0
Vermont	3,020	1,877	133,327	79,794	36,579	16,954	28,286	15,679	11,717	1,968	7 0	12 7	17 0
Virginia ^a	9,455	8,262	524,181	374,775	151,834	97,572	108,347	58,425	42,728	7,293	6 7	12 3	16 9
West Virginia	13,417	10,550	270,515	84,935	108,140	77,440	91,114	69,752	62,965	5,235	5 7	7 5	8 3
Wisconsin	18,376	9,846	432,545	212,732	133,050	86,763	95,634	55,150	42,453	11,466	12 0	20 8	27 0
Wyoming	5,008	3,689	148,664	127,341	12,694	8,629	31,806	17,782	13,375	4,701	14 8	26 4	35 0
District of Columbia	184	41	48,612	2,192	2,192	46,450	10,238	5,507	4,988	2,898	23 3	52 6	58 1
Total, 42 States and District of Columbia	516,532	344,220	20,889,213	10,038,475	4,843,206	5,707,532	4,525,703	2,501,388	1,990,062	439,661	9 7	16 9	22 1
Estimated total, all States, and District of Columbia ^b	595,000		21,980,000	10,784,000	5,237,000	15,969,000	4,633,000	2,779,000	2,126,000	469,841	9 7	16.9	22.1
Total, adjusted for predicted price changes							3,968,000	2,131,000	1,695,000	469,841	11 8	22 0	29 5

^a Table EB in AASHO report
^b Average annual requirements to effect improvements needed as of December 31, 1947, plus additional needs accruing, by means of program of indicated duration
^c Not available
^d Amounts for each of the three Federal-aid systems expanded in proportion to Federal-aid authorizations to the four states not reporting

Federal-State program, each State will meet its needs to the extent of one-half of \$42.15 or \$21.075. The Federal funds would then be apportioned to make up the difference. If a State has needs totaling \$40 a motor vehicle, Federal-aid would equal \$40 minus \$21.075 or \$18.925 per motor vehicle. If needs totaled \$100 a motor vehicle, Federal-aid would equal \$100 minus \$21.075 or \$78.925 a motor vehicle. Matching in the first case would be

TABLE 12
NATION-WIDE SUMMARY OF IMPROVEMENTS NEEDED AS OF DECEMBER 31, 1947, ON FEDERAL-AID PRIMARY, SECONDARY AND URBAN SYSTEMS, ABSTRACTED FROM A COMPILATION BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

Item	Federal-aid Primary System	Federal-aid Secondary System	Federal-aid Urban System	All Federal-aid Systems
Miles in system (approximate)	216,000	364,000	15,000	595,000
Cost Estimates in Million Dollars				
Total cost of needed improvements, as of December 31, 1947	10,784	5,237	5,959	21,980
Average annual capital outlay requirements to effect above improvements and additional needs accruing, by 5-, 10-, or 15-yr. construction program				
At current price levels.				
5-yr program	2,401	1,175	1,257	4,833
10-yr program	1,389	689	701	2,779
15-yr program	1,064	537	525	2,126
Adjusted for predicted price levels over program period.				
5-yr. program	1,971	965	1,032	3,968
10-yr. program	1,065	529	537	2,131
15-yr program	798	403	394	1,595
Annual Federal-aid authorizations of present program (thousand dollars)	211,601	140,686	117,554	469,841
Percentage of annual capital outlay requirements				
5-yr. program	10.7	14.6	11.4	11.8
10-yr. program	19.9	26.6	21.9	22.0
15-yr program	26.5	34.9	29.8	29.5

\$21.075 State to \$18.925 Federal, or approximately 53-47 percent. In the second case, 21 percent State—79 percent Federal.

Regardless of the theory on which a Federal-aid program is to be based, it is apparent that it is necessary to have a measure of the needs for improvement of the Federal-aid systems in the respective States. The estimates currently being developed by the States for the AASHO should be satisfactory. The next Federal-aid authorizations should be set to meet these needs over a definite period of

TABLE 13
AVERAGE ANNUAL CAPITAL REQUIREMENTS FOR 15 YEAR FEDERAL-AID SYSTEMS CONSTRUCTION PROGRAM AND FEDERAL-AID APPORTIONMENTS BY STATES AND PER MOTOR VEHICLE BASED ON AASHO ESTIMATE OF DEC 31, 1947 AND 1947 MOTOR VEHICLE REGISTRATION

State	Average Annual Capital Requirements for 15 Yr Federal-aid Systems Construction Program		Annual Federal-aid Apportionments, 1948 Law	
	thousand dollars	dollars per motor vehicle	thousand dollars	dollars per motor vehicle
Alabama	25,389	51.60	8,788	17.86
Arizona	10,496	54.98	5,113	26.78
Arkansas	35,197	98.39	6,705	18.74
California	113,018	32.04	19,856	5.63
Colorado	24,632	57.34	6,811	15.85
Connecticut	30,449	51.11	4,242	7.12
Delaware	3,751	46.49	1,806	22.38
Florida	19,044	27.06	6,271	8.91
Georgia	34,156	51.88	10,288	15.63
Idaho	10,933	55.95	4,389	22.45
Illinois	80,725	39.46	20,439	9.99
Indiana	39,255	33.83	10,645	9.17
Iowa	a		9,842	11.92
Kansas	45,866	65.06	9,422	13.36
Kentucky	23,164	42.62	7,977	14.33
Louisiana	18,667	39.69	6,694	14.23
Maine	7,603	31.17	3,454	14.16
Maryland	a		4,272	7.85
Massachusetts	55,027	52.54	9,196	8.78
Michigan	54,192	29.69	14,770	8.09
Minnesota	41,573	47.04	10,988	12.43
Mississippi	27,517	76.63	7,223	20.11
Missouri	33,689	32.19	12,760	12.19
Montana	17,820	89.78	7,093	35.74
Nebraska	18,188	38.54	7,426	15.74
Nevada	6,510	110.82	4,334	73.78
New Hampshire	8,637	56.34	2,046	13.35
New Jersey	66,817	54.15	8,387	6.80
New Mexico	15,553	98.20	5,696	35.96
New York	96,265	32.93	30,096	10.29
North Carolina	30,106	38.52	10,194	13.04
North Dakota	12,885	59.88	5,265	24.47
Ohio	95,407	42.14	17,722	7.83
Oklahoma	40,247	64.85	8,987	14.48
Oregon	23,330	43.86	6,315	11.87
Pennsylvania	75,489	31.55	22,173	9.27
Rhode Island	8,701	41.54	2,622	12.52
South Carolina	10,177	22.27	5,646	12.14
South Dakota	a		5,521	24.90
Tennessee	39,603	64.97	8,969	14.71
Texas	48,884	23.82	25,684	12.47
Utah	10,341	54.85	4,159	22.06
Vermont	8,791	81.15	1,812	16.73
Virginia	a		7,842	11.02
Washington	32,056	44.09	6,573	9.04
West Virginia	47,239	133.21	4,788	13.50
Wisconsin	31,850	32.17	10,397	10.80
Wyoming	10,084	98.12	4,266	41.72
District of Columbia	3,742	23.43	2,643	16.55
Total—44 States and D C	1,493,015			
Estimate for 4 States	101,985			
Total	1,595,000	42.15	428,407	11.32

* Individual estimates not available in 4 States See end of table

time. Apportionments of funds to the States and requirements for matching should be established to assure accomplishment uniformly in the period set. If it is in the National interest to provide a considerable portion of the cost of improving the Federal-aid systems, it is likewise in the National interest to require that adequate State and local funds are made available to complete the job. This can be done effectively by matching requirements and by providing for forfeiture of Federal authorizations to the extent the States do not meet their respective requirements. An approach of this kind is essential if the States are to have the encouragement they need for the establishment of long-range programs. Periodic review by Congress, as subsequent authorizations are required, will permit adjustments as needed to meet changed conditions.

STATE FINANCING

The solution to State finance problems logically will be determined in each State. And, the solution will be different from State to State. It is important to recognize, however, that the State revenues have been sharing an ever-increasing proportion of the total cost. If the past trends are continued, it is from the States that the greater part of the increase in revenues will have to come in realizing the needed improvements. Brief comment will be made regarding various potentials for State revenue.

Road User Imposts—These are shown by Table 10 and Figure 4, to vary widely from State to State. The only obvious deterrents to sizable increases in the gasoline taxes and motor vehicle fees in many States, to meet the requirements for additional funds, are the threats of diversion and dispersion. In spite of these threats it can be expected that much of the additional revenue will be provided by increased gasoline tax. Recent actions in a number of States have been in this direction.

General State Revenues have been used in some States, particularly for local road and street improvements. The AASHO special subcommittee on highway finance, in summarizing its report, recommended: "Where it is found that needed increases in the support of local and land service roads cannot be derived from local sources, the use of general State revenues for this purpose (as is now being done in a number of States) is preferable to increased

allocations of road user tax revenues, which are urgently needed for primary improvements."

Toll Road Financing has been hailed by some as the answer to the highway finance problem. In the opinion of this writer it does provide effective answers to some of the things the highway users of the country want. First, it furnishes good highways now—not 15, 20 or more years from now. Second, it allows the motorist to pay for the specific road or roads he uses as he uses them.

There are, however, several compelling arguments against toll road financing. First, a toll road must be designed to pay off, which generally will result in its providing less than the optimum in traffic service. Second, it presumes that the toll road is a luxury service justifying an extra fare, whereas the same standards are being incorporated in modern free highways. Third, a road or very restricted network of roads might conceivably be developed with toll financing, but a complete road system cannot be so developed. Fourth, toll road financing with revenue bonds is a costly way to get roads. Toll collecting facilities at interchanges add to the initial and continuing expense. And, the interest on toll road bonds is high in comparison with general obligation State bonds.

Toll road financing in recent years has demonstrated several very important things which should be recognized in their full significance by highway officials and legislative representatives. The enthusiastic acceptance of toll roads has shown that the motorists want good roads and are ready to pay for them. Toll roads, with minimum charges for passenger vehicles of one cent a mile in addition to regular imposts, have established what the motorists consider modern highways are worth. Bond financing of long-lived expressways makes sense.

⁴ The total burden of all State motor vehicle taxes in 1948 was approximately 0.53 cent per vehicle mile. Adding a cent on toll roads gives 1.53 cents per vehicle mile. The Farrell estimate in Table 2 gives a National total for meeting the \$4.4 billion a year program of 0.94 cent per vehicle mile. The average of needs-studies in six States (see Table A in the appended Extract) gives a cost of 1.08 cents per vehicle mile. These compare most favorably with the toll road cost for passenger vehicles of about 1½ cents a vehicle mile.

Bond Financing appears to provide a part of the answer to the need and the demand for more rapid development of the major traffic arterials. For the most critical problems, where traffic requires the development of controlled access highways, there is ample justification for long-term bond issue financing. As a matter of fact, there is little justification for current revenue financing of most of such facilities.

If highway development now were simply keeping pace with traffic and community growth, a case might be made for current revenue financing—regardless of the fact that the facilities have long service lives. However, the situation faced is one in which an accumulation of deferred needs must be met. It is illogical to expect taxpayers to accept tax rates which are based on providing both for the current and for the accumulated requirements.

LOCAL FINANCING

From data presently available, the extent of additional financing required specifically on local rural roads and city streets is not clear. Table 1 shows expenditures in 1948 on a basis that cannot be compared directly with the needs in Table 2. It is apparent, however, that much of the increase in funds required to meet needs not covered by the Federal-aid highway systems is for local rural roads and city streets. These funds can be provided in part or wholly by the Federal government and the States, or by the local governmental units themselves.

There are several strong arguments against financial participation by the Federal government, beyond the established Federal-aid systems. First, from the standpoint of interstate travel and of National defense, the existing systems are so laid out and so extensive that they include all that could be justified on either of these bases. Second, since the existing Federal-aid systems represent the most important elements of our road network, nationally, and since there is an established Federal interest in them, any expansion of Federal-aid fund authorizations should be directed toward improvement of these systems. It can be seen from the earlier discussion of Federal-aid that the needs on the existing Federal-aid systems require an increase of more than \$700 million a year over the current rate of improvement. Third, expansion of Federal-aid to include local rural roads and city streets will encourage a further reduction of both local and State financial support. This has been demonstrated

all too well in many States in the relationship between the State and the local governments. As the State provided financial support, the local governments withdrew. Fourth, there is strong indication, from the comparisons made of local government support in different States, that much greater financial responsibility could be carried by the local governments in many States. Fifth, if local governments are unable properly to meet the financial requirements of their road and street systems, it would appear that aid should come from the State rather than from the Federal government.

State support of local road and street requirements has been steadily increasing. To date, this has been largely at the expense of the road user revenues. As indicated under STATE FINANCING, several States have used general State revenues rather than road user revenues. If a great part of the increased funds needed for local roads and streets is to come from State funds, the general State revenues might be expected to share an increased amount of this cost.

SUMMARY

1. Meeting accumulated and current needs in the next 15 years will require an annual expenditure of \$4.4 billion for all roads and streets. This represents an increase of about \$1.4 billion over funds currently available from all sources.

2. Federal-aid system improvements require a total Federal-State program of about \$1,595 million a year as against a current program of \$825 million to \$850 million. Expansion of Federal-aid authorizations can be anticipated. But, apportionment between States and matching requirements need to be reviewed to assure uniform development Nation-wide.

3. Because of urgent needs on existing Federal-aid systems in which there is an established Federal interest, as well as for other important reasons, it does not appear desirable to have Federal-aid for local rural roads and city streets.

4. Many States with great needs for highway improvements are providing amounts currently from road user revenues which are much below the level in other States. An increase in support from this source is indicated.

5. Toll roads and free expressways and parkways have demonstrated the appropriateness of bond financing for controlled access

facilities. Bond financing provides the answer in many areas to the need and demand for congestion relief now rather than many years in the future.

6. In many States, local governments could

provide greater financial support for local roads and streets. However, a continuation of past trends will result in increased aid from the State revenues rather than an expansion of local financing.

EXTRACT FROM AASHO SPECIAL SUBCOMMITTEE REPORT ON STUDY OF HIGHWAY FINANCE PROBLEMS

EVIDENCE OF THE HIGHWAY NEEDS STUDIES

It was the hope of the Subcommittee that we could assemble and analyze the data from all recent State studies of highway needs and come forth with a new estimate of the required Nation-wide program based on the data produced by these studies. Studies have been made in at least 16 States which gave some information on future highway requirements. In some of these States, only the State highway system was studied; in others either the local city streets or the local road system was omitted from consideration. Some degree of completeness was achieved in about 10 States. There was, however, considerable variation in methods of analysis which would have made it impossible to generalize the results without a great deal of work and study. The Subcommittee found that such a thoroughgoing analysis was impossible within the time allotted. It became necessary, therefore, to reduce the work to the consideration of the highway-needs studies in six States; Illinois, Kansas, Michigan, Nebraska, Oregon, and Washington. In the studies made in these six States, the costs of a proposed 15-yr program were set forth, and there was sufficient uniformity of treatment so that the figures could be subjected to comparison without special analysis.

Such comparisons regarding the highway-needs studies in these six States are given in Table 4B (Table A in this extract). The total cost and average annual cost of the 15-yr. program in each State are set forth, and these costs are then expressed in terms of (1) average annual cost per registered motor vehicle, (2) average annual cost per vehicle-mile of travel, (3) average annual cost per capita, and (4) average annual cost per dollar of income. The calculations of average annual cost per vehicle, per vehicle-mile, and per capita are based on predicted values of registrations, volume of travel and population at the midyear of the program period. The calculations of average annual cost per dollar of income are based on the Department of Commerce tabulations of income payments to individuals in the several States in 1947; and therefore have no reference to predictions of income.

It will be observed that Illinois is the high

TABLE A*
COMPARISONS, ON THE BASIS OF VARIOUS INDEXES, OF AVERAGE ANNUAL COSTS OF 15-YR. PROGRAMS INDICATED BY REPORTS OF HIGHWAY NEEDS STUDIES IN SIX STATES

State	Estimated Cost of 15 Yr Program		Motor-Vehicle Registrations		Predicted Total Annual Travel in State	
	Total	Average Annual Cost	Predicted Number in Midyear of Period	Average Annual Cost per Vehicle	Predicted Amount in Midyear of Period	Average Annual Cost per Vehicle-mile
	thousand dollars	thousand dollars	thousand dollars		million vehicle-miles	
Illinois	6,021,870	401,458	2,362	\$169.97	26,858	\$0.0149
Kansas	1,516,110	101,074	825	122.51	7,850	0.129
Michigan	2,378,660	158,444	2,200	72.02	23,100	0.069
Nebraska	777,045	51,803	640	95.93	4,700	0.110
Oregon	949,280	63,288	748	84.61	7,361	0.086
Washington	1,145,400	76,360	913	83.64	9,020	0.085
All 6 States. Total	12,786,375	852,426	7,588		78,889	
Average	2,131,062	142,071	1,265	112.34	13,148	0.108

	Population		Income		
	Predicted Population in Midyear of Period	Average Annual Cost per Capita	Income Payments to Residents in 1947 ^b	Average Annual Cost per Dollar of Income	
	thousand persons	persons per sq. ms. of land area	million dollars		
Illinois	8,862	154.8	\$46.35	13,636	\$0.0294
Kansas	1,910	23.3	32.92	2,531	.0389
Michigan	7,062 ^c	124.4	22.34	8,541	.0183
Nebraska	1,370	17.9	37.81	1,589	.0328
Oregon	1,584	19.6	35.59	1,936	.0327
Washington	2,565	35.3	29.77	3,289	.0232
All 6 States. Total	23,483			31,622	
Average	3,914	53.98	36.30	5,270	0.270

* Table 4B in AASHO report
^b Source: Survey of Current Business, Department of Commerce, Aug., 1948, p. 18.
^c Public Roads estimate, none given in Michigan report.

State with respect to most of these indexes of relative costs. It should be noted that the studies in Kansas, Michigan, Nebraska, Oregon, and Washington were ones in which the Automotive Safety Foundation was associated, whereas the Illinois study was conducted by the Griffenhagen Associates. The higher average costs in Illinois perhaps may be attributable in part to different methods pursued by the investigating group in that State. On the other hand, it has been pointed out that the so-called bond-issue system of State highways in Illinois was completed well before 1930. For that reason it may be that the needs for replacements, particularly on account of obsolescence, are relatively greater in Illinois than in other

TABLE B

Basis	Rate as Indicated by 6 States (Table A)	Predicted Value of Base at Midpoint of 15-Yr Period	Resulting Nation-Wide Estimate of Highway Needs
	<i>dollars</i>	<i>billion dollars</i>	<i>billion dollars</i>
Per vehicle (Registration)	112 34	046 to 048	5.2 to 5.4
Per vehicle-mile (Travel)	0108	460 to 480	5.0 to 5.2
Per capita (Population)	36 30	150 to 155	5.4 to 5.6
Per dollar of 1947 income payments	0270	189 734 (1947 value; no prediction)	5.1

States Without a truly intensive analysis of the reports for all of these States, it would be impossible to draw conclusions that could be firmly supported.

It is perhaps of more importance to the present discussion to think in terms of the average indications of these comparisons rather than of differences among the individual States. It is true that the evidence of highway-needs studies in only six States can hardly be regarded as an accurate index of what the dimensions of a Nation-wide program might be. We have, however, four different indexes which, having been applied to these six States, may be applied on a Nation-wide basis to see whether there is any uniformity in the predicted values given by the four separate indexes. We find that for the six States, the average annual cost of the highway-needs programs is \$112 34 per registered vehicle,

\$0 0108 per mile of travel, \$36 30 per capita, and \$0 0270 per dollar of income in 1947. Table B was prepared by applying these four indexes to Nation-wide estimates of registrations, vehicle-miles, and population at the midyear of a 15-yr period, and to the Nation-wide total of income payments to individuals in 1947.

On the ground that the relatively high program costs found in the Illinois study might be thought to have excessive weight in the above estimates, a calculation excluding the Illinois figures was made, and was found to give the following values: (See Table C).

It will be observed that when the averages obtained for all six States are applied to the Nation-wide figures, the resulting Nation-wide estimates are materially higher than those of the so-called \$4 billion program, which resulted

TABLE C

Basis	Rate as Indicated by 5 States (Table A)	Resulting Nation-Wide Estimate of Highway Needs
	<i>dollars</i>	<i>billion dollars</i>
Per vehicle	86 29	4.0 to 4.1
Per vehicle-mile	0087	4.0 to 4.2
Per capita	30 43	4.6 to 4.7
Per dollar of 1947 income payments	.0251	4.8

in an estimate of annual required expenditures of \$4.4 billion. It is to be noted, however, that the separate predictions given by the four estimates are rather close together, varying only from \$5.0 to \$5.6 billion.

When the figures for Illinois are left out of the estimates, the predicted Nation-wide totals are not dissimilar from the estimate of \$4.4 billion given in Table 2 (see text). The variation is from \$4.0 to \$4.8 billion per year as the required annual expenditure. It would be foolhardy to draw any clearcut conclusions from this showing; and it is unfortunate that a thoroughgoing analysis of the highway-needs studies could not have been made. It is reasonable to state, however, that such evidence as could be marshalled in a superficial analysis of the results of these studies indicates a required Nation-wide program of the same general dimensions as that set forth in Table 2.

COMMENTARY ON VALIDITY OF ROAD NEEDS ESTIMATES

Originally it was not intended to comment particularly on the validity of the road needs estimating process. However, so much depends on acceptance of the studies that it is found

desirable to remark about them. In each of the last several years, more States have undertaken needs studies on a similar pattern. The studies are comprehensive in their coverage

of all roads and streets. They have been based on detailed evaluation of existing road conditions, traffic service and highway standards. The AASHO has adopted resolutions commending this approach to a rational highway program. Highway user groups nationally and locally have been active in support of these needs studies and, presumably, were supporting the results of the studies as indicative of a proper approach to modernization of our highway and street plant.

Despite the support that needs studies have been given it appears that there is a sentiment in some quarters against acceptance of the results. The magnitude of the program is viewed as unrealistic. It is said that the people—the legislators—won't go for such grandiose schemes. They imply it is unthinkable to double the volume of current construction, etc. This situation indicates that several things are wrong. First, existing expenditures—which may or may not have a relationship to need for expenditure—are influencing the appraisal of an engineering evaluation. Because a great increase in capital outlay is required the estimates are too high. That's the reasoning. Second, those who are making the studies have done a great deal to show the objective manner in which the studies are made, but apparently something more is needed. More attention needs to be given to demonstrating the economic value of providing the needed improvements. If it can be shown that the Pennsylvania Turnpike attracts almost all

potential traffic from competing free but inadequate routes, what's wrong with a deduction that the cent-a-mile surcharge for its use represents the minimum added value of a modern express highway as compared with an obsolete facility? Would it not be appropriate to assume that the motorists would attach similar value to a comparable situation in other parts of the country where the program contemplates modern expressway substitution for inadequate facilities? Certainly there are many of the planned expressway projects which, mile for mile, will do just as much for the motorists as does the Pennsylvania Turnpike. As can be seen when program costs are reduced to a vehicle mile basis, the capital improvement requirements of \$2.87 billion a year for modernization represents only 0.61 of a cent a vehicle mile.

Another point that should be emphasized in discussing the basis of road needs estimates is the soundness of the standards used. Based on experience in Connecticut, and what is believed to be general practice elsewhere, the standards on which estimates of cost are made represent the standards to which we are currently building highways. The significance of this is that the program of needs is an established and accepted fact in so far as character and cost of needed improvements are concerned. There is really only one variable in the program, and that is the speed with which it goes forward.