









# Public Roads

A JOURNAL OF HIGHWAY RESEARCH

**PUBLISHED  
BIMONTHLY  
BY THE BUREAU  
OF PUBLIC ROADS,  
U.S. DEPARTMENT  
OF COMMERCE,  
WASHINGTON**



Overhead ramp from Slavin Road to Barbur Boulevard, Portland, Oreg.

A dramatic reduction in accidents was brought about by installation of this overhead ramp. Prior to its construction, access was at grade with traffic light control. Accidents averaged 120 a year, with 60 injuries. The number of accidents has now dropped 96 percent to only 4 a year, with 2 injuries, while average daily vehicle counts have increased from 11,000 to 13,000.





# Public Roads

A JOURNAL OF HIGHWAY RESEARCH

Vol. 33, No. 9

August 1961

Published Bimonthly

Muriel P. Worth, Editor

Jessie W. Dean, Assistant Editor

## THE BUREAU OF PUBLIC ROADS

WASHINGTON OFFICE

1717 H St. NW., Washington, D.C., 20235

### REGIONAL OFFICES

No. 1. 4 Normanskill Blvd., Delmar, N.Y., 12055  
*Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Puerto Rico.*

No. 2. 1610 Oak Hill Avenue, Hagerstown, Md. 21740.

*Delaware, District of Columbia, Maryland, Ohio, Pennsylvania, Virginia, and West Virginia.*

No. 3. 50 Seventh St. NE., Atlanta, Ga., 30323.  
*Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.*

No. 4. 18209 Dixie Highway, Homewood, Ill. 60430.

*Illinois, Indiana, Kentucky, Michigan, and Wisconsin.*

No. 5. 4900 Oak St., Kansas City, Mo., 64112.  
*Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.*

No. 6. Post Office Box 12037, Ridglea Station, Fort Worth, Tex., 76116.

*Arkansas, Louisiana, Oklahoma, and Texas.*

No. 7. 450 Golden Gate Avenue, Box 36096, San Francisco, Calif., 94102.

*Arizona, California, Hawaii, and Nevada.*

No. 8. 412 Mohawk Bldg., 222 SW. Morrison Street, Portland, Oreg., 97204.

*Idaho, Montana, Oregon, and Washington.*

No. 9. Denver Federal Center, Bldg. 40, Denver, Colo., 80225.

*Colorado, New Mexico, Utah, and Wyoming.*

No. 10. Post Office Box 1961, Juneau, Alaska, 99801.  
*Alaska.*

Eastern Federal Highway Projects Office—  
Region 15.

1000 N. Glebe Rd., Arlington, Va., 22201.

No. 19. Apartado Q, San Jose, Costa Rica.

*Inter-American Highway: Costa Rica, Guatemala, Nicaragua, and Panama.*

## IN THIS ISSUE

Highway Income, Expenditures, and Earnings in 46 Standard Metropolitan Statistical Areas, by S. F. Bielak and J. F. McCarthy . . . . .	185
Motor Vehicle Size and Weight Limits (AASHO table on pages 192-193) . . . . .	200
New Publications . . . . .	200

U.S. DEPARTMENT OF COMMERCE

JOHN T. CONNOR, Secretary

BUREAU OF PUBLIC ROADS

REX M. WHITTON, Administrator

PUBLIC ROADS is sold by the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402 at \$1 per year (50 cents additional for foreign mailing) or 20 cents per single copy. Subscriptions are available for 1-, 2-, or 3-year periods. Free distribution is limited to public officials actually engaged in planning or constructing highways and to instructors of highway engineering. There are no vacancies in the free list at present.

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, March 6, 1961.

Contents of this publication may be reprinted. Mention of source is requested.



# Highway Income, Expenditures, and Highway-User Earnings in 46 Standard Metropolitan Statistical Areas

BY THE OFFICE OF PLANNING  
BUREAU OF PUBLIC ROADS

Reported by <sup>1</sup> STANLEY F. BIELAK, Chief,  
Financial Branch, and JAMES F. McCARTHY, Economist,  
National Highway Planning Division

## Introduction

GROWTH in population, motor-vehicle registrations, and travel in urban areas has been occurring at such a rapid rate that increased allocations of funds for highways have become necessary. The high cost per mile of urban highway facilities, because of the uniform rate of Federal and State user charges on rural and urban residents, prompted an investigation of highway finances in Standard Metropolitan Statistical Areas (SMSA's).<sup>2</sup> By using the local and State highway finance data that have become available recently, information is presented in this article to relate highway income to highway expenditures and earnings of highway-user taxes in 46 Standard Metropolitan Statistical Areas. Although this article provides only a brief glance at the total highway financial picture, it focuses on an area of highway finance that has not been extensively explored. No attempt has been made to include or evaluate social costs related to the costs of urban highway systems.

The authors have not presented any direct conclusions, but a statistical summary is included at the end of the article.

## Procedure

To determine how highway-user earnings, highway income, and expenditures are related in urban areas, the SMSA was adopted as the unit of measure. Of the 212 SMSA's defined in the 1960 Census, exclusive of Puerto Rico, 46 were used as the sample for the study reported here. Information collected for the 46 SMSA's and the same information for the 12 SMSA's is given in table 1. The sample

Information is presented in this article on road-user tax earnings, highway income, and highway expenditures in 46 Standard Metropolitan Statistical Areas, in 1960. This information was collected to obtain a basis for determining whether an equitable contribution for highway construction was being made by urban and rural highway users. Road-user taxes, fees, and tolls are expressed as earnings of road-user taxes, and these revenues are discussed in relation to highway income from all sources and to expenditures for roads and streets, by population groups.

The road-user revenues from motor-vehicle travel in the 46 SMSA's amounted to \$1.65 billion, but highway expenditures were only \$1.49 billion. Total highway revenue allocated to the SMSA's was \$1.42 billion. Therefore, earnings from motor-vehicle use in these areas exceeded the amount assigned for highways, even when income from borrowings was included. Earnings of road-user taxes also exceeded total highway expenditures, which included debt retirement.

The most favorable ratio of earnings to expenditures, by SMSA population groups, was in the population group 500,000 to 1,000,000, 1.16:1; the population group of 1,000,000 and more had an earnings-expenditure ratio of 1.13:1; the lowest was in the population group of less than 250,000, 0.94:1; and for all SMSA's the ratio of earnings to expenditures was 1.11:1.

On the basis of the data for the 46 SMSA's, the balance of user earnings from travel in metropolitan areas is favorable when compared to the high per-mile costs of construction of urban highway facilities during an accelerated period of construction activity.

used represents nearly 22 percent of the SMSA's and a little more than 31 percent of the total SMSA population. The sample, as shown by the table, is somewhat weighted in favor of the more populous areas—37 percent of the population of SMSA's having populations of more than 1 million, and only 20 percent of the SMSA's having populations of less than 250,000. This disparity has been somewhat minimized in the material presented here as the SMSA's have been grouped according to population and the discussion is related to each of these population groupings individually.

The terms *earnings* or *road-user tax earnings* as used in this article refer to taxes levied on the use or ownership of motor vehicles. In this context, a fixed fee or annual charge, such as a motor-vehicle registration fee, operator's license, transfer fee, and other fees are credited to the SMSA where the vehicle is domiciled. A motor-fuel tax, taxes on tires and other components that are consumed by

travel, and tolls are credited to the SMSA where the travel occurs.

All of the States were requested to select and to report for one SMSA the total travel in 1960, subdivided where possible into travel by: (1) automobiles and (2) trucks and buses. They were also asked to give an estimated motor-fuel consumption rate for each of the two classes of motor vehicles. To obtain adequate travel data, the States were asked to report on an area in which a transportation study had been recently completed or was sufficiently advanced to be of aid in preparing the travel estimates.

The 46 SMSA's included in this analysis represent 1 in each of 44 States, and 2 in Indiana, as illustrated in figure 1. New Hampshire did not provide data, and in 1960 there were no SMSA's in Alaska, Idaho, Vermont, and Wyoming. Although the selection on this basis does not sample the geographic or population areas to the same degree, a more representative cross section of other

<sup>1</sup> Presented at the 44th annual meeting of the Highway Research Board, Washington, D.C., January 1965.

<sup>2</sup> A Standard Metropolitan Statistical Area, established by the Bureau of the Budget for convenience of reporting, consists of the counties, or towns in New England, that contain the entire urbanized portion of a metropolitan area. The SMSA includes, of necessity, the rural portion, if any, of its constituent counties.





Figure 1.—Geographic distribution of 46 SMSA's.

characteristics is obtained, some of which are listed in table 2. By sampling each State, it was possible to obtain data on: (1) the diverse State motor-fuel and motor-vehicle tax rates; (2) a variety of construction programs, particularly on The National System of Interstate and Defense Highways where in a given year construction activity in the urban areas of some States may greatly exceed that in others; (3) a sample of areas in which the central cities originated and developed at different times, such as the older eastern cities and the newer and rapidly growing cities in western areas; and (4) those cities that have urban transportation systems developed

around rails and highways, as well as those where transportation is mainly highway oriented.

#### Data Used

Information concerning the 46 SMSA's selected for a sample is given in table 2. These details are presented to illustrate the differences in makeup of the individual SMSA's. The data for population, land area, and motor-vehicle registrations are a matter of record, except in a few areas where motor-vehicle registrations were estimated. The data on vehicle-miles of travel are perhaps the most uncertain link, but they seem to be

acceptably consistent. The extreme rate of 20.0 miles of travel per person per day in the Atlantic City, N.J. Area, is attributable to the very heavy seasonal use by nonresidents. This figure and the corresponding figure of 20,372 miles of annual travel in the Atlantic City Area, per vehicle registered there, point up the fact that the denominators of the ratios are somewhat defective because the travel in an SMSA includes that of visitors as well as residents. However, the low rate of 7.8 miles per person per day in the Philadelphia Area is reasonably comparable with 11.3 miles in the Los Angeles Area and reflects the populations' use of transit facilities and

Table 1.—Data on the 46 selected SMSA's and all SMSA's in the United States<sup>1</sup>

Census region and population group	SMSA's and population						Land area			Population per sq. mi.	
	All SMSA's		Study sample		Sample, percent of total		All SMSA's	Study sample	Sample, percent of total	All SMSA's	Study sample
	Number	Population (thousands)	Number	Population (thousands)	Number (percent)	Population (percent)	Sq. mi.	Sq. mi.	Percent	Number	Number
All SMSA's.....	212	112,885	46	35,246	21.7	31.2	310,233	75,855	24.5	364	465
Census regions:											
Northeast.....	47	35,347	7	6,961	14.9	19.7	35,650	6,746	18.9	991	1,032
North Central.....	59	30,960	13	10,443	22.0	33.7	87,834	16,678	19.0	352	626
South <sup>2</sup> .....	77	26,447	16	7,676	20.8	29.0	59,328	15,351	25.9	446	500
West.....	29	20,131	10	10,166	34.5	50.5	127,421	37,080	29.1	158	274
Population groups:											
More than 1,000,000.....	24	61,582	7	23,065	29.2	37.5	54,285	19,321	35.6	1,134	1,194
500,000 to 1,000,000.....	29	19,215	7	5,096	24.1	26.5	70,767	16,896	23.9	272	302
250,000 to 500,000 <sup>2</sup> .....	48	15,829	11	3,901	22.9	24.6	78,460	11,219	14.3	202	348
Less than 250,000.....	111	16,259	21	3,184	18.9	19.6	106,721	28,419	26.6	152	112

<sup>1</sup> Excludes Puerto Rico.

<sup>2</sup> Population and area of Osage County of the Tulsa, Okla., SMSA are not included in the sample but are in the totals of all SMSA's in the United States.



much later development of freeways in the Philadelphia Area than in the Los Angeles Area.

### Travel data

Each State was requested to report the total motor-vehicle travel on all roads and streets of the selected SMSA for the calendar year 1960. The State was also asked to classify the travel by that: (1) on the rural roads, (2) on the urban highways and streets, (3) of automobiles, and (4) of trucks and buses combined. The responses by the States were different in degrees of detail that ranged from travel classified by vehicle types and by road systems to only the total vehicle-miles of travel and percentages that indicated distribution of the total travel between automobiles and trucks and buses.

The method of estimating and classifying the travel in the SMSA's also differed. For States in which some form of area transportation studies were available, the information was applied to the 1960 data by travel trends; in others, estimates were prepared from available information on mileage of local streets and arterials and the corresponding current travel volumes on them. Generally, too, where data from area transportation studies were utilized, it was necessary to supplement them with travel in the area beyond that study's external cordon to the county boundaries forming the SMSA. However, it is believed that sufficient accuracy was obtained because the routes that carry the bulk of the travel are the State highways and primary local roads for which data were available from current traffic-counting programs, and these outlying areas were predominantly rural.

### Motor-vehicle registrations

Registrations of motor vehicles by counties are compiled by the States and are currently available for approximately 41 States. In the other States the SMSA registrations were estimated by using collateral data of the Bureau of the Census (1),<sup>3</sup> and the annual and special reports of State motor-vehicle registrations (2).

### Road and street income

The income for road and street purposes of an SMSA comes from several sources. The accounting of the income for each SMSA is obtained by the State highway departments from State and local records and summarized in reports transmitted annually to the Bureau of Public Roads. Income and expenditure data of local governments are summarized in this article from forms PR-532, State Highway Expenditures, and PR-535, Local Road and Street Finance Report. For each SMSA the PR-535 report includes the annual receipts, disbursements, obligations issued, application of proceeds, and a statement of interest and bond redemptions. State income from road users equivalent to State expenditures for highways given in form PR-532-B, State Highway Expenditures Within Standard Met-

Table 2.—Information on population, land area, registered vehicles, and travel in 46 SMSA's, 1960

SMSA's, by population group	Population	Land area	Persons per square mile	Registered vehicles	Travel	Persons per vehicle	Travel	
							Person per day	Annual, in SMSA per registered vehicle therein
LESS THAN 250,000								
	<i>Number</i>	<i>Sq. mi.</i>	<i>Number</i>	<i>Number</i>	<i>Veh.-miles (thousands)</i>	<i>Number</i>	<i>Miles</i>	<i>Miles</i>
Atlantic City, N.J.	160,880	575	280	57,678	1,175,000	2.8	20.0	20,372
Bay City, Mich.	107,042	446	240	44,280	425,000	2.4	10.9	9,598
Cedar Rapids, Iowa	136,899	713	192	63,557	501,680	2.2	10.0	7,893
Charleston, S.C.	216,382	945	229	67,766	715,000	3.2	9.1	10,551
Eugene, Oreg.	162,890	4,560	36	85,003	643,400	1.9	10.8	7,569
Fargo, N. Dak.	106,027	2,799	38	51,492	451,962	2.1	11.7	8,777
Fitchburg-Leominster, Mass.	82,486	99	833	28,479	426,000	2.9	14.1	14,958
Fort Wayne, Ind.	232,196	670	347	99,016	581,960	2.4	6.9	5,877
Great Falls, Mont.	73,418	2,659	28	35,904	273,057	2.0	10.2	7,605
Jackson, Miss.	187,045	877	213	70,890	589,712	2.6	8.6	8,319
Las Vegas, Nev.	127,016	7,927	16	75,750	358,823	1.7	7.7	4,737
Lewiston-Auburn, Maine	70,295	120	586	24,167	174,125	2.9	6.8	7,205
Lexington, Ky.	131,906	280	471	53,644	432,700	2.5	9.0	8,066
Little Rock-No. Little Rock, Ark.	242,980	767	317	103,603	795,700	2.3	9.0	7,680
Lynchburg, Va.	110,701	1,014	109	37,168	423,912	3.0	10.5	11,405
Macon, Ga.	180,403	630	286	66,077	451,870	2.7	6.9	6,839
Madison, Wis.	222,095	1,197	186	87,628	911,610	2.5	11.2	10,403
Sioux Falls, S. Dak.	86,575	815	106	40,403	340,451	2.1	10.8	8,426
South Bend, Ind.	238,614	467	511	98,138	570,090	2.4	6.5	5,809
Springfield, Mo.	126,276	677	187	56,713	659,096	2.2	14.3	11,622
Waterbury, Conn.	181,638	182	998	76,696	523,283	2.4	7.9	6,823
Total	3,183,764	28,419	112	1,324,052	11,424,431	2.4	9.8	8,628
250,000 TO 500,000								
Albuquerque, N. Mex.	262,199	1,163	225	109,249	827,424	2.4	8.6	7,574
Charleston, W. Va.	252,925	908	279	86,166	814,431	2.9	8.8	9,452
Charlotte, N.C.	272,111	542	502	120,599	675,129	2.3	6.8	5,598
Jacksonville, Fla.	455,411	777	586	187,524	1,807,115	2.4	10.9	9,637
Nashville, Tenn.	399,743	532	751	147,128	1,208,996	2.7	8.3	8,217
Omaha, Nebr.	457,873	1,533	299	189,698	1,842,338	2.4	11.0	9,712
Salt Lake City, Utah	383,035	764	501	174,021	1,155,000	2.2	8.3	6,637
Tacoma, Wash.	321,590	1,676	192	134,292	1,281,000	2.4	10.9	9,539
Tulsa, Okla. <sup>1</sup>	386,533	1,538	251	187,975	1,436,382	2.1	10.2	7,641
Wichita, Kans.	343,231	999	344	161,042	1,381,796	2.1	11.0	8,580
Wilmington, Del.	366,157	787	465	139,170	1,586,247	2.6	11.9	11,398
Total	3,900,808	11,219	348	1,636,864	14,015,858	2.4	9.8	8,563
500,000 TO 1,000,000								
Birmingham, Ala.	634,864	1,118	568	234,198	2,052,312	2.7	8.9	8,763
Columbus, Ohio	682,962	537	1,272	282,428	2,696,374	2.4	10.8	9,547
Denver, Colo.	929,383	3,665	254	465,125	3,500,000	2.0	10.3	7,525
Honolulu, Hawaii	500,409	598	837	175,676	1,123,090	2.8	6.1	6,393
New Orleans, La.	868,480	1,118	777	280,907	1,940,483	3.1	6.1	6,908
Phoenix, Ariz.	663,510	9,226	72	336,465	3,083,304	2.0	12.7	9,164
Providence, R.I.	816,148	634	1,287	318,539	3,401,100	2.6	11.4	10,677
Total	5,095,756	16,896	302	2,093,338	17,796,663	2.4	9.6	8,502
MORE THAN 1,000,000								
Baltimore, Md.	1,727,023	1,807	956	572,478	5,965,707	3.0	9.5	10,421
Buffalo, N.Y.	1,306,957	1,587	824	448,307	3,417,680	2.9	7.2	7,624
Chicago, Ill.	6,220,913	3,714	1,675	2,083,209	19,210,133	3.0	8.5	9,221
Houston, Texas	1,243,158	1,711	727	572,343	4,265,000	2.2	9.5	7,452
Los Angeles, Calif.	6,742,696	4,842	1,393	3,415,201	27,808,000	2.0	11.3	8,142
Minneapolis-St. Paul, Minn.	1,482,030	2,111	702	642,617	5,500,000	2.3	10.2	8,559
Philadelphia, Pa.	4,342,897	3,549	1,224	1,536,952	12,313,914	2.8	7.8	8,012
Total	23,065,674	19,321	1,194	9,271,107	78,480,434	2.5	9.3	8,465
TOTAL, ALL SMSA'S	35,246,002	75,855	465	14,325,361	121,717,386	2.5	9.5	8,497

<sup>1</sup> Does not include the population and area of Osage County of the Tulsa, Okla., SMSA.

ropolitan Statistical Areas, is assigned from State and Federal user revenues, as explained subsequently.

In this article income for highways is classified according to (1) the imposts on highway users collected at the different government levels—Federal, State, and local—and tolls on State and local facilities; and (2) other revenue

income of an SMSA, consisting of property taxes and assessments, general fund appropriations—State and local—and miscellaneous local income from a variety of sources such as subdivider payments for road improvements, fines for parking meter violations, rentals, excavation permits, utility taxes, adjustments and repairs, and, in some areas, a miscellany

<sup>3</sup> References indicated by italic numbers in parentheses are based on p. 199.



**Table 3.—Index of automobile motor-fuel consumption rates for overall operation and operation predominantly in rural and urban areas**

Source	Consumption rates, gallons per mile			Index of consumption rates		
	Average	Rural	Urban	Average	Rural	Urban
Illinois MVU <sup>1</sup> .....	0.0725	0.0671	0.0813	1.00	0.93	1.12
Lieder <sup>2</sup> .....	.0690	.0625	.0785	1.00	.91	1.14
7-State MVU.....	.0669	.0616	.0724	1.00	.92	1.08
This study.....	3.0700	.0650	.0756	1.00	.93	1.08

<sup>1</sup> Illinois Motor Vehicle Use Study, Illinois Division of Highways, October 1961, p. 205.

<sup>2</sup> Passenger Car Fuel Consumption Rates, by Nathan Lieder, PUBLIC ROADS, Vol. 32, No. 5, December 1962, p. 119

<sup>3</sup> Average obtained from The Supplementary Report of the Highway Cost Allocation Study (3). The rate for consumption in urban areas was developed for this analysis.

that includes traffic fines and other fees not segregated by a specific source.

**Expenditures on roads and streets**

The expenditures on roads and streets used for each SMSA are as complete as was possible from the available data. The roads and streets in these SMSA's are under several jurisdictions—State, county, and municipal. Road and street construction and maintenance is accomplished by one, two, or jointly by all three levels of government. To the extent that capital outlays are identified by system, they are listed in this article by State and local systems—rural and municipal. Expenditures for maintenance, operation, and administration are lumped because they are less easily identified. In the latter classification, local expenditures are complete, but State outlays are not.

State funds may be expended through: (1) capital outlay, which includes Federal aid; (2) maintenance by the State on State highway

extensions in municipalities, on local rural roads, or municipal streets; or (3) grants-in-aid payments to local rural or municipal units, which are reflected in construction, maintenance, and administration expenditures at the local level. Funds are also transferred between local rural and municipal units, in addition to direct construction in each other's jurisdiction.

Local rural (county) and municipal highway administration, traffic police, bond service, and other miscellaneous expenditures are believed to be adequately represented in the reported data from the local records. Data for State and local toll facilities are available from the annual reports to Public Roads. For each facility situated entirely within an SMSA, the income and expenditures were used as recorded in the annual reports. However, for those facilities extending beyond the boundary of an SMSA, principally toll roads, the expenditures for all purposes such as construction, maintenance, and administration were

assigned in the same proportion that the earnings within the SMSA had to the earnings of the entire facility.

**Highway-user earnings**

User taxes consist of a variety of levies—on the owner or operator of a vehicle, on the vehicle itself, or on the use of a vehicle. Registration fees, vehicle excise and use taxes, transfer and title charges, certain truck and bus franchise or user permits, and drive licenses are paid periodically and are a requirement for owning and operating a vehicle on the highways. Taxes on: gasoline and special fuel, truck and bus mileage, and tires and tube are paid intermittently according to the number of miles the vehicle is operated.

The Federal excise taxes deposited in the Federal Trust Fund and designated for highway purposes are the 1960 user taxes for which earnings were evaluated in the study reported here. These excise taxes included gasoline and special fuels at 4 cents per gallon; tires at 8 cents per pound; innertubes at 3 cents per pound; tread rubber at 3 cents per pound; truck, bus, and trailer excises at percent of manufacturers' wholesale prices and the vehicle-use tax at \$1.50 per 1,000 pounds. Not included with these earnings are other Federal automotive excise taxes that accrue to the general fund, such as the automobile vehicle excise tax, parts and accessories tax, lubricating oil tax, and one-half of the truck, bus, and trailer excise tax at percent of manufacturers' wholesale price.

State user charges consist of gasoline and special fuel taxes; mileage, ton-mile, and franchise taxes; registration fees; operator and chauffeur licenses; and miscellaneous charges for titling or transfer of ownership of vehicles.

Local road-user charges are not levied in all States or in all local jurisdictions of a State. Where imposed, they may consist of motor fuel taxes, bus and wheel taxes, and license fees for automobiles and trucks. Although traffic fines and allied fees are often not considered to be regularly imposed user levies, they have been included with user taxes when they are identified and used for highway purposes.

In this article earnings based on use were computed for all travel in an SMSA regardless of where the motor vehicles were domiciled. Registration and other periodic charges were those paid only for the vehicles domiciled within the SMSA.

**Earnings**

Federal, State, and local fuel taxes, when levied, are earned for each mile of travel. Federal excises on tires, tubes, and tread rubber are earned in direct proportion to the amount of travel and are paid at the time the items are purchased or replenished. State and local registration fees; operator and chauffeur licenses; titling taxes; transfer of certain mileage, permit, and other fees are tax earnings in the form of annual or periodic charges.

Imposts on highway users at the local level (parking fees and other miscellaneous fees) are usually considered in a user tax category, such as traffic fines and penalties, but attributable

**Table 4.—Motor-fuel consumption rates applied to SMSA travel to obtain data on earnings from motor-fuel taxes**

Vehicle class	Motor-fuel consumption rates				
	U.S. average gasoline and diesel vehicles <sup>1</sup>		Urban areas		
	Gal./mile	Miles/gal.	Average	Ratio (U.S. average=1.0) <sup>2</sup>	
Automobile.....	0.070	14.29	0.076	13.16	1.08
Transit bus.....	.237	4.22	.249	4.01	1.05
Intercity bus.....	.167	5.99	.215	4.65	1.29
School and other bus.....	.129	7.75	.129	7.75	1.00
Trucks and truck combinations: <sup>3</sup>					
2, 4-tired truck.....	.080	12.50	.080	12.50	1.00
2, 6-tired truck.....	.123	8.13	.148	6.76	1.20
3.....	.180	5.56	.252	3.97	1.40
2-S1.....	.191	5.24	.267	3.75	1.40
2-S2.....	.217	4.61	.304	3.29	1.40
3-S2.....	.219	4.57	.307	3.26	1.40
2-1.....	.159	6.29	.223	4.48	1.40
2-2.....	.204	4.90	.286	3.50	1.40
2-3.....	.218	4.59	.305	3.28	1.40
3-3.....	.229	4.37	.321	3.12	1.40
3-unit, truck-tractor, semitrailer, and full trailer combination.....	.233	4.29	.326	3.07	1.40
All trucks, buses, and truck combinations <sup>4</sup> .....	.129	7.77	.159	6.29	1.23
All vehicles <sup>4</sup> .....	.081	12.35	.092	10.87	1.14

<sup>1</sup> Weighted average consumption rates developed from those used in Supplementary Report of the Highway Cost Allocation Study (3). Weighted averages reflect relative numbers of gasoline and diesel vehicles in each vehicle class.

<sup>2</sup> Total travel in rural and urban areas by each vehicle class, developed for Highway Cost Allocation Study, H. Doc. No. 54, 87th Cong., 1st sess., 1961, at consumption rates indicated in several studies on rural and urban operation.

<sup>3</sup> Each digit indicates the number of axles of a vehicle or of a unit of a vehicle combination. A single digit, or the first digit of a group symbol, represents a single-unit truck or, if followed by an S, represents a truck-tractor. The S designation represents a semitrailer. A digit without an S, in the second or third position in a group symbol, represents a full trailer.

2=2-axle single-unit truck.

3=3-axle single-unit truck.

2-S1=2-axle truck-tractor with 1-axle semitrailer.

2-S2=2-axle truck-tractor with 2-axle semitrailer.

3-S2=3-axle truck-tractor with 2-axle semitrailer.

<sup>4</sup> Weighted by total travel and fuel consumption of all vehicle classes indicated.



to motor vehicles or paid as a consequence of their use) have been included with user earnings in the amounts reported received by the localities making up the SMSA's of this analysis.

### Federal and State motor-fuel taxes

To obtain a consumption rate that could be applied to automobiles operating in SMSA's, consumption rates obtained for operation under different conditions in both urban and rural areas were investigated. This included consumption for automobiles operated where low average speeds and a high incidence of stop-and-go driving is necessary, and for automobiles operated where higher average speeds and fewer interruptions from traffic signals and traffic friction are possible. For example, in a report on a study made in the Philadelphia area (4) on the financing of road systems, a motor-fuel consumption rate 50 percent larger was used for all vehicles—automobiles and commercial vehicles—in urban areas than in rural areas. Recent studies on motor-fuel consumption rates for overall, rural, and urban vehicle operation support the evidence that fewer miles per gallon—more gallons per mile—are obtained by vehicles operated only in urban areas than by those operated only in rural areas.

Automobile motor-fuel consumption rates obtained from three studies and the rate adopted for use in this analysis are listed in table 3. The consumption rates of rural and urban operation in the first three studies were obtained from replies to questionnaires. In these studies urban operation was defined as travel at speeds of less than 35 miles per hour. The rates in table 3 for operation under rural conditions are those obtained for vehicles that were reported to have been operated 90 percent or more of their mileage at speeds of more than 35 miles per hour; the rates for urban conditions are for vehicles operated 90 percent or more of the reported mileage at speeds of less than 35 miles per hour.

The fourth set of rates was obtained in a somewhat different manner. The 0.070 gallon per mile, or 14.3 miles per gallon, rate was developed for the *Supplementary Report of the Highway Cost Allocation Study* (3) as a national average consumption rate for all automobiles. The rural-urban differential applied to this rate was obtained by application of estimates that reflected operating characteristics of an SMSA. Average operating speed in an urban area, the number of stops per mile, duration of stop, and average speeds on rural roads were all arbitrarily determined by considering the data collected.

After consulting with persons who analyze traffic and after reference to study data (5, 6), 1½ stops per mile were used as representative of travel in an SMSA. By using measurements of fuel consumption at different speeds, while coming to a stop and accelerating again to average speed, and while idling at a stop developed in Claffey's investigation (7), an urban rate was obtained that was 1.08 times the average consumption rate. This ratio was applied to the 0.070-gallon-per-mile national average rate, and a resultant urban

automobile consumption rate of 0.076 gallon per mile, or 13.2 miles per gallon, was obtained.

The consumption rate differential for motor-fuel used in urban areas by trucks, buses, and combinations was obtained in somewhat the same manner. The consumption rates per stop and idling time determined by Kent (8) and Sawhill and Firey (9) were used for the range of sizes and weights given for vehicles listed in table 4. The estimates—25 miles per hour average speed in an urban area, 1½ stops per mile, 15-second average idling time—were the same as those applied to automobiles. Average speeds of trucks traveling in rural areas were assumed to be 40 miles per hour; of buses, 50 miles per hour; and of automobiles, 45 miles per hour. Because most data on vehicle travel could be obtained only in the broad categories—automobiles and all other vehicles—consumption rates used were those of automobiles and the combination rate of trucks and buses.

The total motor-fuel consumption for each group of motor vehicles in each SMSA was calculated by applying the gallons-per-mile rates to the amount of travel. The Federal earnings from this motor-fuel use were obtained by multiplying the total gallonage by the Federal excise tax of 4 cents per gallon. State and local earnings from motor-fuel taxes were determined by multiplying the gallonage by the appropriate 1960 motor-fuel tax rate. Some of the tax contributions per mile of travel at the different rates at which motor fuel is taxed are, as follows:

<i>Tax rate per gallon</i>	<i>Automobile</i>	<i>Truck, bus, and truck combinations</i>
<i>Cents</i>	<i>Cent</i>	<i>Cent</i>
3	0.23	0.48
4	.30	.64
5	.38	.80
6	.45	.95
7	.53	1.11

Only the State of Missouri had a 3-cent motor-fuel tax rate in 1960; no State taxed fuel at 4 cents, which was the Federal excise tax rate. The weighted average State gasoline tax rate, nationally, was 5.92 cents per gallon (2, p. 2), but the weighted average tax rate for the 46 SMSA's was 5.75 cents per gallon.

The 1960 Federal Trust Fund taxes paid by highway users, other than motor-fuel taxes, are shown in table 5. An additional \$5.1 million of truck, bus, and trailer excise taxes, use taxes, and rubber taxes paid on vehicles owned by the Federal Government were not included in the taxes listed in table 5 but were added to the computations in this article to obtain the rates per-vehicle-mile of travel. No distinction was made between the rural or urban rate of consumption for use taxes, except for motor fuel.

The division of vehicle excise, use, and rubber taxes between those paid for automobile use and commercial vehicle use was accomplished according to the detailed analysis prepared for *The Supplementary Report of the Highway Cost Allocation Study* (3). The income of the Federal Trust Fund in 1960 from taxes other than motor fuel, including payments on

Table 5.—Trust Fund Taxes, 1960

Taxes	Million dollars	
Motor-fuel.....	-----	2,269
Other.....	-----	445
Truck, bus, and trailer excise..	127	-----
Motor-vehicle use.....	45	-----
Tires, tubes, and tread rubber..	273	-----
TOTAL.....	-----	2,714

vehicles of Federal agencies, amounted to \$450 million and was obtained from automobiles and commercial vehicles, as shown in table 6.

### State registration fees and taxes

Information about the numbers and classes of registered vehicles in the counties of an SMSA is available in different detail from the registration reports prepared by about 41 States. Also, some of the States included data by counties on payments of registration and other fees. In these States, payments were used as the total contribution by road users in the county or counties of the SMSA. In the States where such payments were not classified by counties, State per-vehicle averages for automobiles and for trucks and buses combined were multiplied by the corresponding numbers registered in the SMSA. An example of the division of receipt of State fees between automobiles and commercial vehicles is shown for Texas in table 7. As in this example, the receipts for each State were identified according to source; that is, automobiles or trucks and buses as were those of a county that had available data classified according to the vehicles for which the fees were paid. The remaining fee data were summarized, and an average per vehicle payment was obtained for each vehicle class according to the number of vehicles registered.

For an SMSA that extended beyond a State boundary, a separate computation was made so that the fee schedules of each State would be reflected. The State motor-vehicle registration and other fees obtained by these methods amounted to an *earning* of \$376 million in the 46 SMSA's

Table 6.—Highway Trust Fund receipts from tire, tube, tread rubber, truck and bus vehicle-excise and vehicle-use taxes, 1960

Vehicle class for which paid	Total received	U.S.	
		Travel 1960	Estimated tax earned per mile
Automobile.....	Millions	<i>Vehicle-miles (billions)</i>	<i>Cent</i>
Trucks, truck combinations, and buses.....	\$154	588.1	0.026
	296	130.7	.227
TOTAL.....	\$450	718.8	-----



Table 7.—Highway income in Texas from motor-vehicle registration and other fees, 1960

	1960	Automobiles	Trucks and buses
State registrations.....	4,457,022	3,534,351	922,671
State income from fees for—			
Automobile registration.....	\$54,576,000	\$54,576,000	NA
Bus registration.....	\$474,000	NA	\$474,000
Truck and truck-tractor registration.....	\$36,884,000	NA	\$36,884,000
Trailer registration.....	\$11,516,000	NA	\$11,516,000
Motorcycle registration.....	\$220,000	\$220,000	NA
Automobile operator and learner licenses.....	\$3,830,000	\$3,830,000	NA
Taxi chauffer licenses.....	\$12,000	\$12,000	NA
Bus and truck chauffeur licenses.....	\$2,964,000	NA	\$2,964,000
Other:			
Classified <sup>1</sup> .....	\$1,683,000	NA	\$1,683,000
Unclassified <sup>2</sup> .....	\$33,248,000	\$26,366,000	\$6,882,000
TOTAL.....	\$145,407,000	\$85,004,000	\$60,403,000
Average.....		\$24.05	\$65.47
Houston SMSA:			
Registrations.....	572,343	487,740	84,603
Fees.....	\$17,269,000	\$11,730,000	\$5,539,000

<sup>1</sup> Oversize and overweight fees, carrier taxes, certificate or permit, and carrier fines and penalties, all of which are attributable to buses and trucks.

<sup>2</sup> Title and titling taxes, transfer, inspection, and other fees that were paid by automobiles and commercial vehicles, but no identification by whom paid was available. Division between automobiles and trucks and buses was made by prorating on the basis of the numbers of vehicles registered in the two categories.

**Tolls, local taxes, and fees**

Most of the local toll facilities, principally bridges, were located entirely within the 46 SMSA's. Information for this analysis was obtained from data in the financial statements of such toll facilities included in reports to Public Roads. For State-administered toll road facilities that extended beyond the

boundaries of an SMSA, the State highway departments reported the total travel and the tolls earned on that travel within the SMSA. Data on local imposts on road users, and other highway income and expenditures for each SMSA, were available from the annual reports to Public Roads—see published State-local finance data (2, pp. 127-140). Earnings of motor-vehicle user taxes at the local,

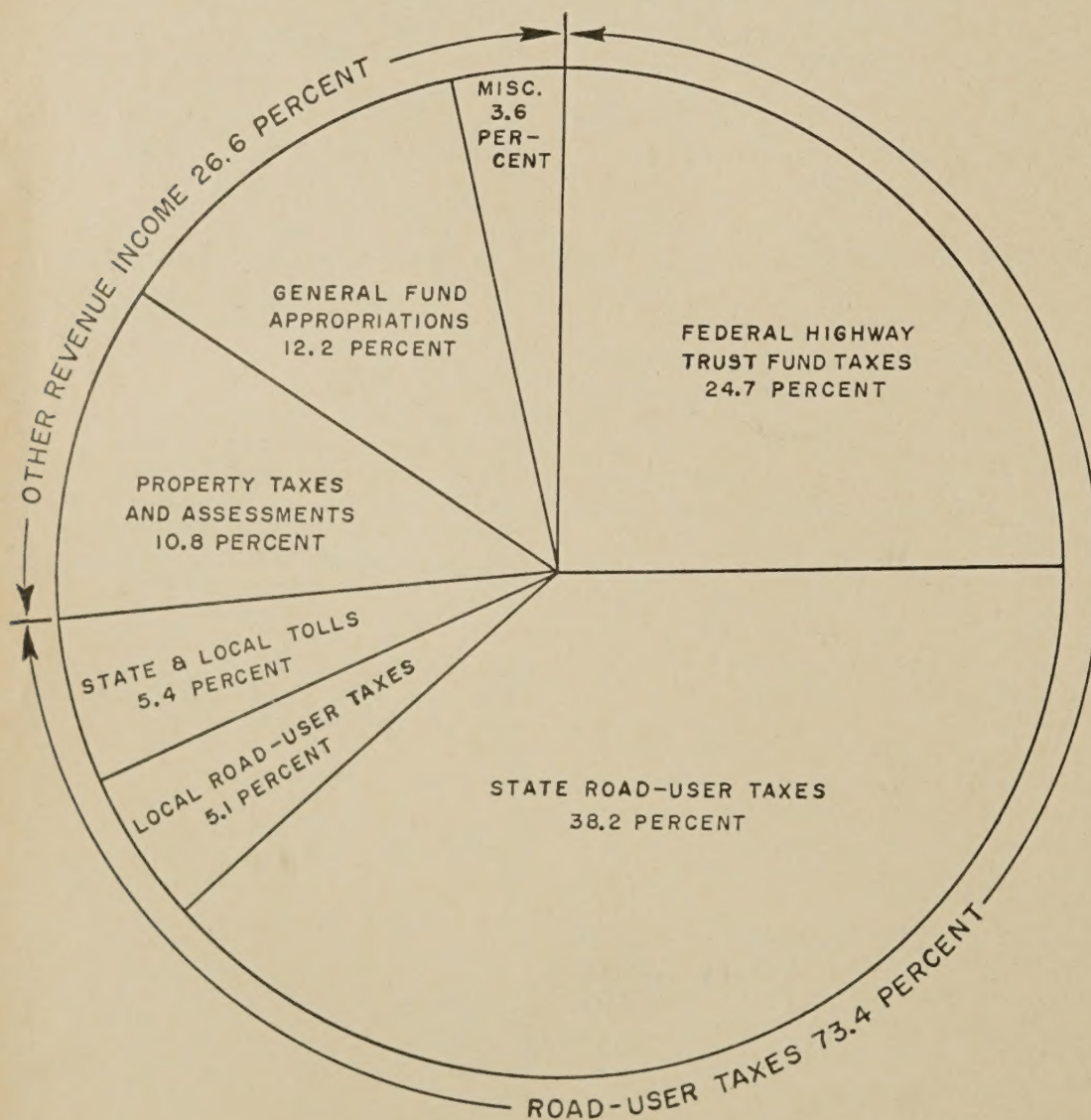


Figure 2.—Sources of income for highways, 46 SMSA's, 1960.

county, or city level consisted of motor-fuel taxes, motor-vehicle registration and other fees where levied, and parking fees.

**Income for Roads and Streets**

The income of each SMSA, by source—Federal, State, and local—is shown in table 8 and is classified between imposts on road users, other revenue income, and receipts from borrowing. Total income by source is illustrated proportionally in figure 2. Income from State road-user taxes equal to expenditures on State highways within each SMSA was assigned as recorded in annual reports by the States. Because Federal aid was available exclusively for capital improvements, Federal funds were assigned to each SMSA as a pro rata share of the State capital outlay in the ratio that Federal-aid reimbursements are to total capital outlay by the State. Local income, by source, is as reported annually in SMSA financial reports on roads and streets. Income from toll facilities, both State and local, is as reported for this study from annual financial reports. The total revenue income of the 46 SMSA's (table 8) amounted to \$1,422 million, of which \$1,044 million, or 73.4 percent, stemmed from imposts on road users and \$378 million, or 26.6 percent, from property taxes and assessments, general fund appropriations, and miscellaneous sources. The income of \$1,044 million from imposts on road users is 63 percent of the road-user earnings of \$1,650 million in these SMSA's. SMSA property taxes and assessments, general fund appropriations, and miscellaneous income amounted to 26.6 percent of the income for roads and streets; whereas nationally receipts from such sources (10) accounted for 18 percent of the total receipts for highways, including small amounts of Federal and State general fund appropriations. Investment income and borrowing of \$223 million supplemented the revenue income for highways, but these items are not relevant to the comparisons made in this article. Borrowing is balanced over time by debt retirements and are not to be considered as revenue income. Investment income, a very small item, does contribute to the funds available for expenditure, but is not relevant to comparisons of user and nonuser income.

The imposts on road users, including tolls, ranged from 71 to 76 percent of the revenue income of the four SMSA groups by population size. The population group 500,000 to 1 million received the lowest percentage of its total income from road-user imposts, just under 71 percent, and it was also second lowest 63 percent, in State and Federal road-user revenue income. The proportion of road-user tax income, excluding tolls, increases as population decreases. The road-user tax income amounted to 73 percent of the total revenue income in the smallest population group and 61 in the largest. But, the proportion of income from local user imposts and State and local tolls increases as the population increases.



Table 8.—Road and street income of 46 SMSA's, by population groups, 1960

SMSA's, by population group	Revenue income											Income from investments and borrowing	Total income
	Imposts on road users						Other						
	Federal aid	State	Local (including parking fees)	Tolls		Total	Property taxes and assessments	General fund appropriations	Miscellaneous	Total	Total		
				State facilities	Local facilities								
LESS THAN 250,000													
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
Atlantic City, N.J.	\$550	\$1,835	\$273	\$380	-----	\$3,038	\$1	\$3,593	-----	\$3,594	\$6,632	\$221	\$6,853
Bay City, Mich.	1,634	3,524	-----	-----	-----	5,158	48	449	\$219	716	5,874	555	6,429
Cedar Rapids, Iowa	702	2,131	210	-----	-----	3,043	2,214	22	122	2,358	5,401	561	5,962
Charleston, S.C.	1,815	2,267	-----	-----	-----	4,082	-----	485	-----	485	4,567	-----	4,567
Eugene, Ore.	6,727	5,780	276	-----	-----	12,783	1,292	-----	39	1,331	14,114	696	14,810
Fargo, N. Dak.	8,298	4,523	-----	-----	-----	12,821	1,983	573	133	2,689	15,510	2,186	17,696
Fitchburg-Leominster, Mass.	53	253	1,012	-----	-----	1,318	-----	269	198	467	1,785	7	1,792
Fort Wayne, Ind.	1,259	3,337	95	-----	-----	4,691	1,079	171	68	1,318	6,009	-----	6,009
Great Falls, Mont.	2,052	1,465	137	-----	-----	3,654	1,627	-----	-----	1,627	5,281	181	5,462
Jackson, Miss.	1,858	2,048	137	-----	-----	4,043	2,761	848	301	3,910	7,953	2,313	10,266
Las Vegas, Nev.	2,355	2,012	197	-----	-----	4,564	635	424	139	1,198	5,762	460	6,222
Lewiston-Auburn, Maine	58	53	134	272	-----	517	-----	717	15	732	1,249	20	1,269
Lexington, Ky.	880	726	81	-----	-----	1,687	-----	826	-----	826	2,513	188	2,701
Little Rock-North Little Rock, Ark.	12,349	6,802	188	-----	-----	19,339	1,084	943	157	2,184	21,523	-----	21,523
Lynchburg, Va.	974	1,228	260	-----	-----	2,462	4	412	2	418	2,880	788	3,668
Macon, Ga.	1,050	774	174	-----	-----	1,998	502	493	10	1,005	3,003	-----	3,003
Madison, Wis.	3,219	6,780	360	-----	-----	10,359	2,196	2,463	206	4,865	15,224	1,486	16,710
Sioux Falls, S. Dak.	4,724	3,492	158	-----	-----	8,374	641	494	144	1,279	9,653	600	10,253
South Bend, Ind.	99	2,667	152	-----	-----	2,918	1,039	-----	516	1,555	4,473	1,000	5,473
Springfield, Mo.	1,408	2,569	770	-----	-----	4,747	860	155	265	1,280	6,027	265	6,292
Waterbury, Conn.	1,050	3,296	26	-----	-----	4,372	4	1,960	287	2,251	6,623	25	6,648
Total	\$53,114	\$57,562	\$4,640	\$652	-----	\$115,968	\$17,970	\$15,297	\$2,821	\$36,088	\$152,056	\$11,552	\$163,608
Percentage of revenue income	34.9	37.9	3.1	0.4	-----	76.3	11.8	10.1	1.8	23.7	100.0	-----	-----
250,000 TO 500,000													
Albuquerque, N. Mex.	\$6,589	\$4,472	\$629	-----	-----	\$11,690	\$2,692	\$52	\$276	\$3,020	\$14,710	\$2,809	\$17,519
Charleston, W. Va.	422	2,220	257	-----	-----	2,899	363	1,023	-----	1,386	4,285	-----	4,285
Charlotte, N.C.	970	2,706	144	-----	-----	3,820	-----	1,857	-----	1,857	5,677	-----	5,677
Jacksonville, Fla.	10,438	10,001	427	\$3,338	-----	24,204	2,234	1,634	1,997	5,865	30,069	1,673	31,742
Nashville, Tenn.	11,288	6,962	1,401	-----	-----	19,651	1,813	85	198	2,096	21,747	654	22,401
Omaha, Nebr.	6,591	9,489	1,987	-----	\$197	18,264	5,003	-----	344	5,347	23,611	2,760	26,371
Salt Lake City, Utah	5,798	3,707	257	-----	-----	9,762	2,391	943	171	3,505	13,267	-----	13,267
Tacoma, Wash.	3,341	6,495	-----	-----	-----	9,836	1,451	1,157	269	2,867	12,703	-----	12,703
Tulsa, Okla.	1,996	4,380	484	1,598	-----	8,458	850	744	426	2,020	10,478	4,481	14,959
Wichita, Kans.	4,149	3,478	418	359	-----	8,404	7,842	362	840	9,044	17,448	6,659	24,107
Wilmington, Del.	3,762	1,597	467	4,770	-----	10,596	99	4,412	28	4,539	15,135	5,853	20,988
Total	\$55,344	\$55,507	\$6,471	\$10,065	\$197	\$127,584	\$24,738	\$12,269	\$4,539	\$41,546	\$169,130	\$24,889	\$194,019
Percentage of revenue income	32.7	32.8	3.8	6.0	0.1	75.4	14.6	7.3	2.7	24.6	100.0	-----	-----
500,000 TO 1,000,000													
Birmingham, Ala.	\$3,088	\$4,020	\$2,283	-----	-----	\$9,391	\$4,592	-----	\$969	\$5,561	\$14,952	\$3,300	\$18,252
Columbus, Ohio	7,876	16,711	446	-----	-----	25,033	2,337	\$696	961	3,994	29,027	8,203	37,230
Denver, Colo.	6,677	10,453	-----	\$643	-----	17,773	4,441	2,580	752	7,773	25,546	47	25,593
Honolulu, Hawaii	3,806	8,284	4,368	-----	-----	16,458	3,493	85	474	4,052	20,510	-----	20,510
New Orleans, La.	8,314	8,997	539	2,926	\$1,437	22,213	5,259	5,476	1,796	12,531	34,744	9,074	43,818
Phoenix, Ariz.	7,651	6,850	-----	-----	-----	14,501	1,635	5,144	4,349	11,128	25,629	4,686	30,315
Providence, R.I.	13,686	13,454	1,390	718	-----	29,248	12	10,104	222	10,338	39,586	4,368	43,954
Total	\$51,098	\$68,769	\$9,026	\$4,287	\$1,437	\$134,617	\$21,769	\$24,085	\$9,523	\$55,377	\$189,994	\$29,678	\$219,672
Percentage of revenue income	26.9	36.2	4.7	2.3	0.8	70.9	11.4	12.7	5.0	29.1	100.0	-----	-----
MORE THAN 1,000,000													
Baltimore, Md.	\$7,829	\$32,683	\$4,602	\$5,558	\$351	\$51,023	\$865	\$13,016	\$442	\$14,323	\$65,346	\$4,840	\$70,186
Buffalo, N. Y.	8,804	13,139	781	4,637	-----	27,361	5,069	18,223	1,277	24,569	51,930	12,774	64,704
Chicago, Ill.	88,698	104,595	39,080	18,426	2,208	253,007	30,443	5,928	2,741	39,112	292,119	83,073	375,192
Houston, Tex.	15,146	21,653	687	-----	-----	37,486	20,674	6,387	3,766	30,827	68,313	19,224	87,537
Los Angeles, Calif.	32,529	121,238	3,686	-----	281	157,734	11,202	44,776	15,262	71,240	228,974	10,720	239,694
Minneapolis-St. Paul, Minn.	26,225	27,770	1,072	-----	-----	55,067	19,945	6,832	3,175	29,952	85,019	11,495	96,514
Philadelphia, Pa.	12,406	40,074	1,999	28,034	1,566	84,079	429	26,987	7,215	34,631	118,710	14,601	133,311
Total	\$191,637	\$361,152	\$51,907	\$56,655	\$4,406	\$665,757	\$88,627	\$122,149	\$33,878	\$244,654	\$910,411	\$156,727	\$1,067,138
Percentage of revenue income	21.0	39.7	5.7	6.2	0.5	73.1	9.8	13.4	3.7	26.9	100.0	-----	-----
TOTAL ALL SMSA's	\$351,193	\$542,990	\$72,044	\$71,659	\$6,040	\$1,043,926	\$153,104	\$173,800	\$50,761	\$377,665	\$1,421,591	\$222,846	\$1,644,437
Percentage of revenue income	24.7	38.2	5.1	5.0	0.4	73.4	10.8	12.2	3.6	26.6	100.0	-----	-----

(Continued on page 194)



Line	State	Width inches <sup>1</sup>	Height ft.-in.	Length-feet <sup>2</sup>					Number of towed units <sup>3</sup>			Axle load-pounds				Operating tire inflation pressure pounds per sq. in.	Pound engine horsepower delivered to clutch or equivalent						
				Single unit				Truck tractor semi-trailer	Other combination	Semi-trailer	Full trailer	Semi-trailer and full trailer	Single		Tandem								
				Truck	Bus	Semi-trailer or trailer	Truck tractor semi-trailer						Statutory limit	Including statutory enforcement tolerance	Statutory limit			Including statutory enforcement tolerance					
1	Alabama	96	13-6	40	40	NS	55	NP	1	NP	NP	18,000	19,800	36,000	39,600	NS							
2	Alaska	96	12-6	35	640	740	60	60	1	1	2	18,000		32,000		NS							
3	Arizona	96	13-6	40	40	NS	65	65	1	1	2	18,000		32,000		NS							
4	Arkansas	96	13-6	40	40	NS	55	55	1	1	NP	18,000		32,000		NS							
5	California	96	13-6	35	935	740	60	65	NR	NR	NR	18,000		32,000		NS							
6	Colorado	1096	113-6	35	40	NR	60	1260	1	2	2	18,000		36,000		NS							
7	Connecticut	102	12-6	50	50	NR	50	NP	1	NP	NP	22,400	22,848	36,000	36,720	NS							
8	Delaware	96	13-6	40	42	40	55	60	1	1	NP	20,000		36,000		NS							
9	Florida	96	13-6	1335	40	14	NS	55	1	1	NP	20,000	22,000	40,000	44,000	NS							
10	Georgia	96	13-6	55	55	NR	55	55	NR	NR	NR	18,000	20,340	36,000	40,680	NS							
11	Hawaii	108	13-0	40	40	NR	55	65	1	1	2	24,000		32,000		NS							
12	Idaho	1096	14-0	1835	18	35	NR	19	60	1	2	2018,000		32,000		NS							
13	Illinois	96	13-6	42	42	NR	42	21	55	1	1	2318,000		32,000		NS							
14	Indiana	1096	13-6	36	40	NR	55	21	55	1	1	2518,000	2519,000	2532,000	2533,000	NS							
15	Iowa	96	13-6	35	640	7NR	55	26	55	1	1	18,000	18,540	32,000	32,960	NS							
16	Kansas	96	13-6	35	640	NS	50	50	1	1	NP	18,000		32,000		NS							
17	Kentucky	96	13-6	2735	27	35	NR	28	55	1	1	18,000	2918,900	32,000	2933,600	NS							
18	Louisiana	96	13-6	35	640	NR	55	60	1	1	NP	18,000		32,000		NS							
19	Maine	102	13-6	55	55	NR	55	55	1	1	NP	22,000		32,000		NS							
20	Maryland	3296	12-6	55	55	NR	55	34	55	NR	NR	22,400		40,000		NS							
21	Massachusetts	96	NS	35	640	NR	50	NP	1	NP	NP	22,400		36,000		NS							
22	Michigan	96	13-6	35	40	40	15	55	15	55	1	1	2	3718,000		32,000		NS					
23	Minnesota	96	13-6	40	40	40	50	50	1	1	NP	18,000		32,000		NS							
24	Mississippi	96	13-6	35	40	NR	55	55	1	1	NP	18,000		28,650	22	32,000		NS					
25	Missouri	96	12-6	35	40	NR	50	50	1	1	2	18,000		32,000		NS							
26	Montana	1096	13-6	35	40	NR	60	60	1	1	2	18,000		32,000		NS							
27	Nebraska	96	13-6	40	40	39	NR	60	60	1	1	18,000	18,900	32,000	33,600	NS							
28	Nevada	96	NR	NR	NR	NR	NR	NR	NR	NR	NR	18,000	18,900	32,000	33,600	NS							
29	New Hampshire	96	13-6	35	22	40	NR	55	55	NR	NR	22,400		36,000		NS							
30	New Jersey	4196	4113-6	35	42	35	7	40	55	50	1	1	NP	22,400	23,520	32,000	33,600	NS					
31	New Mexico	4396	13-6	40	40	NR	65	65	1	1	2	21,600		34,320		NS							
32	New York	96	13-0	35	44	35	7	NR	55	55	1	1	NP	22,400		36,000		NS					
33	North Carolina	96	13-6	35	640	NR	55	55	1	1	NP	18,000	19,000	36,000	38,000	NS							
34	North Dakota	4196	4113-6	13	35	640	NR	60	60	1	1	2	18,000		32,000		NS						
35	Ohio	96	13-6	35	640	7	40	55	60	1	NR	19,000		31,500		NS							
36	Oklahoma	96	13-6	35	45	NR	45	50	45	50	1	1	NP	18,000		32,000		NS					
37	Oregon	96	13-6	35	22	40	22	40	21	55	22	65	1	1	222	46	18,000		46	32,000		NS	
38	Pennsylvania	96	12-6	35	40	40	48	50	34	50	1	1	NP	22,400	23,072	36,000	37,080	NS					
39	Rhode Island	102	12-6	40	40	40	50	50	1	1	NP	22,400		NS		NS							
40	South Carolina	96	13-6	640	640	NR	55	55	55	55	1	1	NP	20,000		32,000		NS					
41	South Dakota	96	13-6	35	40	NR	22	65	22	65	1	1	2	18,000		32,000		NS					
42	Tennessee	96	13-6	35	40	7	NS	50	50	1	56	1	NP	18,000		32,000		NS					
43	Texas	96	13-6	35	40	NS	50	50	50	1	1	NP	18,000		32,000		NS						
44	Utah	96	14-0	45	45	45	60	60	NR	NR	NR	18,000		33,000		NS							
45	Vermont	96	13-6	50	50	NS	55	55	1	1	NP	22,400	23,520	57	36,000		NS						
46	Virginia	96	13-6	35	40	NR	50	50	1	1	NP	18,000		32,000		NS							
47	Washington	96	13-6	35	640	40	19	60	65	1	1	2	18,000		32,000		NS						
48	West Virginia	96	13-6	35	640	35	50	50	1	1	NP	18,000	18,900	32,000		NS							
49	Wisconsin	96	13-6	35	40	35	50	55	1	1	NP	18,000	69	19,500	30,400	32,000		NS					
50	Wyoming	96	13-6	40	40	NR	65	65	1	1	2	18,000		32,000		62	36,000		NS				
51	District of Columbia	96	12-6	40	40	NS	50	50	1	1	NP	22,000		38,000		NS							
52	Puerto Rico	96	12-6	35	40	NS	50	50	1	1	NP	NS		NS		NS							
	AASHO Policy	102	13-6	40	40	40	55	65	1	1	2	20,000		32,000		95							
	Number of States	Higher	1	4	8	10	35	14	1	6	8	7	16		26		52						
		Same	3	37	12	37	6	24	9	46	41	18	2		25		0						
		Lower	48	11	32	5	11	14	42	0	3	27	34		1		0						

NP—Not permitted. NR—Not restricted. NS—Not specified.  
<sup>1</sup> Various exceptions for farm and construction equipment, public utility vehicles, house trailers, urban, suburban, and school buses; haulage of agricultural and forest products, at wheels of vehicles for safety accessories, on designated highways, and as administratively authorized.  
<sup>2</sup> Various exceptions for utility vehicles and loads, house trailers and mobile homes.  
<sup>3</sup> When not specified, limited to number possible in practical combinations within permitted length limits; various exceptions for farm tractors, mobile homes, etc.  
<sup>4</sup> Legally specified or established by administrative regulation.  
<sup>5</sup> Computed under the following conditions to permit comparison on a uniform basis between States with different types of regulation:  
 A. Front axle load of 8,000 pounds.  
 B. Maximum practical wheelbase within applicable length limits:  
 (1) Minimum front overhang of 3 feet, minimum spacing from first to second axle of truck tractor 8 feet.  
 (2) In the case of a 4-axle truck-tractor semitrailer, rear overhang computed as necessary to distribute the maximum possible uniform load on the maximum permitted length of semitrailer to the single drive-axle of the tractor and to the tandem axles of the semitrailer, within the permitted load limits of each.  
 (3) In the case of a combination having 5 or more axles, minimum possible combined front and rear overhang assumed to be 5 feet, with maximum practical load on maximum permitted length of semitrailer, subject to control of loading on axle groups and on total wheelbase as applicable.  
 C. Including statutory enforcement tolerance as applicable.  
<sup>6</sup> Less than three axles 35 feet.  
<sup>7</sup> Trailer 35 feet.  
<sup>8</sup> Steering axle 12,000 pounds.  
<sup>9</sup> On specific routes in urban or suburban service under special permit from P.U.C. 40 feet, also 3-axle buses with turning radius less than 45 feet without restriction.  
<sup>10</sup> Buses 102 inches on highways of surfaced width at least 20 feet or otherwise as administratively authorized.  
<sup>11</sup> On class AA, or designated highways, 12 ft. 6 in. on other highways.  
<sup>12</sup> Except 3-unit combinations may use up to 65 ft. combinations on certain highways designated by the Department of Highways.  
<sup>13</sup> Three-axle vehicles 40 feet.  
<sup>14</sup> Two-axle trailer 35 feet, three-axle trailer 40 feet.

<sup>15</sup> Auto transports permitted 63 feet.  
<sup>16</sup> 73,280 pounds maximum, except on roads over 700 (L+40) when L is 18' or less; 800 (L+30) span of 20' or over.  
<sup>17</sup> On designated highways 40 feet.  
<sup>18</sup> Auto transports on designated highways 6 feet.  
<sup>19</sup> Special limits for vehicles hauling timber 11 livestock, single axle 18,900 pounds, tandem axle 36,000 pounds maximum at 21-foot axle spacing, vehicle 32,000 pounds maximum at 21-foot axle spacing.  
<sup>20</sup> 60 ft. in special cases: Illinois, auto transport trailers on designated major routes.  
<sup>21</sup> On designated highways only.  
<sup>22</sup> On designated highways; 16,000 pounds combined axle load.  
<sup>23</sup> Axle spacing 44 feet or more; otherwise 70 feet.  
<sup>24</sup> On designated highways; single axle 22,400 pounds weight under one or more limitations of axle load and axle spacing.  
<sup>25</sup> Auto and boat transports and three-unit combinations 50 feet for all combinations.  
<sup>26</sup> On designated highways, trucks 26.5 feet maximum gross weight on Class A highways.  
<sup>27</sup> State maintained highways; 45 feet on other highways.  
<sup>28</sup> Class AA highways only.  
<sup>29</sup> Maximum gross weight on Class A highways 40,000 pounds.  
<sup>30</sup> Including load 14 feet; various exceptions apply.  
<sup>31</sup> Vehicles loaded with tobacco hogsheads.  
<sup>32</sup> Auto transports 13 feet 6 inches; Maryland 13 feet flat glass.  
<sup>33</sup> Exception for poles, pilings, structural uses.  
<sup>34</sup> Less than 48-inch spacing, 36,000 pound limit.  
<sup>35</sup> Subject to axle and tabular limits.  
<sup>36</sup> Single axle spaced less than 9 feet from front axle.



# VEHICLES COMPARED WITH AASHO STANDARDS

Public Roads

Axle limit	Specified maximum gross weight-pounds <sup>4</sup>								Practical maximum gross weight-pounds <sup>5</sup>						Line
	Applicable to:		Truck		Truck-tractor semitrailer			Other combination	Truck		Truck-tractor semitrailer			Other combination	
	Any group of axles	Total wheel-base only	2-axle	3-axle	3-axle	4-axle	5-axle		2-axle	3-axle	3-axle	4-axle	5-axle		
	Under 18'	Over 18'	29,000	43,000	47,000	61,000	73,280 75,000	76,800	27,800 26,000 26,000 26,000	47,600 40,000 40,000 40,000	47,600 44,000 44,000 44,000	67,400 58,000 58,000 58,000	73,280 72,000 72,000 72,000	NP 76,800 76,800 73,280 76,800	1 2 3 4 5
		X	32,000	53,800	53,800	67,400	73,000	NP	26,000 30,848 28,000 30,000	44,000 44,720 44,000 52,000	44,000 53,800 48,000 52,000	62,000 67,400 64,000 73,271	76,000 73,000 73,280 73,271	76,000 NP 73,280 73,271	6 7 8 9
	X					73,280	73,280		28,340 32,000 26,000 26,000	48,680 40,000 40,000 40,000	48,680 56,000 44,000 44,000	69,110 64,000 58,000 58,000	73,280 72,000 73,280 72,000	73,280 80,000 76,800 73,280	10 11 12 13
	X		36,000	50,000	50,000	64,000	<sup>24</sup> 73,280		27,000 26,540 26,000 27,000	41,000 40,960 40,000 42,000	45,000 45,080 44,000 42,000	59,000 59,500 58,000 59,640	<sup>25</sup> 73,000 73,280 72,000 73,280	<sup>25</sup> 73,000 73,280 73,280 73,280	14 15 16 17
	X	X	32,000	<sup>31</sup> 51,800	51,800	62,050	73,280	73,280	26,000 30,000 30,400 30,400	40,000 40,000 48,000 44,000	44,000 51,800 52,800 52,800	58,000 62,000 55,000 66,400	72,000 72,000 73,280 73,000	76,000 73,280 73,280 NP	18 19 20 21
	X								26,000 26,000 26,000 26,000	<sup>22</sup> 40,000 40,000 <sup>22</sup> 40,000 40,000	44,000 44,000 44,000 44,000	<sup>22</sup> 58,000 58,000 58,000 58,000	<sup>22</sup> 66,000 72,000 <sup>22</sup> 72,000 <sup>22</sup> 72,000	<sup>22</sup> 102,000 73,280 <sup>22</sup> 73,280 <sup>22</sup> 73,280	22 23 24 25
	Under 18'	Over 18'	36,000	54,000	54,000	71,146	71,146	71,146	26,000 26,780 26,900 30,400	40,000 41,200 41,600 44,000	44,000 45,320 45,800 52,800	58,000 59,740 60,500 66,400	72,000 73,280 75,200 73,280	76,000 73,280 76,800 73,280	26 27 28 29
	Under 18'	Over 18'							31,520 29,600 30,400 27,000	41,600 42,320 44,000 46,000	55,040 51,200 52,800 46,000	65,120 63,920 66,400 65,000	73,280 76,640 71,000 73,280	73,280 86,400 71,000 73,280	30 31 32 33
	Under 18'	Over 18'							26,000 27,000 26,000 26,000	40,000 39,500 40,000 40,000	44,000 46,000 44,000 44,000	58,000 58,500 58,000 58,000	72,000 71,000 72,000 72,000	73,280 78,000 73,280 <sup>47</sup> 76,000	34 35 36 37
	X		33,000	47,000	50,000	60,000	71,145	71,145	31,072 30,400 28,000 26,000	45,080 44,000 40,000 40,000	51,500 53,800 48,000 44,000	61,800 67,400 60,000 58,000	73,280 73,280 72,000 72,000	73,280 88,000 73,280 73,280	38 39 40 41
	X	X	36,000	51,000	54,000	69,000	79,900	73,280	26,000 26,000 26,000 31,520	40,000 40,000 41,000 44,000	44,000 44,000 44,000 55,000	58,000 58,000 59,000 66,400	72,000 72,000 74,000 73,280	43,500 72,000 79,900 73,280	42 43 44 45
	Under 18'	Over 18'	28,000	36,000	46,000	60,000	70,000	70,000	26,000 26,000 26,900 27,500	40,000 36,000 41,600 40,000	44,000 44,000 45,800 47,000	50,000 60,000 60,500 59,500	70,000 68,000 73,280 73,000	70,000 72,000 73,280 73,000	46 47 48 49
	X					70,000	70,000		26,000 30,000	44,000 46,000	44,000 52,000	62,000 68,000	73,950 70,000	73,950 70,000	50 51 52
	X								28,000	40,000	48,000	60,000	72,000	86,500	
	18	20							15 2 34	25 24 2	15 2 34	22 3 26	25 20 6	2 0 49	

000 pounds maximum.  
9,000 (L + 40) on highways having no structures with  
ates, aggregates, and agricultural products including  
le: vehicle with 3 or 4 axles permitted 66,000  
9,000 pounds maximum at 43-foot axle spacing.  
lling house trailers only; Oregon, truck tractor semi-  
ands; tolerance of 1,000 pounds on total of all excesses  
upon the placing of 9000# on the front or steering  
highways with surface width 22 feet or more; other-  
ways.  
highways 30,000 pounds.  
ducts and construction materials.  
or vehicles loaded with hay or straw, or carrying  
red 70 feet.  
ounds.

38 On designated highways only and limited to one tandem axle in combination; otherwise 26,000 pounds.  
39 Trailer 40 feet.  
40 On Interstate System 47,500 pounds.  
41 Vehicles in excess may be operated under special permit obtained in advance; in New Jersey from the Department of Motor Vehicles; in North Dakota, from State Highway Truck Regulatory Department.  
42 Or as prescribed by P.U.C.  
43 On designated highways 102 inches. Body restricted to 96", additional 6" for tires only.  
44 Trackless trolleys and buses 7 passengers or more, P.S.C. certificate 40 feet.  
45 Auto transports, oil field equipment, by special permit only, 60 feet.  
46 Logging vehicles permitted 7-foot wheelbase tolerance, 19,000-single axle, 34,000-pounds tandem axle.  
47 Governs gross weight permitted on highways designated by resolution of State highway commission.  
48 Where truck-tractor was properly registered in Pennsylvania as of December 31, 1961, 55 feet.  
49 Single unit truck with 4 axle permitted 60,000 pounds.  
50 Axles spaced less than 6 feet 32,000 pounds; less than 12 feet 36,000 pounds; 12 feet or more gross weight governed by axle limit.  
51 Single vehicle with 3 or more axles spaced less than 16 feet 40,000 pounds; less than 20 feet 44,000 pounds; 20 feet or more governed by axle limit.  
52 Tractor semitrailer with 3 or more axles spaced less than 22 feet 46,000 pounds; not less than 27 feet 53,800 pounds.  
53 Legal limit 67,400 pounds, axle spacing 27 feet or more.  
54 House trailers, auto transports, and double saddle mounts in daylight hours, 60 feet.  
55 On Interstate System; 36,000 pounds on other roads.  
56 Limited to 3,500 pounds.  
57 Three-axle tandem 42,700 pounds.  
58 Vehicles registered before July 1, 1956, permitted limits in effect January 1, 1956, for life of vehicle.  
59 Only on certain highways, or portions thereof, designated by State Roads Commissioner, and consistent with Congressional action.  
60 Axle load 21,000 pounds on 2-axle trucks hauling peeled or unpeeled forest products cut crosswise or transporting milk from farm to market but not over Interstate System.  
61 On Class A highways. All axles of a vehicle or combination—73,000 pounds maximum. Wheel, axle, axle group and gross vehicle weights on Class B highways are 60% of weights including tolerance authorized for Class A highways.  
62 Based on ruling of Attorney General.



# Highway Income, and Earnings in 46 Standard Metropolitan Statistical Areas

(Continued from page 191)

**Table 9.—Expenditures for roads and streets in 46 SMSA's, 1960**

SMSA's, by population group	Capital outlay <sup>1</sup>						Maintenance, administration, operation, etc. <sup>2</sup>	Interest	Total expenditures	Debt retirement	Total disbursements	
	On State-administered highways			On local roads and streets								Total
	Rural	Municipal	Total	Rural	Municipal	Total						
LESS THAN 250,000												
Atlantic City, N.J.	\$1,044	\$51	\$1,095	\$165	\$293	\$458	\$1,553	\$4,608	\$298	\$6,459	\$406	\$6,865
Bay City, Mich.	3,773	99	3,872	41	745	786	4,658	1,614	14	6,286	90	6,376
Cedar Rapids, Iowa	907	370	1,277	888	911	1,799	3,076	2,552	56	5,684	279	5,963
Charleston, S.C.	2,817	353	3,170	99	84	183	3,353	1,334	---	4,687	---	4,687
Eugene, Oreg.	7,849	---	7,849	1,763	1,135	2,898	10,747	3,084	54	13,885	246	14,131
Fargo, N. Dak.	10,265	985	11,250	1,572	1,552	3,124	14,374	2,361	273	17,008	536	17,544
Fitchburg-Leominster, Mass.	99	---	99	46	206	252	351	1,289	12	1,652	140	1,792
Fort Wayne, Ind.	1,952	205	2,157	809	599	1,408	3,565	1,875	97	5,537	307	5,844
Great Falls, Mont.	2,834	70	2,904	42	241	283	3,187	1,443	241	4,871	475	5,346
Jackson, Miss.	2,287	478	2,765	505	1,033	1,538	4,303	2,598	295	7,196	2,485	9,681
Las Vegas, Nev.	3,011	24	3,035	180	853	1,033	4,068	1,830	41	5,939	234	6,173
Lewiston-Auburn, Maine	4	110	114	---	110	110	224	795	199	1,218	42	1,260
Lexington, Ky.	1,492	73	1,565	---	---	(3) 1,565	1,138	1,138	---	2,703	---	2,703
Little Rock-North Little Rock, Ark.	4,739	12,698	17,437	99	1,530	1,629	19,066	2,964	141	22,171	345	22,516
Lynchburg, Va.	1,243	168	1,411	---	604	604	2,015	1,229	120	3,364	304	3,668
Macon, Ga.	1,559	---	1,559	345	135	480	2,039	915	24	2,978	45	3,023
Madison, Wis.	6,127	166	6,293	2,006	3,129	5,135	11,428	3,914	227	15,569	1,069	16,638
Sioux Falls, S. Dak.	4,428	2,782	7,210	1,004	241	1,245	8,455	1,539	14	10,008	20	10,028
South Bend, Ind.	153	16	169	477	436	913	1,082	2,800	25	3,907	575	4,482
Springfield, Mo.	2,911	642	3,553	67	307	374	3,927	1,656	29	5,612	330	5,942
Waterbury, Conn.	3,216	---	3,216	104	245	349	3,565	3,089	103	6,757	192	6,949
Total	\$62,710	\$19,290	\$82,000	\$10,212	\$14,389	\$24,601	\$106,601	\$44,627	\$2,263	\$153,491	\$8,120	\$161,611
Percentage of expenditures	40.8	12.6	53.4	6.6	9.4	16.0	69.4	29.1	1.5	100.0	---	---
250,000 TO 500,000												
Albuquerque, N. Mex.	\$1,031	\$9,157	\$10,188	\$101	\$2,268	\$2,369	\$12,557	\$3,726	\$469	\$16,752	\$1,492	\$18,244
Charleston, W. Va.	655	---	655	---	37	37	692	3,426	116	4,234	176	4,410
Charlotte, N.C.	1,436	396	1,832	---	428	428	2,260	3,140	181	5,581	298	5,879
Jacksonville, Fla.	17,862	6,338	24,200	143	1,058	1,201	25,401	7,898	5,011	38,310	6,963	45,273
Nashville, Tenn.	7,465	8,694	16,159	626	1,126	1,752	17,911	3,454	276	21,641	866	22,507
Omaha, Nebr.	8,205	2,740	10,945	3,156	3,708	6,864	17,809	6,510	402	24,721	2,875	27,596
Salt Lake City, Utah	7,931	174	8,105	778	685	1,463	9,568	3,477	---	13,045	---	13,045
Tacoma, Wash.	2,044	4,629	6,673	---	2,795	2,795	9,468	3,736	179	13,383	346	13,729
Tulsa, Okla.	3,347	419	3,766	1,739	1,856	3,595	7,361	5,151	1,757	14,269	1,547	15,816
Wichita, Kans.	3,658	2,894	6,552	1,152	4,228	5,380	11,932	4,637	1,330	17,899	7,116	25,015
Wilmington, Del.	6,342	1,958	8,300	48	943	991	9,291	6,336	1,145	16,772	3,246	20,018
Total	\$59,976	\$37,399	\$97,375	\$7,743	\$19,132	\$26,875	\$124,250	\$51,491	\$10,866	\$186,607	\$24,925	\$211,532
Percentage of expenditures	32.2	20.0	52.2	4.2	10.2	14.4	66.6	27.6	5.8	100.0	---	---
500,000 TO 1,000,000												
Birmingham, Ala.	\$4,988	\$103	\$5,091	\$2,718	\$2,251	\$4,969	\$10,060	\$4,144	\$217	\$14,421	\$846	\$15,267
Columbus, Ohio	7,697	9,822	17,519	1,543	1,892	3,435	20,954	7,196	829	28,979	8,774	37,753
Denver, Colo.	5,920	5,033	10,953	1,625	1,677	3,302	14,255	10,438	325	25,018	455	25,473
Honolulu, Hawaii	2,877	4,584	7,461	---	3,334	3,334	10,795	7,801	475	19,071	446	19,517
New Orleans, La.	4,051	12,478	16,529	1,693	3,594	5,287	21,816	9,892	5,627	37,335	5,638	42,973
Phoenix, Ariz.	2,917	6,046	8,963	8,153	3,117	11,270	20,233	6,767	440	27,440	1,408	28,848
Providence, R.I.	3,197	20,518	23,715	459	4,372	4,831	28,546	12,793	459	41,798	2,038	43,836
Total	\$31,647	\$58,584	\$90,231	\$16,191	\$20,237	\$36,428	\$126,659	\$59,031	\$8,372	\$194,062	\$19,605	\$213,667
Percentage of expenditures	16.3	30.2	46.5	8.4	10.4	18.8	65.3	30.4	4.3	100.0	---	---
MORE THAN 1,000,000												
Baltimore, Md.	\$10,812	\$37	\$10,849	\$4,146	\$15,761	\$19,907	\$30,756	\$27,208	\$4,245	\$62,209	\$8,322	\$70,531
Buffalo, N. Y.	10,100	9,193	19,293	4,346	6,806	11,152	30,445	22,304	3,719	56,468	10,455	66,923
Chicago, Ill.	46,414	120,089	166,503	8,573	26,159	34,732	201,235	101,616	31,450	334,301	32,764	367,065
Houston, Tex.	2,877	35,954	35,954	2,548	12,087	14,635	50,589	16,949	4,403	71,941	10,190	82,131
Los Angeles, Calif.	38,885	59,884	98,769	15,494	31,647	47,141	145,910	78,583	1,692	226,185	4,548	230,733
Minneapolis-St. Paul, Minn.	7,923	33,772	41,695	6,046	11,761	17,807	59,502	27,096	1,511	88,109	5,729	93,838
Philadelphia, Pa.	23,110	20,642	43,752	3,512	12,195	15,707	59,459	46,787	11,259	117,505	16,506	134,011
Total	\$137,244	\$279,571	\$416,815	\$44,665	\$116,416	\$161,081	\$577,896	\$320,543	\$58,279	\$956,718	\$88,514	\$1,045,232
Percentage of expenditures	14.4	29.2	43.6	4.7	12.1	16.8	60.4	33.5	6.1	100.0	---	---
TOTAL, All SMSA's	\$291,577	\$394,844	\$686,421	\$78,811	\$170,174	\$248,985	\$935,406	\$475,692	\$79,780	\$1,490,878	\$141,164	\$1,632,042
Percentage of expenditures	19.5	26.5	46.0	5.3	11.4	16.7	62.7	31.9	5.4	100.0	---	---

<sup>1</sup> In some SMSA's, the classification of expenditures by system is not exact. In the Baltimore area for example, the State and Federal-aid expenditures for municipal extensions of State highways are included with local municipal street expenditures because State highways stop at the Baltimore municipal limits. When the expenditures for

rural and municipal State highways were not segregated, the amounts are given under rural.

<sup>2</sup> Includes parking, policing, and allied street functions.

<sup>3</sup> No local capital outlay given in the report of expenditures for 1960.



## Expenditures

Expenditures for highways are detailed for capital outlays between those expended on State administered highways and those on local roads and streets, as shown in table 9 and figure 3. Because of the rural areas in the SMSA's, rural-municipal classification is shown to the extent that the data permitted. The classification of expenditures for construction, by systems, is frequently not complete or exact, or the rural-municipal segregation of expenditures on State-administered highways may not be complete. In the Baltimore, Md., Area, for example—perhaps the most extreme—Federal aid of \$7.8 million, matched with \$5.5 million of local municipal funds, was expended for construction of Federal-aid route extensions in the city of Baltimore that ordinarily would be extensions of State highways. It because State jurisdiction stops at the Baltimore city limit, such extensions are under municipal jurisdiction. The capital expenditure of the entire \$13.4 million is included in table 9 with those for local municipal streets rather than with those for municipal extensions of State-administered systems, as for other Areas.

The split between rural and municipal expenditures is further complicated because the State classification of rural expenditures includes Federal-aid urban outlay to the extent that the Federal-aid urban area extends beyond the corporate limits of cities. Although such classification difficulties affect the columnar data of individual SMSA's in table 9, the total outlays shown are complete. The total 1960 expenditures for highways were \$1,491 million in the 46 SMSA's. Capital outlay, which consists of right-of-way, engineering, and construction costs, amounted to \$935 million, 62.7 percent of total expenditures. Maintenance, operation, and administration expenditures were \$476 million, or 31.9 percent, and interest and financing costs the remainder, \$80 million or 5.4 percent. The broad classification of maintenance, administration, and operation requires some definition. Local expenditures were considered to be complete and adequately reported. Expenditures for maintenance and administration of local toll facilities were usually well reported. At the State level, maintenance of condition and operating expenses were included in the analysis for study. But expenditures for administration, collection, and State highway police and safety were not included in this analysis because proration would be required that might be misleading; nevertheless, earnings from highway use are expended for these functions. The magnitude of the cost of collecting user fees, administration of highway organizations, and highway police and safety expenditures of the States in 1960 is illustrated by the following figures. For example, the total for highway administration, collection of user fees, and highway police and safety were, respectively, for all States and the District of Columbia: \$290 million, \$212 million, and \$4 million. The same expenditures provided to the 46 SMSA's were: \$35 million, \$36 million, and \$39 million. Costs of collection,



Figure 3.—Expenditures for highways, 46 SMSA's, 1960.

including administrative and enforcement costs, were obtained by relating the total State costs to total State user revenues in each State and applying that relationship to State user-tax earnings of the SMSA in that State. State highway administration costs were related to total capital and maintenance ex-

penditures in each State, and that relationship was applied to State expenditures for capital outlay and maintenance of each SMSA. Expenditures for State highway police and safety education were derived only in total for all SMSA's by relating all travel in the SMSA's to the total travel nationwide.

Table 10.—Disbursements for allied street functions and parking facilities for the United States and 46 SMSA's, 1960<sup>1</sup>

	Allied street functions					Parking facilities	Total
	Street lighting	Street cleaning	Sidewalks	Storm sewers	Total		
United States:	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
Capital outlay.....	\$33,615	\$2,853	\$19,277	\$87,393	\$143,138	\$55,757	\$198,895
Maintenance and operation.....	176,559	67,290	4,425	14,651	262,925	37,093	300,018
Interest on debt.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	11,648	13,694	25,342
Total expenditures.....					417,711	106,544	524,255
Fund transfers to—						73,974	73,974
Municipal street funds.....						2,310	2,310
Allied street functions.....						523	523
County road funds.....					6,977	5,142	12,119
Other purposes.....					\$6,977	\$61,949	\$68,926
Total.....							
Debt retirement.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	\$31,499	\$18,658	\$50,157
TOTAL DISBURSEMENTS.....					\$456,187	\$207,151	\$663,338
SMSA's (46):							
Total expenditures.....	\$59,111	\$19,449	\$2,876	\$36,647	\$118,083	\$16,370	\$134,453

<sup>1</sup> Source: *Highway Statistics 1961*, Bureau of Public Roads, 1963, table UF-12-1960, p. 79.

<sup>2</sup> Debt service for these functions grouped in total, no breakdown available.



Table 11.—Estimated earnings of motor-vehicle-user taxes and tolls generated by travel and vehicle ownership in 46 SMSA's in 1960, at 1960 tax rates and tolls

SMSA's, by population group	Vehicle-miles of travel within the SMSA	Collecting agencies							Total user taxes on highway use in SMSA	Ratio of user earnings to expenditures (Expenditures=1.0)
		Federal Government	State agencies <sup>1</sup>			Local governments <sup>1</sup>				
			Excise taxes of the Federal Highway Trust Fund <sup>2</sup>	Motor-fuel and vehicle taxes and fees	Tolls	Total State taxes and fees	Motor-fuel and vehicle taxes and fees <sup>3</sup>	Tolls		
LESS THAN 250,000										
Atlantic City, N.J.	1,175	\$4,690	\$7,102	\$380	\$7,482	\$273	-----	\$273	\$12,445	1.93
Bay City, Mich.	425	1,751	3,354	-----	3,354	-----	-----	-----	5,105	.81
Cedar Rapids, Iowa	502	2,125	4,988	-----	4,988	210	-----	210	7,323	1.29
Charleston, S.C.	715	3,103	5,332	-----	5,332	-----	-----	-----	8,435	1.80
Eugene, Oreg.	643	2,597	6,456	-----	6,456	276	-----	276	9,329	.67
Fargo, N. Dak.	452	1,962	3,835	-----	3,835	-----	-----	-----	5,797	.34
Fitchburg-Leominster, Mass.	426	1,492	2,286	-----	2,286	1,012	-----	1,012	4,790	2.90
Fort Wayne, Ind.	582	2,399	5,072	-----	5,072	95	-----	95	7,566	1.37
Great Falls, Mont.	273	1,048	2,174	-----	2,174	137	-----	137	3,359	.69
Jackson, Miss.	590	2,526	5,112	-----	5,112	137	-----	137	7,775	1.08
Las Vegas, Nev.	359	1,722	3,658	-----	3,658	197	-----	197	5,577	.94
Lewiston-Auburn, Maine	174	622	1,650	272	1,922	134	-----	134	2,678	2.20
Lexington, Ky.	433	1,832	3,666	-----	3,666	81	-----	81	5,579	2.06
Little Rock-North Little Rock, Ark.	796	3,876	7,330	-----	7,330	188	-----	188	11,394	.51
Lynchburg, Va.	424	1,837	3,220	-----	3,220	260	-----	260	5,317	1.58
Macon, Ga.	452	1,721	3,273	-----	3,273	174	-----	174	5,168	1.74
Madison, Wis.	911	3,916	7,436	-----	7,436	360	-----	360	11,712	.75
Sioux Falls, S. Dak.	340	1,435	3,027	-----	3,027	158	-----	158	4,620	.46
South Bend, Ind.	570	2,301	4,888	-----	4,888	152	-----	152	7,341	1.88
Springfield, Mo.	659	2,505	2,962	-----	2,962	770	-----	770	6,237	1.11
Waterbury, Conn.	523	2,146	4,208	-----	4,208	26	-----	26	6,880	.94
Total	11,424	\$47,606	\$91,029	\$652	\$91,681	\$4,640	-----	\$4,640	\$143,927	.94
Percentage of user taxes	-----	33.1	63.3	0.4	63.7	3.2	-----	3.2	100.0	-----
250,000 TO 500,000										
Albuquerque, N. Mex.	828	\$3,531	\$7,109	-----	\$7,109	\$629	-----	\$629	\$11,269	0.67
Charleston, W. Va.	815	3,504	8,734	-----	8,734	257	-----	257	12,495	2.95
Charlotte, N.C.	675	2,741	6,462	-----	6,462	144	-----	144	9,347	1.67
Jacksonville, Fla.	1,807	7,297	15,715	\$3,338	19,053	427	-----	427	26,777	.70
Nashville, Tenn.	1,209	5,147	10,389	-----	10,389	1,401	-----	1,401	16,937	.78
Omaha, Nebr.	1,842	7,585	14,988	-----	14,988	1,987	\$197	2,184	24,757	1.00
Salt Lake City, Utah	1,155	4,929	8,908	-----	8,908	257	-----	257	14,094	1.08
Tacoma, Wash.	1,281	5,087	12,035	-----	12,035	-----	-----	-----	17,122	1.28
Tulsa, Okla. <sup>4</sup>	1,436	5,931	15,757	1,598	17,355	484	-----	484	23,770	1.67
Wichita, Kans.	1,382	5,514	8,846	359	9,205	418	-----	418	15,137	.85
Wilmington, Del.	1,586	6,554	11,000	4,770	15,770	467	-----	467	22,791	1.36
Total	14,016	\$57,820	\$119,943	\$10,065	\$130,008	\$6,471	\$197	\$6,668	\$194,496	1.04
Percentage of user taxes	-----	29.7	61.7	5.2	66.9	3.3	0.1	3.4	100.0	-----
5,000,000 TO 1,000,000										
Birmingham, Ala.	2,052	\$8,140	\$14,661	-----	\$14,661	\$2,283	-----	\$2,283	\$25,084	1.74
Columbus, Ohio	2,696	10,308	23,291	-----	23,291	446	-----	446	34,045	1.17
Denver, Colo.	3,500	14,354	26,939	\$643	27,582	-----	-----	-----	41,936	1.68
Honolulu, Hawaii	1,123	4,544	8,903	-----	8,903	4,368	-----	4,368	17,815	.93
New Orleans, La.	1,941	9,138	16,690	2,926	19,616	539	\$1,437	1,976	30,730	.82
Phoenix, Ariz.	3,084	13,157	21,430	-----	21,430	-----	-----	-----	34,587	1.26
Providence, R.I.	3,401	11,997	27,150	718	27,868	1,390	-----	1,390	41,255	.99
Total	17,797	\$71,638	\$139,064	\$4,287	\$143,351	\$9,026	\$1,437	\$10,463	\$225,452	1.16
Percentage of user taxes	-----	31.8	61.7	1.9	63.6	4.0	0.6	4.6	100.0	-----
MORE THAN 1,000,000										
Baltimore, Md.	5,966	\$24,796	\$48,698	\$5,558	\$54,256	\$4,602	\$351	\$4,953	\$84,005	1.35
Buffalo, N.Y.	3,417	13,638	31,416	4,637	36,053	781	-----	781	50,472	.89
Chicago, Ill.	19,210	76,656	135,788	18,426	154,214	39,080	2,208	41,288	272,158	.81
Houston, Tex.	4,265	17,958	36,935	-----	36,935	687	-----	687	55,580	.77
Los Angeles, Calif.	27,808	117,625	264,876	-----	264,876	3,686	281	3,967	386,468	1.71
Minneapolis-St. Paul, Minn.	5,500	22,557	42,210	-----	42,210	1,072	-----	1,072	65,839	.75
Philadelphia, Pa.	12,314	48,908	90,797	28,034	118,831	1,999	1,566	3,565	171,304	1.46
Total	78,480	\$322,138	\$650,720	\$56,655	707,375	\$51,907	\$4,406	\$56,313	\$1,085,826	1.13
Percentage of user taxes	-----	29.7	59.9	5.2	65.1	4.8	0.4	5.2	100.0	-----
TOTAL, ALL SMSA'S	121,717	\$499,202	\$1,000,756	\$71,659	\$1,072,415	\$72,044	\$6,040	\$78,084	\$1,649,701	1.11
Percentage of user taxes	-----	30.2	60.7	4.3	65.0	4.4	0.4	4.8	100.0	-----

<sup>1</sup> Includes earnings from State motor-fuel taxes at estimated consumption rates per mile of travel, and registration, operator license, and other fees that were either recorded or computed on basis of vehicle ownership in that SMSA. Local highway-user imposts include proceeds from motor fuel, bus and wheel taxes, automobile and truck licenses, and other fees levied on highway users within those jurisdictions.

<sup>2</sup> Includes taxes on motor fuel, truck, bus, and trailer excise, tires, tubes, and tread rubber, and vehicle-use taxes. Does not include automobile excise, parts and accessories, and lubricating oil taxes that are general fund revenues.

<sup>3</sup> Includes parking fees.

<sup>4</sup> Excludes Osage County.



**allied street functions**

As stated previously, charges for State administration, collection, and police and safety have not been included with the expenditures shown in table 9. However, expenditures for direct municipal street functions, usually termed *allied street functions*, have been included in the amounts shown for maintenance and administration. These allied street functions consist of construction, maintenance, and administration for street lighting, street cleaning, sidewalks, storm drainage, and maintenance and operation of parking meters and lots. Because division of the expenditures for construction or maintenance was not always reported, the entire expenditure for allied street function has been included in the amounts shown in table 9 for maintenance and administration.

Except for parking facilities, the expenditures for allied street functions provide the most benefits to abutting property and in the form of protection of public health, safety, and security. For example, storm sewers drain adjacent property as well as the streets, and street lighting provides safety and security to pedestrians and occupants of nearby buildings. Inclusion of such expenditures in the statistical data presented here may therefore be regarded as an offset against the omission of the allocated expenditures for State highway administration, user-tax revenue collection, and State highway police.

Funds for allied street functions are derived mainly from property taxes and assessments and from local general revenue funds. Road-user revenues, State and local, are used to some extent when outlays for these purposes are incidental to highway construction or maintenance operations. The amounts shown in table 8 include the income from these different sources for the indirect municipal street functions, and the expenditures amounting to \$134 million are included with the amounts shown in table 9. A summary of the nationwide expenditures for allied street functions in 1960 and the corresponding expenditures in the 46 SMSA's are shown in table 10.

**Road-user earnings**

The motor-vehicle user tax and toll earnings of each SMSA are listed in table 11, and figure 4 shows the proportion of the total earnings, by Federal, State, and local sources. The proportions of earnings from Federal, State, and local levies are given in percentages. State motor-fuel taxes and motor-vehicle registration and other fees were 60.7 percent of total earnings, double those realized from Federal excise group. Local levies on road users amounted to 4.4 percent of the total and are equal to the earnings of the State level toll facilities. Tolls from all facilities, State and local, were \$79 million, or 1.1 percent.

The total road-user tax earnings of \$1,650 million divided by the number of vehicle-miles equals a payment of 1.36 cents per vehicle-mile of travel; of this amount, 0.41 cent was from Federal Trust Fund excise taxes and 0.88 cent from State taxes and tolls. Local user

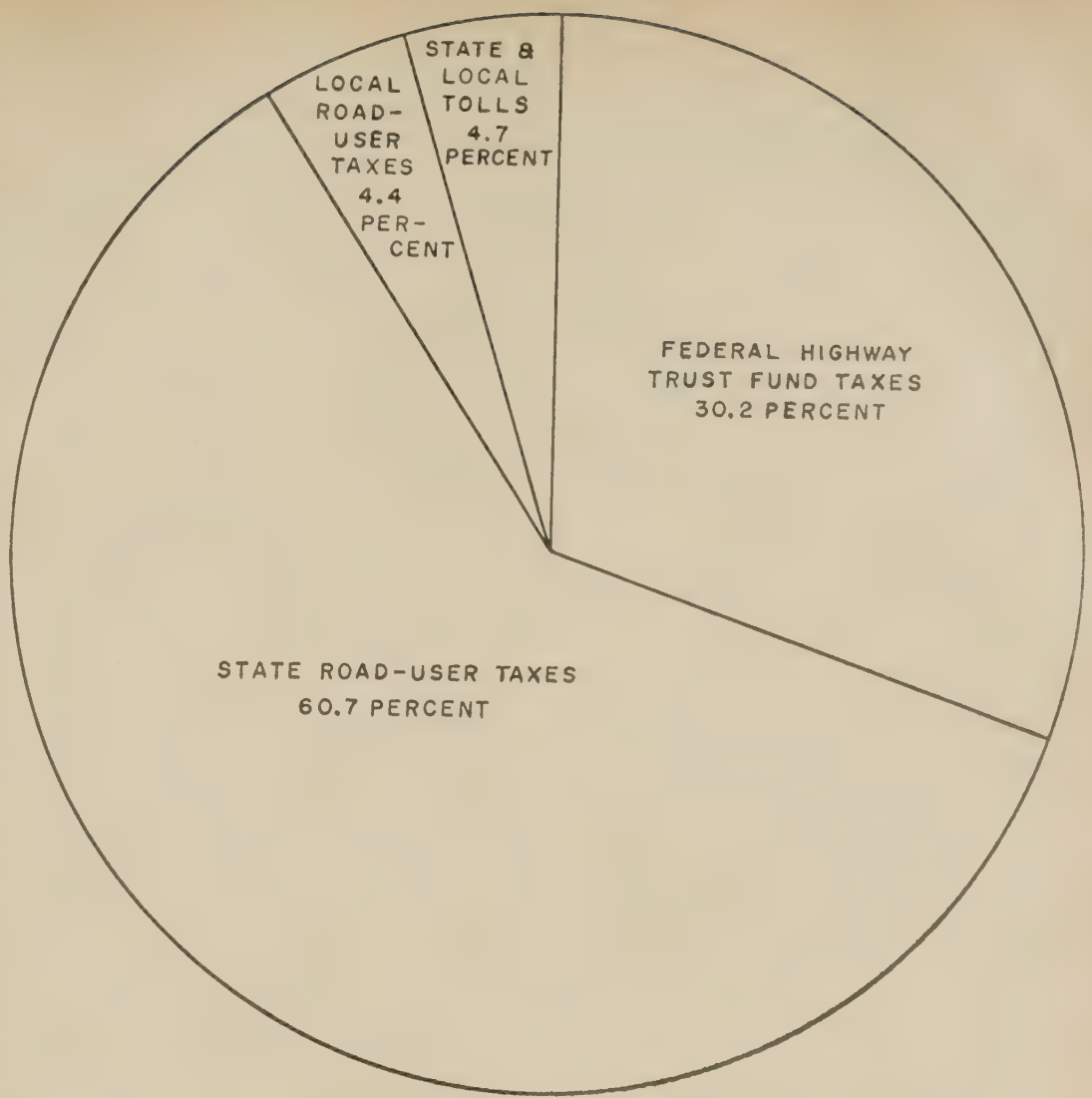


Figure 4.—Estimated earnings for highways, 46 SMSA's, 1960.

levies amounted to an average per vehicle-mile earnings of slightly less than 0.07 cent.

By comparison, the total 1960 U.S. road-user taxes (10) amounted to \$8,211 million, and the corresponding total travel (2, p. 80) was 718,845 million vehicle-miles. These two items equal an average earning rate of 1.14 cents per vehicle-mile of travel. The computed earning rate of 1.36 cents per vehicle-mile of travel for the SMSA's was 19 percent more than the national average. The differences in the motor-fuel consumption rate estimated for the SMSA's accounted for 14 of the 19 percent earning rate (table 4). The remainder of the difference is accounted for by the fact that the annual travel in the SMSA per vehicle registered therein (a synthetic figure because much of the travel is contributed by vehicles from outside the Area) runs low—8,497 miles per year, in comparison with the national per vehicle average, which was 9,652 in 1960. When the annual mileage is low the effect of registration and other flat fees causes the payment per vehicle-mile to be high.

The last column of table 11 shows the ratio of motor-vehicle user tax earnings to total current highway expenditures in 1960 as shown in table 9. In 26 of the 46 SMSA's, earnings of user taxes were more than the total current expenditures for highways. The ratios

for the several population groups differ, generally upward as population increases, but there is no similar consistency in the number of places that have ratios of earnings to expenditures of more or less than 1.00, as shown in table 12.

**Statistical Summary**

The information in tables 8, 9, and 11 is summarized in table 13, from which a comparison of road and street income, expenditures, and road-user earnings of each SMSA population group can be made. In the 46

Table 12.—Ratio of earnings to expenditures, by population groups

Population group	Ratio of earnings to expenditures	
	SMSA's ratios larger than 1.0	Group ratio
	<i>Number</i>	<i>Percent</i>
Less than 250,000.....	12 out of 21	0.91
250,000-500,000.....	7 out of 11	1.04
500,000-1,000,000.....	4 out of 7	1.16
More than 1,000,000.....	3 out of 7	1.13
All SMSA's.....	26 out of 46	1.11



Table 13.—Highway income, expenditures, and earnings of motor-vehicle-user taxes, 46 SMSA's 1960

for only 1 year, but the average for 46 SMSA's may be taken as reasonably indicative of current trend.

1960 and 1961 data

Because 1960 was the first year for which the complete highway finance data for SMSA's were compiled, it was possible to survey income and expenditures for only that 1 year. Since this analysis was undertaken, however, 1961 data for the 46 SMSA's have become available in sufficient detail to permit a comparison of the State highway department expenditures, excluding those for toll facilities, with 1960 expenditures and to examine any major fluctuations between the 2 years.

State highway department expenditures may increase or decrease from year to year in an SMSA, as shown in table 14. In table 14 the 1960 and 1961 State highway department expenditures for capital improvements on State and local highways are presented, the increase or decrease is shown in column 3. The 1960 amount of \$1,491 million is a part of the \$686 million capital outlay on State highways (tables 9 and 10) but excludes local expenditures on State administered highways and State toll facilities.

Column 4 of table 14 duplicates the total road and street expenditures of \$1,491 million given in table 9, then adjusts these amounts for each SMSA by substituting the 1961 State capital outlay for that of 1960. The adjusted expenditure is then compared with the 1960 road-user earnings of table 11, and in column 7 of table 14 there is given a new ratio of earnings to expenditures on this basis.

The result of this exercise demonstrates that there is a rather stable relationship between earnings and expenditures for the successive years. In the last two columns of the table the ratios of the 1960 data and the ratios based on the modified 1961 expenditures are presented.

Data for individual SMSA's

The ratio of motor-vehicle user earnings to expenditures for the SMSA's varied considerably: The lowest ratio was 0.34 in the Fargo, N. Dak., SMSA; the highest was 2.95 in the Charleston, W. Va., SMSA. Attempts to rationalize the differences from the standpoint of population, travel, amount of area, or population density failed to provide a complete answer. Some effect, of course, was the result of the earnings per vehicle-mile of travel that in the Areas cited previously showed the Fargo, N. Dak., SMSA earning 1.283 cents per mile and the Charleston, W. Va., SMSA, 1.534 cents. These differences can be mainly ascribed to a 5-cent-per-gallon gasoline tax rate in North Dakota—the rate changed from 5 to 6 cents in 1960—compared with a 7-cent-per-gallon gasoline tax in West Virginia. A comparison of capital expenditures in 1960 and 1961 listed in table 14, shows that in the Fargo SMSA, State expenditures for capital outlay on State and local highways amounted to \$11.8 million in 1960 and \$5.4 million in 1961, whereas in the Charleston SMSA \$0.7 million was expended in 1960 and \$3.7 million in 1961.

	Standard Metropolitan Statistical Area population group—									
	Less than 250,000		250,000 to 500,000		500,000 to 1,000,000		1,000,000 and more		Totals, 46 SMSA's	
INCOME										
Imposts on highway users:										
State and Federal taxes.....	Thou-	Per-	Thou-	Per-	Thou-	Per-	Thou-	Per-	Thou-	Per-
Local.....	sands	cent	sands	cent	sands	cent	sands	cent	sands	cent
Tolls.....	\$110,676	72.78	\$110,851	65.54	\$119,867	63.09	\$552,789	60.72	\$894,183	62.90
Total.....	4,705	3.10	6,471	3.83	9,026	4.75	51,907	5.70	72,109	5.07
	652	0.43	10,262	6.07	5,724	3.01	61,061	6.71	77,699	5.47
	116,033	76.31	127,584	75.44	134,617	70.85	665,757	73.13	1,043,991	73.44
Other revenue income:										
Property taxes and assessments.....	17,970	11.82	24,738	14.63	21,769	11.46	88,627	9.73	153,104	10.77
General fund appropriations.....	15,297	10.06	12,269	7.25	24,085	12.68	122,149	13.42	173,800	12.22
Miscellaneous taxes and fees.....	2,756	1.81	4,539	2.68	9,523	5.01	33,878	3.72	50,696	3.57
Total.....	36,023	23.69	41,546	24.56	55,377	29.15	244,654	26.87	377,600	26.56
TOTAL REVENUE INCOME.....	152,056	100.00	169,130	100.00	189,994	100.00	910,411	100.00	1,421,591	100.00
Investment income and borrowing.....	11,552	-----	24,889	-----	29,678	-----	156,727	-----	222,846	-----
TOTAL INCOME.....	\$163,608	-----	\$194,019	-----	\$219,672	-----	\$1,067,138	-----	\$1,644,437	-----
EXPENDITURES										
Capital outlay:										
On State highways.....	\$82,000	53.42	\$97,375	52.18	\$90,231	46.50	\$416,815	43.57	\$686,421	46.04
On local roads and streets.....	24,601	16.03	26,875	14.40	36,428	18.77	161,081	16.83	248,985	16.70
Total.....	106,601	69.45	124,250	66.58	126,659	65.27	577,896	60.40	935,406	62.74
Maintenance, administration, operation, etc.....	44,627	29.08	51,491	27.60	59,031	30.42	320,543	33.51	475,692	31.91
Interest on debt.....	2,263	1.47	10,866	5.82	8,372	4.31	58,279	6.09	79,780	5.35
Total.....	46,890	30.55	62,357	33.42	67,403	34.73	378,822	39.60	555,472	37.26
Total expenditures.....	153,491	100.00	186,607	100.00	194,062	100.00	956,718	100.00	1,490,878	100.00
Debt retirement.....	8,120	-----	24,925	-----	19,605	-----	88,514	-----	141,164	-----
TOTAL DISBURSEMENTS.....	\$161,611	-----	\$211,532	-----	\$213,667	-----	\$1,045,232	-----	\$1,632,042	-----
EARNINGS FROM MOTOR-VEHICLE-USER TAXES										
Federal Trust Fund.....	\$47,606	33.08	\$57,820	29.73	\$71,638	31.73	\$322,138	29.67	\$499,202	30.26
State motor-vehicle-user taxes.....	91,029	63.25	119,943	61.67	139,064	61.68	650,720	59.93	1,000,756	60.66
Local motor-vehicle-user taxes.....	4,640	3.22	6,471	3.33	9,026	4.00	51,907	4.78	72,044	4.37
Tolls.....	652	0.45	10,262	5.27	5,724	2.54	61,061	5.62	77,699	4.71
TOTAL EARNINGS.....	\$143,927	100.00	\$194,496	100.00	\$225,452	100.00	\$1,085,826	100.00	\$1,649,701	100.00

SMSA's studied, road-user income sources provided 73.4 percent of the revenue income, property taxes and assessments and other sources, 26.6 percent. Although the earnings by the travel in these SMSA's amounted to \$1,650 million, the amount of road-user taxes, fees, and tolls applied to these SMSA's was only \$1,044 million, or 63.2 percent of the amount earned. Earnings of \$1.6 billion from the travel in these SMSA's are of the same order of magnitude as: the total receipts for highways, which include \$378 million from nonuser sources and \$223 million of borrowing; and the total expenditures, which include more than \$141 million of debt retirement.

It is not known, of course, whether the totals of all metropolitan areas of the country, if arrayed in this manner, would compare in the same fashion, but it is reasonable to speculate that they might.

A year's expenditures in an SMSA may substantially exceed earnings when highway construction is at a high level (such as in 1960) and a large part of a State's construction program is within the area of the SMSA. This same concentration of construction probably will not continue indefinitely in any one SMSA, and the expenditure-earning relationship would improve. The relationship between expenditures and earnings cited here is valid



More striking, perhaps, is the situation in the SMSA's of Chicago and Los Angeles. In the former, capital expenditures were \$121 million in 1960 and \$61 million in 1961—a reduction in expenditures that, if applied to the 1960 earnings, was sufficient to bring the earnings-expenditure ratio to nearly 1.0. In Los Angeles, capital outlays were \$99 million in 1960 and \$183 million in 1961. The adjusted expenditures compared with 1960 user earnings retained a ratio of more than 1.0. The largest extremes between the earnings and expenditures shown in table 11 are in the group having a population of less than 250,000. Two Areas in this group had a ratio of less than 0.50, and five of less than 0.70; whereas only the Area, Albuquerque, in the population group of more than 250,000 had an earnings-expenditure ratio of less than 0.70. At the other extreme, 8 SMSA's out of 21 in the group having a population of less than 250,000 each had an earnings-expenditure ratio of more than 1.50—38 percent of the group—compared with only 6 SMSA's out of 21 in all of the remaining population groups that had a ratio of more than 1.50.

The more constant relationship in the SMSA's having 250,000 or more population may signify that, at least for 1960—and to the extent that comparisons of the substituted 1961 State highway department expenditures are an indication—there is more stability between the user earnings and expenditures in the larger metropolitan areas even during a period of a high level of highway construction.

## REFERENCES

- (1) *United States Census of Housing: 1960*, table 16, series HC(1), by Bureau of the Census, U.S. Department of Commerce.
- (2) *Highway Statistics 1960*, by Bureau of Public Roads, U.S. Department of Commerce.
- (3) *Supplementary Report of the Highway Cost Allocation Study*, H. Doc. 124, 89th Cong., 1st sess., 1965.
- (4) *Improved Transportation for Southwestern Pennsylvania*, Bureau of Municipal Research, and Pennsylvania Economy League, Philadelphia, Pa., May 1960 (Processed).
- (5) *The Application of Benefit-Cost Ratios to the Expressway System*, by Howard W. Bevis, Proceedings, Highway Research Board, 1956, vol. 35, pp. 63-75.
- (6) *Increasing the Traffic-Carrying Capacity of Urban Arterial Streets: The Wisconsin Avenue Study*, by Arthur A. Carter, Jr., Bureau of Public Roads, U.S. Department of Commerce, May 1962; and *Appendixes to the Original Wisconsin Avenue Study*.
- (7) *Time and Fuel Consumption for Highway Inter Benefit Studies*, by Paul J. Claffey, HRB Bulletin 276, Motor Vehicle Time and Fuel Consumption, 1960, pp. 20-34.
- (8) *Fuel and Time Consumption Rates for*

**Table 14.—Expenditures for capital outlay by State highway departments, 16 SMSA's, 1960 and 1961, and 1960 motor-vehicle road-user earnings<sup>1</sup>**

SMSA's by population group	Capital outlay by State highway departments on State and locally administered highways		1961 increase or decrease	Expenditures		1960 road-user earnings	Ratio of user earnings to—	
	1960	1961		Total 1960 (table 9)	Adjusted by substituting 1961 for 1960 State capital outlay		Adjusted expenditures (Expenditures=1.0)	1960 (table 11)
LESS THAN 250,000								
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>		
Atlantic City, N.J.-----	\$1,055	\$2,363	+\$1,308	\$6,459	\$7,767	\$12,445	1.60	1.93
Bay City, Mich.-----	3,913	2,375	-1,538	6,286	4,748	5,105	1.08	.81
Cedar Rapids, Iowa-----	1,617	2,377	+760	5,684	6,444	7,323	1.14	1.29
Charleston, S.C.-----	3,170	6,209	+3,039	4,687	7,726	8,435	1.09	1.80
Eugene, Oreg.-----	8,102	3,767	-4,335	13,885	9,550	9,329	.98	.67
Fargo, N. Dak.-----	11,769	5,389	-6,380	17,008	10,628	5,797	.55	.34
Fitchburg-Leominster, Mass.-----	106	274	+168	1,652	1,820	4,790	2.63	2.90
Fort Wayne, Ind.-----	2,157	2,181	+24	5,537	5,561	7,566	1.36	1.37
Great Falls, Mont.-----	2,904	1,815	-1,089	4,871	3,782	3,359	.89	.69
Jackson, Miss.-----	2,765	2,730	-35	7,196	7,161	7,775	1.09	1.08
Las Vegas, Nev.-----	3,044	2,850	-194	5,939	5,745	5,577	.97	.94
Lewiston-Auburn, Maine-----	110	27	-83	1,218	1,135	2,678	2.36	2.20
Lexington, Ky.-----	1,557	3,649	+2,092	2,703	4,795	5,579	1.16	2.06
Little Rock-North Little Rock, Ark.-----	17,536	13,352	-4,184	22,171	17,987	11,394	.63	.51
Lynchburg, Va.-----	1,411	1,173	-238	3,364	3,126	5,317	1.70	1.58
Macon, Ga.-----	1,627	1,482	-145	2,978	2,833	5,168	1.82	1.74
Madison, Wis.-----	6,748	15,300	+8,552	15,569	24,121	11,712	.49	.75
Sioux Falls, S. Dak.-----	7,440	10,111	+2,671	10,008	12,679	4,620	.36	.46
South Bend, Ind.-----	169	295	+126	3,907	4,033	7,341	1.82	1.86
Springfield, Mo.-----	3,552	7,431	+3,879	5,612	9,491	6,237	.66	1.11
Waterbury, Conn.-----	833	4,786	+3,953	6,757	10,710	6,380	.60	.81
Total-----	\$81,585	\$89,936	+\$8,351	\$153,491	\$161,842	\$143,927	.89	.94
250,000 TO 500,000								
Albuquerque, N. Mex.-----	\$10,076	\$8,216	-\$1,860	\$16,752	\$14,892	\$11,269	0.76	0.67
Charleston, W. Va.-----	655	3,708	+3,053	4,234	7,287	12,495	1.71	2.95
Charlotte, N.C.-----	1,832	1,330	-502	5,581	5,079	9,347	1.84	1.67
Jacksonville, Fla.-----	11,769	5,761	-6,008	38,310	32,302	26,777	.83	.70
Nashville, Tenn.-----	16,258	11,558	-4,700	21,641	16,941	16,937	1.00	.78
Omaha, Nebr.-----	11,697	12,189	+492	24,721	25,213	24,757	.98	1.00
Salt Lake City, Utah-----	8,270	13,898	+5,628	13,045	18,673	14,094	.75	1.08
Tacoma, Wash.-----	6,994	9,531	+2,537	13,383	15,920	17,122	1.08	1.28
Tulsa, Okla.-----	3,771	5,630	+1,859	14,269	16,128	23,770	1.47	1.67
Wichita, Kans.-----	6,914	7,032	+118	17,899	18,017	15,137	.84	.85
Wilmington, Del.-----	7,820	6,690	-1,130	16,772	15,642	22,791	1.46	1.36
Total-----	\$86,056	\$85,543	-\$513	\$186,607	\$186,094	\$194,496	1.05	1.04
500,000 TO 1,000,000								
Birmingham, Ala.-----	\$5,314	\$3,964	-\$1,350	\$14,421	\$13,071	\$25,084	1.92	1.74
Columbus, Ohio-----	18,244	14,347	-3,897	28,979	25,082	34,045	1.36	1.17
Denver, Colo.-----	11,089	11,335	+246	25,018	25,264	41,936	1.66	1.68
Honolulu, Hawaii-----	7,461	8,015	+554	19,071	19,625	17,815	.91	.93
New Orleans, La.-----	8,099	7,037	-1,062	37,335	36,273	30,730	.85	.82
Phoenix, Ariz.-----	2,940	10,757	+7,817	27,440	35,257	34,587	.98	1.26
Providence, R.I.-----	24,051	23,175	-876	41,798	40,922	41,255	1.01	.99
Total-----	\$77,198	\$78,630	+\$1,432	\$194,062	\$195,494	\$225,452	1.15	1.16
MORE THAN 1,000,000								
Baltimore, Md.-----	\$26,034	\$37,928	+\$11,894	\$62,209	\$74,103	\$84,005	1.15	1.35
Buffalo, N.Y.-----	17,243	14,390	-2,853	56,468	53,615	50,472	.94	.89
Chicago, Ill.-----	120,734	60,705	-60,029	334,301	274,272	272,158	.99	.81
Houston, Tex.-----	35,142	44,338	+9,196	71,941	81,137	55,580	.69	.77
Los Angeles, Calif.-----	99,147	182,551	+83,404	226,185	309,589	386,468	1.25	1.71
Minneapolis-St. Paul, Minn.-----	42,470	49,586	+7,116	88,109	95,225	65,839	.69	.75
Philadelphia, Pa.-----	41,921	29,203	-12,718	117,505	104,787	171,304	1.63	1.46
Total-----	\$382,691	\$418,701	+\$36,010	\$956,718	\$992,728	\$1,085,826	1.09	1.13
TOTAL, All SMSA's-----	\$627,530	\$672,810	+\$45,280	\$1,490,878	\$1,536,158	\$1,649,701	1.07	1.11

<sup>1</sup> Although local agencies undertake costly facilities also, the impact of interstate construction under State jurisdiction is most certain to affect large and small population areas.

*Trucks in Freight Service*, by Malcolm F. Kent, HRB Bulletin 276, Motor Vehicle Time and Fuel Consumption, 1960, pp. 1-19.

(9) *Motor Transport Fuel Consumption Rates and Travel Time*, by Roy B. Sawhill and Joseph C. Firey, HRB Bulletin 276, Motor

Vehicle Time and Fuel Consumption, 1960, pp. 35-68.

(10) *Total Receipts for Highways, All Units of Government, 1960-63*, table HF-1, December 1962, news release, Bureau of Public Roads, Department of Commerce, Jan. 13, 1963.



# Motor Vehicle Size and Weight Limits

A comparison of State legal limits of motor-vehicle sizes and weights with standards recommended by the American Association of State Highway Officials is given in the table on pages 192-193. The statutory limits reported in this tabulation, prepared by the Bureau of Public Roads as of December 31, 1964, have been reviewed for accuracy by the appropriate State officials.

Statutory limits are shown for width, height, and length of vehicles; number of towed units; maximum axle loads for single and tandem axles; maximum gross weights for single-unit trucks, truck-tractor semi-trailer combinations, and other combinations; and certain performance standards.

## New Publications

### *Supplementary Report of the Highway Cost Allocation Study*

The *Supplementary Report of The Highway Cost Allocation Study*, prepared by the Bureau

of Public Roads and transmitted to the Congress on March 24, 1965, by the Secretary of Commerce, John T. Connor, has been published as House Document 124, 89th Congress, 1st session. This report may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402, for \$1.00. *The Highway Cost Allocation Study*, Parts I-V (H. Doc. 54, 87th Cong., 1st sess., 1961) also may be purchased from the Superintendent of Documents; the price is 70 cents.

The supplement, as does the basic report, contains information from a study conducted by the Bureau of Public Roads in response to a Congressional directive to provide information for "an equitable distribution of the tax burden among the various classes of persons using the Federal-aid highways or otherwise deriving benefits from such highways." The supplementary report makes use of the final results of the AASHO Road Test, carried out at Ottawa, Ill., under the sponsorship of the American Association of State Highway Officials.

Congress directed that the Federal-aid highway program be studied on the basis of both the costs incurred to serve the different groups of highway users and the benefits

they receive from the use of the Federal-aid system. Accordingly, *incremental cost* and *differential benefit* methods of determining cost responsibility were used in the study.

*Incremental cost* is the traditional method used for determining highway-user charge. Under this method, each element of highway design affected by the size or weight of the vehicles in the traffic stream is broken down into a series of additions, or increments, and the cost of providing each of these additions is charged only to those vehicles whose size and weight require them. In this way, all vehicles will share in the cost of the first basic increment, but for each succeeding and heavier increment only the vehicles that require the additional design feature will be required to contribute to its cost.

*Differential benefit* is the method used for assigning cost responsibility to the different groups of users in direct proportion to the vehicular benefits that they receive through their use of the highways. The four kinds of vehicular benefits measured were: (1) reductions in operating costs, (2) reductions in time costs, (3) reductions in accident costs, and (4) reductions in the strains and discomforts of driving. The latter, known as impedance costs, were calculated for passenger-car users only.



# PUBLICATIONS of the Bureau of Public Roads

A list of the more important articles in PUBLIC ROADS and title sheets for volumes 24-32 are available upon request addressed to Bureau of Public Roads, Washington, D.C., 20235.

The following publications are sold by the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402. Orders should be sent direct to the Superintendent of Documents. Prepayment is required.

## ANNUAL REPORTS

Annual Reports of the Bureau of Public Roads:  
1960, 35 cents. 1963, 35 cents. 1964, 35 cents. (Other years are now out of print.)

## REPORTS TO CONGRESS

Federal Role in Highway Safety, House Document No. 93 (1959). 50 cents.  
Highway Cost Allocation Study:  
Final Report, Parts I-V, House Document No. 54 (1961). 70 cents.  
Supplementary Report, House Document No. 124 (1965). \$1.00.  
Maximum Desirable Dimensions and Weights of Vehicles Operated on the Federal-Aid Systems, House Document No. 354 (1964). 45 cents.  
The 1965 Interstate System Cost Estimate, House Document No. 2 (1965). 20 cents.

## PUBLICATIONS

Quarter Century of Financing Municipal Highways, 1937-61. \$1.00.  
Accidents on Main Rural Highways—Related to Speed, Driver, and Vehicle (1964). 35 cents.  
Aggregate Gradation for Highways: Simplification, Standardization, and Uniform Application, and A New Graphical Evaluation Chart (1962). 25 cents.  
America's Lifelines—Federal Aid for Highways (1962). 15 cents.  
Calibrating and Testing a Gravity Model With a Small Computer (1964). \$2.50.  
Classification of Motor Vehicles, 1956-57 (1960). 75 cents.  
Design Charts for Open-Channel Flow (1961). 70 cents.  
Design of Roadside Drainage Channels (1965). 40 cents.  
Federal Laws, Regulations, and Other Material Relating to Highways (1960). \$1.00.  
Financing of Highways by Counties and Local Rural Governments: 1942-51 (1955). 75 cents.  
Highway Bond Financing . . . An Analysis, 1950-1962. 35 cents.  
Highway Finance 1921-1962 (a statistical review by the Office of Planning, Highway Statistics Division) (1964). 15 cents.  
Highway Planning Map Manual (1963). \$1.00.  
Highway Planning Technical Reports—Creating, Organizing, and Reporting Highway Needs Studies (1964). 15 cents.

## PUBLICATIONS—Continued

Highway Research and Development Studies Using Federal-Aid Research and Planning Funds (1964). \$1.00.  
Highway Statistics (published annually since 1945):  
1956, \$1.00. 1957, \$1.25. 1958, \$1.00. 1959, \$1.00. 1960, \$1.25. 1961, \$1.00. 1962, \$1.00. 1963, \$1.00.  
Highway Statistics, Summary to 1955. \$1.00.  
Highway Transportation Criteria in Zoning Law and Police Power and Planning Controls for Arterial Streets (1960). 35 cents.  
Highways and Economic and Social Changes (1964). \$1.25.  
Hydraulics of Bridge Waterways (1960). 40 cents.  
Increasing the Traffic-Carrying Capability of Urban Arterial Streets: The Wisconsin Avenue Study (1962). 40 cents. Appendix, 70 cents.  
Interstate System Route Log and Finder List (1963). 10 cents.  
Labor Compliance Manual for Direct Federal and Federal-Aid Construction, 2d ed. (1965). \$1.75.  
Landslide Investigations (1961). 30 cents.  
Manual for Highway Severance Damage Studies (1961). \$1.00.  
Manual on Uniform Traffic Control Devices for Streets and Highways (1961). \$2.00.  
Part V—Traffic Controls for Highway Construction and Maintenance Operations (1963). 25 cents.  
Opportunities for Young Engineers in the Bureau of Public Roads (1964). 15 cents.  
Peak Rates of Runoff From Small Watersheds (1961). 30 cents.  
Reinforced Concrete Pipe Culverts—Criteria for Structural Design and Installation (1963). 30 cents.  
Road-User and Property Taxes on Selected Motor Vehicles, 1964. 45 cents.  
Selected Bibliography on Highway Finance (1951). 60 cents.  
Specifications for Aerial Surveys and Mapping by Photogrammetric Methods for Highways (1958): a reference guide outline. 75 cents.  
Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-61 (1962-1964). \$2.25.  
Standard Plans for Highway Bridges (1962):  
Vol. I—Concrete Superstructures. \$1.00.  
Vol. II—Structural Steel Superstructures. \$1.00.  
Vol. III—Timber Bridges. \$1.00.  
Vol. IV—Typical Continuous Bridges. \$1.00.  
Vol. V—Typical Pedestrian Bridges. \$1.00.  
The Identification of Rock Types (revised edition, 1960). 20 cents.  
The Role of Aerial Surveys in Highway Engineering (1960). 40 cents.  
Traffic Assignment Manual (1964). \$1.50.  
Traffic Safety Services, Directory of National Organizations (1963). 15 cents.  
Transition Curves for Highways (1940). \$1.75.



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
DIVISION OF PUBLIC DOCUMENTS  
WASHINGTON, D.C. 20402

POSTAGE AND FEES PAID  
U.S. GOVERNMENT PRINTING OFFICE

OFFICIAL BUSINESS

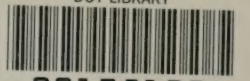
If you do not desire to continue to receive this publication, please CHECK HERE ; tear off this label and return it to the above address. Your name will then be removed promptly from the appropriate mailing list.







DOT LIBRARY



00195133