HIGHWAY RESEARCH BOARD

Bulletin No. 12

Highway Finance

FIVE PAPERS

PRESENTED AT THE
TWENTY-SEVENTH ANNUAL MEETING

1948

HIGHWAY RESEARCH BOARD

1948

OFFICERS

Chairman ..... F. V. Reagel
Vice-Chairman ..... R. A. Moyer
Director ..... R. W. Crum
Associate Director ..... Fred Burggraf

EXECUTIVE COMMITTEE

Thomas H. MacDonald	Commissioner, Public Roads Administration
Frederick M. Feiker	Chairman, Division of Engineering and Industrial Research, National Research Council
Hal H. Hale	Executive Secretary, American Association of State Highway Officials
R. H. Baldock	State Highway Engineer, Oregon State Highway Commission, Salem, Oregon
Pyke Johnson	President, Automotive Safety Foundation, 700 Hill Building, Washington, D. C.
Burton W. Marsh	Director, Safety and Traffic Engineering Department, American Automobile Association, Mills Building, Washington, D. C.
Roger L. Morrison	Professor of Highway Engineering and Highway Transport, Department of Civil Engineering, University of Michigan, Ann Arbor, Michigan
R. A. Moyer	Research Associate Professor of Highway Engineering, Iowa State College, Ames, Iowa
F. V. Reagel	Engineer of Materials, Missouri State Highway Department, Jefferson City, Missouri
Charles M. Upham	Engineer-Director, American Road Builders' Association, 1319 F Street, N. W., Washington, D.C.
Stanton Walker	Director of Engineering, National Sand and Gravel Association, Munsey Building, Washington, D.C.

EDITORIAL STAFF

R. W. Crum — Fred Burggraf — W. N. Carey, Jr.

PUBLICATION OFFICES

2101 Constitution Avenue — Washington 25, D. C.

HIGHWAY RESEARCH BOARD

Bulletin No. 12

HIGHWAY FINANCE

FIVE PAPERS
PRESENTED AT THE TWENTY-SEVENTH ANNUAL MEETING

1947

HIGHWAY RESEARCH BOARD
DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH
NATIONAL RESEARCH COUNCIL

Washington 25, D. C. August 1948

DEPARTMENT OF ECONOMICS, FINANCE, AND ADMINISTRATION

H. S. Fairbank, *Chairman*
Deputy Commissioner, Department of Research
Public Roads Administration

COMMITTEE ON HIGHWAY FINANCE

Charles L. Dearing, *Chairman*
In Charge of Transportation Research
The Brookings Institution, 722 Jackson Place, N. W.
Washington 6, D. C.

C. D. Curtiss, Deputy Commissioner, Public Roads Administration, Federal Works Building, Washington 25, D. C.

Yule Fisher, Assistant Research Counsel, National Highway Users Conference, National Press Building, Washington 4, D. C.

G. Donald Kennedy, Vice-President, Automotive Safety Foundation, 700 Hill Building, Washington 6, D. C.

B. H. Lindman, American Automobile Association, Mills Building, Washington 6, D. C.

C. M. Nelson, Editor, BETTER ROADS MAGAZINE, 173 West Madison Street, Chicago 2, Illinois

Wilfred Owen, The Brookings Institution, 722 Jackson Place, N. W., Washington 6, D. C.

C. A. Steele, Highway Economist, Public Roads Administration, Federal Works Building, Washington 25, D. C.

TABLE OF CONTENTS

	Page
THE FEDERAL-AID HIGHWAY PROGRAM, C. D. Curtiss	1
SELECTION OF SECONDARY SYSTEM	3
URBAN AREAS	4
FEDERAL-AID URBAN HIGHWAY SYSTEM	4
INTERSTATE SYSTEM	4
FEDERAL-AID FISCAL PROCEDURE	5
Apportionment	5
Programs	5
Plans Approved	5
Contracts Awarded	6
Construction	6
Earned by Work Done	6
Progress Payments	6
Completion and Final Payment	6
CONSTRUCTION PROGRAM	6
SOURCES OF MATCHING FUNDS	10
HIGHWAY FINANCE AND THE CONSUMER, Wilfred Owen	13
THE FUTURE HIGHWAY BILL	13
WHERE THE CONSUMER'S DOLLAR GOES	14
FINANCIAL CAPACITY OF THE CONSUMER	14
CONSUMER PAYS FOR HIGHWAYS	15
WHAT CAN THE CONSUMER AFFORD?	16
USING WHAT WE HAVE	16
ECONOMICS OF GOOD ROADS	17
APPLICATION TO THE HIGHWAY PROBLEM	18
CAN HIGHWAY FINANCIAL SUPPORT BE INCREASED?	19
INFORMATION NEEDED FOR THE FISCAL AND ALLIED PHASES OF LONG-RANGE HIGHWAY PROGRAM PLANNING, C. A. Steele	20
PHASES OF LONG-RANGE PLAN STUDIES	22
PUBLIC ROADS OUTLINES THE BASIS OF THIS INQUIRY	23
DETERMINING SPECIFIC REQUIREMENTS	23
A Method for Determining Data Requirements	24
Historical Studies of Finance and Taxation	31
Financial Requirements of the Physical Program	32
Developing a Fiscal and Tax Program	32
THE ADEQUACY OF AVAILABLE INFORMATION	33
Value of Data from Basic and Continuing Planning-Survey Studies	34
Other Highway Department and Public Roads Sources	36
Other Major Sources of Fiscal Data	36
APPLICATION OF FINANCIAL DATA	39
Preparation of Forecasts	39
Development of Better Systems of Support	39

TABLE OF CONTENTS

	Page
APPENDIX: OUTLINE OF COMPLETE SURVEY REPORT	42
INTRODUCTION	42
HISTORY OF HIGHWAY DEVELOPMENT IN THE STATE	42
CHARACTERISTICS OF ROAD USE	42
FUTURE DEVELOPMENT OF THE STATE AND ITS SUBDIVISIONS	43
CLASSIFICATION OF ROAD SYSTEMS	43
STANDARD OF ROAD IMPROVEMENT	43
STANDARDS OF ROAD OPERATIONAL IMPROVEMENT	43
ELEMENTS OF ROAD COST	43
FUTURE ROAD IMPROVEMENT PROGRAM	44
FINANCE AND TAXATION	44
HIGHWAY ADMINISTRATION	45
HIGHWAY VEHICLE AND TRAFFIC REGULATION	46
CONCLUSIONS	46
HIGHWAY REVENUE AND EXPENDITURE TRENDS, Bertram Lindman	46
CURRENT LONG-RANGE STUDIES OF HIGHWAY MODERNIZATION PROGRAMS, G. Donald Kennedy	57
NEW APPROACH DEVELOPED	58
STATES IN WHICH STUDIES ARE UNDERWAY OR COMPLETE	60
California	60
Pennsylvania	60
Michigan	60
Kentucky	60
Washington	60
Oregon	60
Kansas	61
Nebraska	61
Colorado	61
EARLIER HIGHWAY PLANNING EFFORTS	61
Connecticut	61
Virginia	61
Vermont	61
West Virginia	61
Maryland	61
District of Columbia	61
STATES WHICH PLAN NO ACTION NOW	62
Alabama	62
Oklahoma	62
South Carolina	62
Utah	62
Wyoming	62
Missouri	62
Nevada	62

TABLE OF CONTENTS

	Page
STATES WHICH PLAN NO ACTION NOW (cont.)	
New Mexico	62
North Carolina	62
North Dakota	62
Rhode Island	62
SURVEYS AUTHORIZED BY LEGISLATIVE MANDATE	62
Illinois	62
Iowa	62
Maine	62
Massachusetts	62
Minnesota	62
Mississippi	62
South Dakota	63
Ohio	63
SURVEYS AUTHORIZED BY ADMINISTRATIVE DIRECTIVE	63
Arizona	63
Arkansas	63
Delaware	63
Florida	63
Georgia	63
Idaho	63
Indiana	63
Montana	63
New Hampshire	64
New Jersey	64
New York	64
Tennessee	64
Texas	64
SUMMARY	64

THE FEDERAL-AID HIGHWAY PROGRAM

C. D. CURTISS
Deputy Commissioner
Public Roads Administration

The Federal-Aid Highway Act of 1944 may be considered the third major milestone in Federal highway legislation. The first was the Federal-Aid Road Act of July 11, 1916, which launched the Federal Government on a nation-wide cooperative plan of highway improvement. A vital feature of this first act was that the Federal Government was "-- authorized to cooperate with the States through their respective State highway departments --." Another wise provision was "that all roads constructed under the provisions of this act shall be free from tolls of all kinds."

The second important milestone was the Federal Highway Act of 1921. This act was passed after hearings at which two schools of thought were ably represented. One school advocated construction and maintenance at Federal expense of a limited system of national highways. The other advocated a continuation of the cooperative Federal-aid plan with initiative in the selection of projects resting with the State highway departments. The cooperative plan prevailed and has not since been seriously questioned. A notable feature of this 1921 act was provision for selection by the State highway departments with approval by the Federal Bureau of a Federal-aid highway system, frequently referred to in the ensuing years as the "7 percent system" because of an initial limitation of the mileage to 7 percent of the total highway mileage within each State.

In the years between 1921 and 1944, there were a number of perfecting amendments which strengthened the legislation and facilitated the highway program. One of these changes removed the limitation on the amount of Federal participation per mile which the original act had placed at $10,000. This, with the more recent provision for participation in the cost of surveys and plans and rights-of-way, now permits full financial partnership. Another amendment removed the restriction on the use of Federal-aid funds within municipalities of over 2,500 population. Another - the so-called anti-diversion provision - expressed the policy that all road-user revenues should be used for highway purposes. Still another, recognizing the hazards to life and impediments to highway traffic existing at railway grade crossings, authorized the use of Federal-aid funds to the extent of 100 percent of the construction costs for the elimination or protection of such crossings. By far the most important change, however, was the provision first carried in Section 11 of the Act of June 18, 1934, authorizing the use of 1½ percent of the Federal-aid apportionment to any State for engineering and economic studies for advance planning. The fact-finding studies which were inaugurated under this provision came to be known as "State-wide Highway Planning Surveys." The wisdom of this provision has been amply demonstrated, and the "planning surveys" are continuing to pro-

vide the information so vital and essential to the sound planning of our annual and long-range highway programs.

These "surveys" provided the fundamental information of our highway needs which, when presented to the road committees of the Congress by representatives of all the States in the hearings initiated in the winter of 1943, resulted in the enactment of the Federal-Aid Highway Act of 1944.

This act is the third major milestone in Federal highway legislation. For the first time it provides for cooperation with the States in a completely integrated program of highway improvement involving urban as well as primary and secondary rural highways. Under its provisions, the following activities have been initiated:

1. The selection of a system of principal secondary and feeder roads by the State highway departments in cooperation with local authorities. The proper selection of the secondary system has necessitated a review and some revision of the Federal-aid primary system.

2. The delineation by the State highway departments of urban areas "including and adjacent to a municipality or other urban place of 5,000 or more population" and the selection of an urban highway system on which the urban funds provided by the act are to be expended.

3. The selection of a national system of interstate highways not exceeding 40,000 mi. to connect the principal metropolitan areas, cities, and industrial centers, to serve the national defence and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico.

4. The programming and construction of the three categories of projects by the State highway departments, utilizing funds authorized by the act.

It is the principal purpose of this paper to discuss the progress that has been made in carrying forward these several programs. The Federal-Aid Highway Act of 1944 was approved December 20, 1944. It authorized 1½ billion to be appropriated to become available at the rate of 500 million a year for each of three successive postwar fiscal years. The 500 million authorized for each fiscal year was divided as follows:

$225,000,000 a year for projects on the Federal-aid highway system to be apportioned in accordance with Section 21 of the Federal Highway Act of 1921 as follows:

One-third in the ratio which the area of each State bears to the total area of all States; 1/3 in the ratio which the population of each State bears to the total population of all the States as shown by the latest available Federal Census; 1/3 in the ratio which the mileage of rural delivery routes and star routes in each State bears to the total mileage of rural delivery and star routes in all the States.

$150,000,000 a year for projects on the secondary and feeder road system to be apportioned in the following manner:

One-third in the ratio which the area of each State bears to the total area of all the States; 1/3 in the ratio which the rural population of each State bears to the total rural population of all the States, as shown by the Federal census of 1940; and 1/3 in the ratio which the mileage of rural delivery and star routes in each State bears to the total mileage of rural delivery and star routes in all the States.

$125,000,000 a year for urban highway projects to be apportioned

among the States in the ratio which the population in municipalities and other urban places, of 5,000 or more, in each State bears to the total population in municipalities and other urban places, of 5,000 or more, in all the States as shown by the latest available Federal Census.

The act provided that "the first post-war fiscal year shall be that fiscal year which ends on June 30 following the date proclaimed by the President as the termination of the existing war emergency, or following the date specified in a concurrent resolution of the two Houses of Congress as the date of such termination, or following the date on which the Congress by a concurrent resolution of the two Houses finds as a fact that the war emergency hereinbefore referred to has been relieved to an extent that will justify proceeding with the highway construction program provided for by this Act, whichever is the earliest."

It further provided that the authorization for the first postwar fiscal year should be apportioned among the States within 30 days of the passage of the act. The actual apportionment was made on January 6, 1945. On October 2, 1945, the Congress by a concurrent resolution found that the war emergency had been relieved to an extent which justified proceeding with the postwar highway construction program authorized in the act, and actual construction with postwar funds was thus authorized. The authorization for the second postwar fiscal year was apportioned among the States on May 13, 1946, and the authorization for the third postwar fiscal year was apportioned on May 12, 1947.

SELECTION OF SECONDARY SYSTEM

The regulations covering the selection of the secondary system as provided in Section 3 of the act were developed by the Public Roads Administration in cooperation with the State highway departments. The two principal requirements were, first, that the principal secondary roads selected shall constitute, with the primary roads of the State, an integrated system; and second, that the extent of the system shall be consistent with the anticipated finances available for its improvement. No specific mileage limitation was imposed on the extent of the system. In conformity with the provisions of the act, emphasis has been given to the fact that the system should consist of the principal secondary and feeder roads. This means that the system is being selected to extend out from market areas in order to provide the maximum of farm-to-market service per mile. Cooperation of the State highway departments with local officials as required by the act has been very satisfactory.

In the selection of the secondary system, a number of States have made a review of their Federal-aid highway system with the result that some mileage has been shifted to the secondary system and other more important mileage added to the Federal-aid system. The Federal-aid highway system now comprises 232,297 miles.

On October 1, 1947, secondary system routes totaling 358,993 mi. in the 48 States, the District of Columbia, Hawaii, and Puerto Rico had been approved and an additional 5,675 mi. were under review by the Public Roads Administration preliminary to approval. In selecting a secondary system, most of the States developed over-all formulas covering the geographical distribution of the mileage. Various factors were used in 42 States out of 46 States for which the data have been analyzed. The following factors appear with the indicated frequency: Area (either total or rural), 32;

rural population, 30; vehicle miles of travel on all or part of the rural roads, 24; rural route mileage, 21; vehicle registration, 8; property value, 7; value of farm products, 6; number of farms, 5; other, 4.

URBAN AREAS

The act defined an "urban area" as an area including and adjacent to a municipality or other urban place, of 5,000 or more, the population of such included municipality or other urban place to be determined by the latest available Federal census. It also provided that the boundaries of urban areas would be "fixed by the State highway department of each State subject to the approval of the Public Roads Administration." According to the 1940 Federal census there are 2,070 urban places or municipalities in the United States of more than 5,000 population. As of October 1, 1947, all but 61, or 2,009 of these urban communities, had been included in 1,595 approved urban areas. Each area had to include at least the incorporated area of the municipality but could extend outside the corporate limits to include areas which are urban in character. Satellite communities, such as city suburbs in a metropolitan area, could be included regardless of size. In the Los Angeles urban area 35 places were included, of which 30 are cities of over 5,000 population. Thus, by the establishment of these urban areas, highway planning for the whole community without regard to corporate boundaries and political subdivisions is being facilitated.

FEDERAL-AID URBAN HIGHWAY SYSTEM

Although restriction on the use of Federal-aid funds on extensions of rural Federal-aid routes into or through municipalities was removed in 1934, the 1944 act carried the first authorization of funds for a Federal-aid highway system in urban areas, restricted to that purpose. This urban Federal-aid system will ultimately consist of the important arterial routes in the urban highway and street network. The ultimate system will be determined by study of the Federal-aid, Federal-aid secondary and State highway system extensions within urban areas, and all other routes of primary arterial significance for the service of traffic within such areas. Important arterials whose early and substantial improvement will be of greatest benefit to the urban area are being selected to form an interim system sufficient in extent to permit reasonable latitude in the programming of available Federal funds for a 6- to 8-year period.

INTERSTATE SYSTEM

Section 7 of the act provided for the designation within the continental United States of a "National System of Interstate Highways not exceeding 40 thousand miles in total extent so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers, to serve the national defense, and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico." This provision was the outgrowth of the report of the National Interregional Highway Committee which was transmitted to the Congress by the President on January 12, 1944. In the year following passage of the act, all of the States submitted their selection of routes for inclusion in the National Interstate System. Subsequently, conferences between representatives of the State highway departments and Public Roads Administration were held to adjust differences concerning al-

ternate routes and connections at State boundaries. The system as finally agreed upon was approved August 2, 1947. This system, which includes diagonal as well as north-and-south and east-and-west routes, will make it possible to travel from any section of the country to any other section by a direct route. As approved, the system includes 37,681 mi., including 2,882 mi. of urban highways. A reserve of 2,319 mi. is available for the later designation of additional urban circumferential and distributing routes. While the rural sections of the Interstate System comprise only 1.1 percent of all rural routes, it is estimated that they will carry 20 percent of all rural traffic. The system will serve directly 42 State capitals and 182 of the 199 cities in the country having a population of 50,000 or more.

Design standards for the system, which were approved on August 1, 1945, by the American Association of State Highway Officials, provide for 4-lane divided highways for a traffic volume of 800 motor vehicles in peak hours. In rural areas a right-of-way of 250 ft. is advocated. Traffic lanes 12 ft. wide are recommended for all heavily traveled sections, and, where traffic exceeds 3,000 vehicles in peak hours, elimination of all cross traffic at grade is proposed.

No separate funds for the development of this system are provided. It is part of the Federal-aid system and, as such, both the urban and Federal-aid highway system funds are available for its improvement. As of November 1, 1947, over 2,250 mi. of Interstate System improvements financed from postwar Federal-aid highway funds had been programmed for construction at a total cost of $376,000,000, with Federal funds amounting to $191,000,000.

FEDERAL-AID FISCAL PROCEDURE

The Federal-aid highway program in each State is made up of a number of individual projects in all stages from the initial programming to completion. On October 1, 1947, there were 12,523 active projects in the several stages. Federal funds are paid to the States covering the Federal pro rata for items of work actually accomplished on individual projects. The successive steps in the fiscal relations between the State and the Public Roads Administration are as follows:

Apportionment The funds authorized for any fiscal year are apportioned among the States in accordance with the prescribed formulas, and the amounts apportioned are set up to the credit of each State.

Programs Following an apportionment, the State highway departments submit programs of projects to be constructed with these funds. These programs are reviewed by Public Roads District Engineers and are forwarded with their recommendations, together with the recommendations of the Division Engineers, to the Washington office for approval. The approval of a program by the Commissioner of Public Roads represents a binding commitment to the State and they may proceed to take the successive steps necessary to place each project under construction. At this stage, funds are reserved on the accounting records of the Public Roads Administration to provide the Federal share of the cost of the project.

Plans Approved When detail plans, specifications, and estimates have been prepared by a State for a project in an approved program, they are submitted to the District En-

gineer of Public Roads for review and approval. Concurrently with approval of plans, specifications, and estimates, the States are authorized to proceed with advertising for bids.

Contracts Awarded After bids are received, the State makes a finding for award or rejection which it submits to the District office of the Public Roads Administration for concurrence. The District Engineer concurs in the award of contracts for Federal-aid projects.

Construction Construction work is supervised by the State highway department and inspected at periodic intervals by field engineers of the Public Roads Administration.

Earned by Work Done Current estimates are maintained of dollar value of work that has been accomplished on all projects placed under construction. The Federal share of the cost of work done is a financial liability payable to the State on demand.

Progress Payments Payments to a contractor on monthly estimates are made by the State from State funds. Any State may receive payment of the Federal share of the cost of work actually accomplished by submitting "progress vouchers." These claims are certified by the Federal District Engineers under whose direction the work is inspected, and payments are made promptly.

Completion and Final Payment A project is reported completed when the major elements of construction are done and the road or bridge is open to traffic. To secure final reimbursement the State then submits vouchers to the Public Roads Administration indicating the various construction items and claiming the Federal portion due but not paid on progress vouchers. Final payment is not made until the project has been finally inspected and a determination made by field engineers of Public Roads that it was constructed in accordance with the approved plans, specifications, and estimates, and a detailed audit made of the claim in the offices of the State highway department.

CONSTRUCTION PROGRAM

There was an almost unanimous prediction that following cessation of hostilities there would be a period of slack employment while industrial conversion from war to a peacetime basis was underway. It was expected that needed public works and the large highway program authorized would serve to cushion unemployment during this period. Instead, during the two years following V-J Day, the number of gainfully employed increased to an all-time high approximating 60,000,000. During the war only the most urgent highway construction, certified as essential to the war effort, was undertaken. The normal program of replacement and modernization was abandoned. Highway contractors transferred to war work and many did not promptly re-enter the highway field. While demobilization of the armed forces was rapid, the very size of the undertaking made rebuilding of the State highway organizations a slow process. Inadequate pay discouraged many from returning to their former positions. The situation in the immediate postwar period made for a relatively slow start on highway work so urgently needed for recovery from wartime wear and neglect. As the program began to get underway, prices began to rise. Shortages of all sorts and uncertainty of delivery tended to push prices up. In the first full year after the war (1946) highway bid prices averaged 166 percent of comparable work in 1940 and reached 180 percent in the last

TABLE 1

ACTIVE FEDERAL-AID HIGHWAY PROGRAM
As of October 1, 1947

Project Status	No. of Projects	Total Cost	Federal Funds	Miles	No. of Bridges
		$	$		
Programmed only	5,396	700,000,000	367,000,000	17,706	
Authorized:					
Plans approved, not under contract	1,757	212,000,000	102,000,000	3,825	778
Contracts awarded, not under construction	936	108,000,000	56,000,000	3,100	436
Under construction	4,434	776,000,000	407,000,000	15,068	2,723
Total authorized	7,127	1,096,000,000	565,000,000	21,993	3,937
Total programmed and authorized, not completed	12,523	1,796,000,000	932,000,000	39,699	

quarter. To counteract this spiraling tendency, the State highway departments and Public Roads adopted a very conservative policy. Only the more urgent projects were advanced to construction and then only if analysis showed prices to be reasonable. Much bridge work involving structural steel was deferred since this type of work and structural concrete advanced most in cost.

This conservative policy resulted in the rejection during 1946 of bids for work estimated to cost $141,000,000, which was about 22 percent of all bids taken, and the amount of work actually placed under contract was only about 40 percent of what the program would have been under favorable conditions. During 1947 an attempt was made to hold the price line and highway costs did not advance much beyond the late 1946 level, even though there have been rather general industrial wage increases.

In spite of these obstacles, very substantial progress has been made in advancing the postwar program. During this past construction season there was a larger volume of Federal-aid work under construction than at any previous time in Federal-aid history. During the late summer and early fall months the total cost of construction put in place averaged about $80,000,000 monthly.

The status of all active projects on October 1, 1947, is shown in Table 1.

Data relating to approved railway-highway projects financed from postwar funds and from remaining balances of prewar Federal-aid grade crossing funds are included in Table 1 and shown separately in Table 2.

For the most part the present Federal financing on Federal-aid projects is from postwar funds made available under the 1944 act.

Progress in advancing projects financed from postwar funds has been more rapid for the highway system and secondary funds than for the urban funds. By October 1, 1947, projects utilizing about 67½ percent of the highway system funds and about 65 percent of the secondary funds apportioned for the three postwar fiscal years had been programmed for construction, whereas

TABLE 2

ACTIVE RAILWAY-HIGHWAY PROJECTS APPROVED
As of October 1, 1947

Type of Protection	No. of Crossings	Total Cost	Federal Funds
		$	$
Crossings eliminated by separation	192	42,773,000	31,199,000
Crossings eliminated by relocation of highway	26	3,313,000	2,850,000
Signal devices	350	1,973,000	1,814,000
Separation structures reconstructed	49	9,305,000	8,491,000
Total	617	57,364,000	44,354,000

projects covering only 50 percent of the urban funds had been programmed. On the same date, Federal funds allotted to highway system projects approved for construction amounted to 46 percent of the total apportionment of these funds, allotments of secondary funds totaled about 40 percent of the apportionment, and urban funds allotted totaled only about 24 percent of the apportionment. The slower rate of progress in advancing projects financed with urban funds is attributed to the greater amount of advance planning required in connection with the location and design of such projects, to the difficulties inherent in securing rights-of-way in cities, and in some cases to the necessity for advance arrangements relating to the financing of the work.

Figure 1 shows cumulatively, on a Federal fund basis for postwar Federal-aid highway system, secondary and urban funds combined, the apportionments for the fiscal years 1946, 1947, and 1948, and the progress made in advancing projects to October 1, 1947. On that date projects totaling $904,000,000 in Federal funds have been programmed for construction, and there was an unprogrammed balance of about 546 million available for additional projects. The total cost of programmed projects was $1,793,000,000 for 48,000 mi. of construction.

Postwar projects for which plans were approved on October 1, 1947, amounted to $561,000,000 in Federal funds and $1,126,000,000 in total cost. The indicated time lag between program approval and approval of plans is about 11 mo. Contracts were awarded on projects costing $471,000,000 in Federal funds and $934,000,000 in total cost, and the time lag from plans approved to contracts awarded was about 3 mo. Work is started on projects about 1½ mo. after the contracts are awarded, the cost of projects placed under construction to October 1 amounting to $422,000,000 in Federal funds and $838,000,000 total cost for 24,300 mi. of construction.

The work done to October 1, 1947 on projects financed from postwar funds amounted to $291,000,000 in Federal funds and nearly $580,000,000 total cost. The time lag between placed under way and earned by work done is about 4 mo. The total payments of postwar funds to States amounted to $202,000,000, and the lag between earnings and payments was only about 2-2/3 mo. The time lag from plans approved to paid to States was 13 mo., and the total time from initial programming of

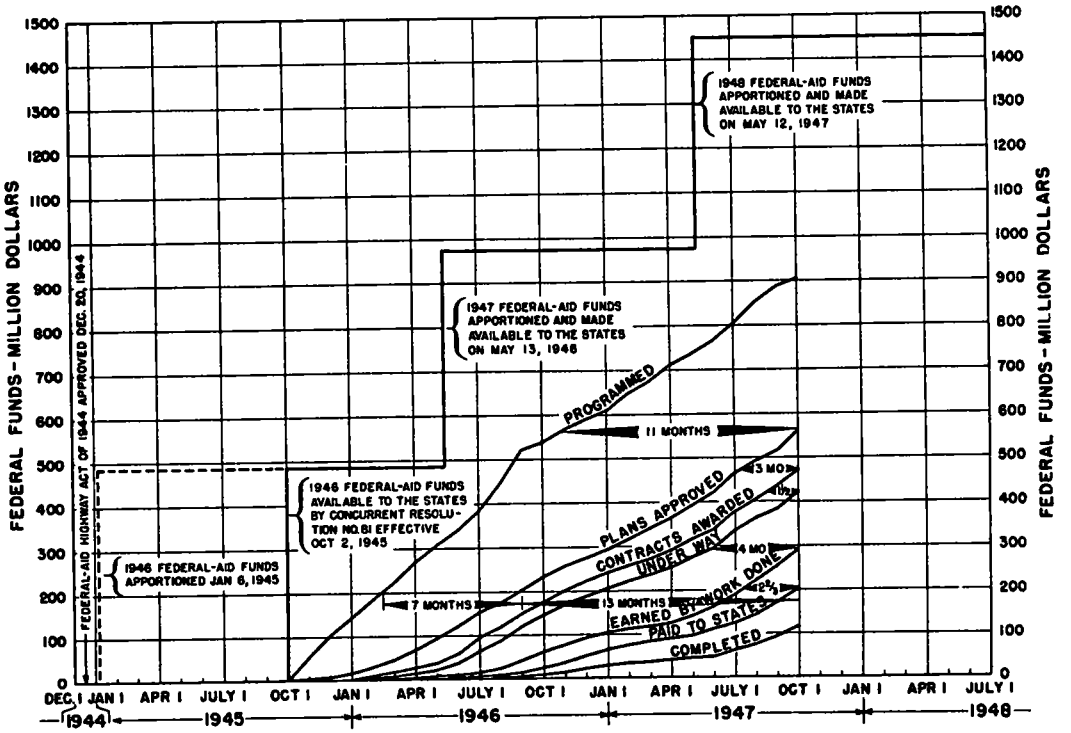


Figure 1. Postwar Federal-Aid Highway Funds
Summary: Federal-Aid Highway System, Secondary and Urban Funds Combined

projects to paid to States for work done was nearly 20 mo.

Postwar projects completed on October 1 involved 10,600 mi. of construction costing $118,000,000 in Federal funds and $226,000,000 total cost.

Table 3 provides a summary of the types of improvement approved for construction with postwar funds. Plans were approved by October 1, 1947, for a total of 30,839 mi. of highway improvements. Grading in preparation for future surfacing accounted for 2,985 mi. Surfacing construction, including necessary grading, drainage and other construction items except bridges, provided for 9,764 mi. of soil-surfaced, gravel, or stone road; 14,491 mi. of bituminous surface-treated, mixed bituminous, or bituminous penetration road; and 3,473 mi. of high-type bituminous, portland cement concrete, brick and block, or combination type road.

Bridge construction totaled 126 mi. and included 4,463 structures. As shown in Table 4, stream crossings accounted for 4,131 of the structures, and there were 97 railway-highway separations, 180 highway-highway separations, and 55 combination structures involving stream crossings, railway-highway separations and highway-highway separations.

Railway-highway improvements approved for construction with postwar Federal-aid funds (Table 5) provide for the elimination of 116 crossings by separation, elimination of 16 crossings by relocation of highway, protection of 112 crossings by flashing lights, short-arm gates, etc., and for the reconstruction of 25 separation structures.

TABLE 3

TYPE OF IMPROVEMENTS APPROVED FOR CONSTRUCTION FINANCED FROM POSTWAR FEDERAL-AID HIGHWAY FUNDS
As of October 1, 1947

Type	Total Cost $	Federal Funds $	Miles
Graded and drained earth	88,272,905	44,029,016	2,985
Soil-surfaced	14,657,251	7,267,752	822
Gravel or stone	117,203,624	59,518,993	8,942
Bituminous surface treated	142,930,531	70,378,021	8,026
Mixed bituminous	125,771,395	68,917,847	5,602
Bituminous penetration	29,492,455	14,616,541	863
Bituminous concrete, sheet and rock asphalt	71,967,152	34,601,753	1,261
Portland cement concrete	243,866,048	118,671,672	2,105
Brick or block	406,297	203,149	2
Combination	7,885,879	3,918,682	105
Bridges	216,017,342	111,078,650	126
Miscellaneous	8,698,915	4,374,475	
Total	1,067,169,794	537,576,551	30,839

SOURCES OF MATCHING FUNDS

The matching provisions of prior Federal-aid legislation were continued in the 1944 act. For all but railway-highway projects, Federal funds used for construction are required to be matched on a 50-50 basis with provision for a higher Federal fund ratio in any State having unappropriated and unreserved public land and nontaxable Indian lands exceeding 5 percent of the total area of the State. In lieu of the separate authorization formerly provided for railroad grade crossing projects which could be financed 100 percent from Federal funds, the 1944 act provides that railway-highway projects in any State may be financed with up to 100 percent Federal funds from not to exceed 10 percent of the State's total apportionment of highway system, secondary, and urban funds. Preliminary engineering and construction engineering costs are eligible for payment from Federal funds in the same manner as construction, whereas costs for rights-of-way may be paid one-half from Federal funds on railway-highway projects financed under the 10 percent limitation and one-third from Federal funds on regularly financed highway projects.

For all projects financed from postwar Federal-aid funds, the ratio of Federal funds to total cost is almost exactly 50 percent. There is no significant variation in this ratio with respect to projects financed from highway system, secondary, or urban funds. Occasionally there are related costs for preliminary engineering, rights-of-way, or miscellaneous construction that for various reasons are not made a part of the Federal-aid project costs, which if included would result in a Federal fund ratio of about 48 percent for all postwar Federal-aid improvements.

The routes of the Federal-aid highway system coincide for the most part with major State highway routes in each State. As would be expected, the matching funds for Fed-

TABLE 4

BRIDGES APPROVED FOR CONSTRUCTION FINANCED FROM POSTWAR FEDERAL-AID HIGHWAY FUNDS
As of October 1, 1947

Type	Total Cost $	Federal Funds $	Number
Stream crossings	142,311,050	70,651,483	4,131
Railroad separations	14,152,790	9,456,883	97
Highway separations	27,345,411	13,340,784	180
Combinations	32,208,091	17,629,500	55
Total	216,071,342	111,078,650	4,463

eral-aid highway system projects are almost entirely State funds. Over 99 percent of the matching funds for highway system improvements are State funds, the remainder consisting of small contributions by counties and cities, or by railroads when railway benefits are involved.

The Federal-aid secondary system, comprising principal secondary and feeder roads, coincides in part with State highway routes, the remainder consisting of farm-to-market roads not located on any State system. About 84 percent of the matching funds for secondary road improvements are State funds, and about 15 percent are county funds. In addition to participating in the financing of some of the construction, the counties frequently furnish rights-of-way for secondary projects, particularly for farm-to-market secondary roads not on the State system. Also, there are at least 900 counties in 24 States that have participated in engineering. Surveys and plans have been made by all of these counties, and 500 counties have prepared specifications and estimates. Some of the matching funds for Federal-aid secondary road improvements are contributed by townships, small municipalities or urban places, railroads, or are from other miscellaneous sources.

Projects financed with Federal-aid urban funds are located within the "urban areas" delimited as previously described. About 6 percent of the matching funds for Federal-aid urban improvements are contri-

TABLE 5

RAILWAY-HIGHWAY IMPROVEMENTS APPROVED FOR CONSTRUCTION FINANCED FROM POSTWAR FEDERAL-AID HIGHWAY FUNDS
As of October 1, 1947

Crossings	Total Cost $	Federal Funds $	Number
Eliminated by separation	29,043,340	18,442,864	116
Eliminated by relocation	2,071,209	1,308,164	16
Protected	615,859	475,794	112
Separation structures reconstructed	4,788,307	4,226,285	25
Total	36,518,715	24,453,107	269

TABLE 6

PERCENTAGE DISTRIBUTION OF MATCHING FUNDS FOR FEDERAL-AID, HIGHWAY IMPROVEMENTS PROGRAMMED TO JULY 31, 1947

Source of Matching Money	Highway System	Secondary	Urban	Total
State	99.22	84.00	89.40	92.43
County	0.36	15.08	3.84	5.45
City	0.13	0.08[a]	6.31	1.63
Township		0.13		0.04
Railroad	0.19	0.06	0.40	0.20
Other	0.10	0.65	0.05	0.25
Total	100.00	100.00	100.00	100.00

[a] By small municipalities

buted by cities. In a few cases, the counties also are contributing matching funds for improvements within urban areas. In one such case the county contribution amounts to nearly $6,000,000. In another State the counties have contributed over $3,000,000 to the cost of improvements in urban areas. State funds account for 89 percent of the matching funds on Federal-aid urban improvements.

Total contributions by counties, cities, local governments, and other local sources, and by railroads, amounted to more than $74,000,000 for postwar Federal-aid improvements programmed for construction to July 31, 1947.

Summary data relating to the percentage distribution of matching money for each class of Federal-aid funds and for the three classes combined are provided in Table 6. The railroad contributions indicated conform generally to the railroad benefit provisions of the 1944 act. In many cases there have been contributions of preliminary engineering and rights-of-way, by counties, cities, or other local units, for which monetary values have not been established. Contributions of this nature are not accounted for in the data shown in Table 6.

Contributions toward the financing of Federal-aid secondary projects programmed to July 1, 1947 are anticipated from counties, townships, small municipalities, and from other local sources other than railroads in 28 States. Similarly, contributions are expected toward the financing of Federal-aid urban projects in 29 States. In both cases there may be, in the remaining States, contributions of preliminary engineering or rights-of-way for which cash values were not established and which consequently are excluded from this summary.

The foregoing review would seem to indicate conclusively that the State highway departments, under unprecedented adverse conditions, have done a really remarkable job in advancing the postwar highway program to its present state.

HIGHWAY FINANCE AND THE CONSUMER

WILFRED OWEN
Brookings Institution

The inadequacy of much of our principal highway mileage, in both rural and urban areas, has long been apparent in the record of accidents and congestion, and in the inconveniences which have become typical of motor vehicle transportation. Despite the expenditure since 1921 of more than 30 billions of dollars for highway construction, and a total expenditure of 50 billion dollars, much of our most heavily traveled road and street mileage is incapable of providing safe and efficient transportation. Many of these roads conform in their basic design to the early roads laid out long before the advent of motorized transportation. The successive improvements and enlargement of these basic facilities have failed to alter many of the conditions which long ago rendered them obsolete.

THE FUTURE HIGHWAY BILL

During the war, the urgent need for more highway capacity so apparent during the years immediately preceding hostilities was largely forgotten. Today, however, with a record 37 million motor vehicles in operation, and traffic levels higher than at any previous period, the inadequacies of our highway system have once again become a subject of widespread concern. According to the American Association of State Highway Officials, expenditures aggregating 30 billion dollars are necessary during the next 10 years to rehabilitate a million miles of roads which, it is claimed, are in such a state of deterioration that they offer a constant menace to drivers.

How much the highway bill would amount to if the goal of a satisfactory standard of service were to be sought can be gleaned from the numerous plans for modern facilities which were formulated during the war. On the Interregional Highway System, for example, it was estimated that on over half the rural sections the cost, in 1941 dollars, would be from $100,000 to $700,000 per mi., while the required outlay in cities would run from $700,000 to $1,250,000 per mi., exclusive of land. A one-mile expressway proposed for Chicago was estimated to call for $4,000,000 per mi. at prewar prices, and 10 mi. of highway through the heart of Baltimore would cost $10,000,000.

Today these and all other prewar estimates are completely out of date. One reason is the sharp increase in prices which has continued through 1946 and 1947. The index of construction cost for a standard mile of highway rose from 82 in 1941 to 123 in 1946. But beyond this fact, the volume of postwar traffic has already exceeded all previous highs, and with the demand for automobiles still seemingly limitless, it is possible that new record volumes of traffic will be established for many months to come.

Under these circumstances, where are the funds to be obtained to achieve the standard of highway service required for safe and efficient highway transportation? It is true that the more traffic, the more user tax revenues, but it is also true that the greater the vol-

ume of traffic, the more fabulous the sums of money required to provide adequate accomodations. Moreover, it should be noted that unlike the trend in most prices, the amounts charged the consumer for his use of the highways have for the most part remained fairly stationary. In only eight states during 1947 have tax rates been increased; in 40 states the rate of payment for highways, in the form of gasoline taxes and registration fees, remains substantially unchanged from the prewar level. This has been made possible in part by the ample cash balance in state highway accounts as a result of deferred wartime construction, in part by the generous authorizations of Federal funds under the 1944 Federal-Aid Act, and in part by reason of the slow start of the construction program, due to shortages of men and materials.

WHERE THE CONSUMER'S DOLLAR GOES

Only a part of the total funds made available for highway purposes is available to build new main highways of adequate design. In 1946, approximately 2/3 of highway-user revenues were left to the state highway departments after aid had been distributed for local roads and to non-highway purposes. Of the money comprising the state highway share, 56 cents of every dollar was absorbed by the expenses of maintaining the existing system, paying debt service on roads already built, and defraying the cost of administration. And of the total spent for construction and maintenance, only 4 percent found its way to urban streets where the most urgent bottlenecks and the highest costs were to be found.

The objective of raising the standards of our roads and streets, therefore, together with maintaining existing facilities, presents a formidable financial undertaking at a time when the highway dollar goes only a fraction as far as it used to. Can the consumer afford to pay the necessary additional sums to obtain the highways he needs? Over the past two decades he has been contributing an increasingly larger share of the total money available for highways. In 1921 he paid only 12 percent of the bill. By 1941 he was paying 51 percent. There is no apparent reason to conclude that this trend will not continue, so that the question is whether the consumer in the future must not only pay a higher percentage of the total highway bill, but a higher percentage of an increasing total bill.

FINANCIAL CAPACITY OF THE CONSUMER

The relation of individual incomes to automobile ownership and use provides ample demonstration of the financial capacity of the consumers of automobile transportation service. In 1941, for example, only 12 percent of families with less than $500 cash income owned automobiles, but 94 percent of those with $10,000 a year and over owned cars. Half of the families in the lowest income class who were car owners could not afford to drive as much as 3,000 mi. per yr.; and even in the income class from $1,000 to $1,500, 30 percent of car-owning families restricted their travel to less than 3,000 mi. annually. In the upper income groups, however, there was none who drove under 3,000 mi. during the course of the year; 94 percent of these motorists drove over 10,000 mi. per yr.

Further evidence of the financial position of many automobile owners before the war is indicated by the direct relationship between individual incomes and the amounts spent for car ownership and operation. In the period 1935-36, motorists having incomes under $1,000 per yr. spent only $40 to $60 a

year for car operation. Persons with incomes ranging from $5,000 to $10,000 spent an average of five times as much for this purpose.

The proportion of automobile owners who are extremely sensitive to the cost of automobile transportation accounts for a major part of total automobile transportation expenditures, Specifically, in 1935-36, 27 percent of all such expenditures were made by motorists with incomes up to $1,500 a year. And 59 percent of all expenditures were accounted for by persons with incomes of $2,500 and under. It is true that the present distribution of income differs substantially from that of the prewar decade; that there has been an extensive shift from low-income brackets to the middle-income classes. Under existing tax policies and price levels, however, it is to be doubted that a major proportion of car owners are better able to afford car ownership and operation now than they were before the war.

CONSUMER PAYS FOR HIGHWAYS

The "average" motorist before the war operated his automobile at a cost of 4 cents a mile. Of this amount, 0.4 of 1 cent represented his payment for highways. In absolute amounts, this charge totaled $35, of which $10 was the registration fee and $25 the state tax on gasoline. In other words, approximately one-tenth of the cost of automobile transportation represented highway cost and nine-tenths was the cost of the vehicle, its upkeep and repair, tires, gasoline, oil, insurance, and miscellaneous items.

An "average" motorist, of course, is hard to find, and costs in reality differ widely among motorists. This follows from the wide range in prices paid for automobiles, the varying performance characteristics of different vehicles, and the differing conditions under which automobiles are operated. In addition to variations in cost per year or cost per mile, consumer payments for highways likewise vary among the states. Registration fees for passenger cars range from approximately $3 to $19, and state gasoline tax rates from 2 cents to 7 cents a gal. Thus, for 10,000 mi. of highway use, the motorist in Florida pays $58, but in Missouri he pays only $23.

These variations are important because they signify the different impacts of highway tax payments on the motorists in different states and in different income classes in the same state. For the so-called "average" motorist who pays 4 cents a mile for automobile transportation, highway tax payments may range from 6 to 16 percent of the total cost of owning and operating an automobile, depending on the particular state. Similarly, a motorist in the lowest income brackets, who holds his costs down by driving an old car sparingly, may find the proportion of his total outlay which represents highway taxes may be very substantial.

As a specific example, suppose that a motorist in Idaho before the war drove 4,000 mi. a year at 2 cents a mi., excluding highway taxes. He was able to drive at this low cost by purchasing an old car, doing most of the repair work himself, and avoiding such charges as insurance and garage. Total cost per year would be $80, plus taxes. In Idaho a flat fee of $5 is charged to register the vehicle, and the tax on gasoline is at the rate of 6 cents per gal. Total tax payments for 4,000 mi. of travel would be in the neighborhood of $21. Operating costs, including taxes, would be $101, and taxes would comprise over 20 percent of this total.

WHAT CAN THE CONSUMER AFFORD?

When the situation of the "average" motorist is examined, the fact that only one cent out of every 10 cents paid for automobile transportation goes for highways raises the question as to whether or not this is a reasonable division of emphasis. To state the case in terms of total expenditures for automobile transportation, it is estimated that in 1946 approximately 11 billion dollars were spent for automobile purchases, gasoline, and other operating items, exclusive of taxes. The additional sum of approximately one billion dollars was paid by passenger car owners for the use of the highways. This picture of 1946 expenditures similarly raises the question of whether, in view of the inadequacy of our highways, it is reasonable to spend 11 billions for automobiles and the products required to make them go, but only one billion dollars for the 1½ million mi. of surfaced roads on which safe and efficient operation depends. If the facilities necessary for highway transportation were all supplied by one agency, as in the case of railroad transportation, it is doubtful that over 90 percent of all funds spent for this purpose would be allocated to vehicles and their operation, and the remaining small percentage used for highways. Certainly the railroads would not devote such exclusive attention to rolling stock if it were apparent that roadbed and rail capacity were wholly inadequate to permit safe and efficient transportation.

The need for greater emphasis on highways seems to be a logical conclusion in view of the tremendous new construction requirements which are so obvious today. But when we consider the size to which the total highway transportation bill has already grown, and when we examine the financial position of the large majority of consumers, it is necessary to ask how large a segment of our national income can be devoted to this purpose, and how long it will be possible for low-income motorists to absorb the increasing cost of automobile transportation. For, while the cost of food and other necessities of life have risen even further than the elements entering into transportation costs, the fact is that the consumer must eat before he rides, and the more required for food, clothing, and housing, the less may be available for automobiles.

Certainly the goal should be to reduce the cost of automobile transportation, at the same time improving the standard of service. If the evidence appears to support an increase in the amount of highway expenditures, such an increase should be justified in terms of its effectiveness in reducing total transportation costs. The question, in other words, is whether we can increase highway expenditures without moving farther and farther away from the objective of achieving low-cost transportation.

USING WHAT WE HAVE

It is apparent that the need for better highways and streets does not necessarily mean a greater expenditure of public funds. Certainly a first step toward attaining higher standards of highway service is to use existing facilities as effectively as possible, and to apply existing funds as productively as possible. That neither of these goals has been attained is obvious; and the potential improvement of the traffic situation which lies in traffic engineering and in sound financial management is undoubtedly tremendous. The widespread adoption of one-way streets, the provision of off-street parking, and the sensible development of public transit would be equivalent to many millions

of dollars of new street capacity. And the allocation of motor vehicle tax revenues on the basis of highway use and need, together with a judicious programming of expenditures, would mean the equivalent of new tax dollars.

There is no need to dwell on these possibilities. Their potentials are known, as is also the resistance to their adoption. It is sufficient here to note that a plea for greater amounts of money for highway loses much of its urgency as long as the existing road system is poorly utilized and existing funds ineffectively spent.

ECONOMICS OF GOOD ROADS

A factor which requires emphasis at this point is the effect which the provision of adequate highways may have on automobile operating costs, and the possibility that the construction of a costly highway may actually reduce rather than increase the cost of transportation. There are many examples of how the cost of vehicle operation is lowered by means of raising the quality of the highway. The principle is demonstrated by prewar data comparing a trip on the old Boston Post Road in Connecticut with driving over the limited-access Merritt Parkway, a four-lane divided road running parallel to the Post Road. Between two cities connected by these roads the distance is 55 mi. by the Parkway and 53 mi. by the Post Road. The trip by the Parkway can be made at an average speed of 52 mi. per hr., consuming no more gasoline than is required to make the trip on the old highway traveling at an average of 25 mi. per hr. The driver who uses the Parkway makes the trip safely and in comfort, and saves 40 min. This is possible because the cost of driving at a uniformly high speed is less than the cost of numerous stops and starts, and sporadic bursts of speed. The driver using the old highway encounters 116 traffic lights on a 48-mi. section, which cause an average of 41 stops per trip, or nearly one every mile.

A similar illustration of the lower operating costs on superior roads is supplied by the comparison between a 92-mi. section of the German motor road system and a roughly parallel state road 101 mi. long which connect the same cities. The state road at the time of these tests was in good condition, and well-constructed for long-distance trips, but the route passed through three large towns and 32 other localities, and along the route there were 219 crossroads and 744 branch roads. Trial runs at speeds as high as feasible were made on each of these routes, which revealed that the trip could be made at an average speed of 44 mi. per hr. on the ordinary road and at 74 mi. per hr. on the superhighway. From these tests it was demonstrated not only that the trip by superhighway saved more than one hr. on a trip of little over 100 mi.; in addition, the wear on both car and driver was found to be much less for the high-speed trip. Instruments were installed to record the number of times the speed changed more than 6¼ mph., and how many times the circumference of the steering wheel was turned more than 2.3 in. Results showed that there were 440 speed changes during the trip on the ordinary road, and that manipulations of the steering wheel were in the ratio of 570 on the ordinary road to one on the motor road. The brakes were used 491 times on the ordinary road and three times on the motor road.

A second test was then run on both roads at the average speed of 44 mi. per hr., which had been found possible on the ordinary road. Because the motor road was free from obstructions, this average was nearly a uniform speed. The most

surprising saving was in gasoline consumption. On the ordinary road the car traveled 14 mi. per gal., while on the motor road it traveled 22 mi. per gal. The fast trip on the motor road, at 74 mi. per hr., was accomplished with mileage per gal. of fuel over half again as great as on the slow trip on the ordinary road.

Evidence has been collected of similar gasoline savings realized daily by the 50,000 motorists using Arroyo Seco Parkway in California. A 20-mi. trip by expressway consumes a gallon of fuel whereas by existing surface streets consumption would be 1.5 gal. Each motorist thus saves more than 10 cents per 20 mi. of travel by using the Parkway, and total savings in gasoline alone amount to nearly one million dollars per year. A half cent saved per mile more than offsets what the average motorist pays in total for his use of the highway system. Other savings, especially in accident costs, provide further evidence of the savings which result from operating on good roads.

In addition to demonstrations of the savings which can be realized in time, money, and lives, there are many examples of the surprising increase in capacity which these modern roads make possible. In urban areas a single well-designed four-lane expressway will carry the same number of vehicles, at nearly double the average speed, as five 40-ft. city streets with no parking and favorable control of cross traffic. Under the less favorable conditions which generally obtain on city streets, eight streets of 54-ft. width would be required to equal the carrying capacity of one four-lane expressway. According to the United States Commissioner of Public Roads, "These comparisons are so startling that many well-informed people will not easily accept them."

The justification of expenditures for high-cost roads, then, may be found in comparing these savings in vehicle-operating costs with the cost of the highway. If the cost of providing special facilities is half a cent per vehicle-mile and the savings in gasoline or other operating costs is an equivalent amount, the project does not increase the total cost of transportation. Moreover, there is a net gain for the consumer in a higher standard of service, including faster and safer transportation.

APPLICATION TO THE HIGHWAY PROBLEM

Comparison of highway costs and savings for specific projects has long been accepted as a method of determining the economic justification of proposed highways, and excellent papers on the subject have been submitted to the Highway Research Board over a number of years. The application of this principle to highway systems as well as to specific sections of highway is equally sound, and may be used to determine how far it is possible to go in the direction of specially designed highways before the total cost of transportation must inevitably rise.

There are several defects in the practical application of these concepts, however. Granting that the construction of a new limited-access road will produce such savings in operating costs as to achieve a net reduction in total transportation costs, the tremendous initial investment poses a problem of where to obtain the necessary funds at once. Because current revenues may be inadequate to permit extensive investments of this magnitude, pay-as-you-go finance may not meet the needs. It is this situation, often coupled with unreasonable formulas for distributing the proceeds of motor vehicle taxes, which in large measure explains the current toll road movement. The cost to the

consumer of driving over a toll facility may be less, including the toll, than the cost of operating over the "free" road. Quite aside from the relative merits of toll roads and free roads, the rebirth of the turnpike is a practical demonstration of the fact that it is often more economical, in terms of total transportation costs, to spend more for highways, and as a result, less for vehicle operation.

CAN HIGHWAY FINANCIAL SUPPORT BE INCREASED?

The obvious alternative to the toll road, of course, is for the state to issue bonds to permit the desired projects to be undertaken and promptly completed. In many states at the present time neither this procedure nor the application of the toll principle is required, because funds are plentiful and only materials and construction capacity are wanting. In a few years, however, greater resort may be made both to toll roads and to bonding, especially when the current surplus of funds in the state highway account has been eliminated.

For most states, however, the problem of building modern traffic facilities without increasing the net burden on the motorist will probably not be solved either by toll roads or by borrowing. Resistance to the rejuvenation of the turnpike, plus the burden of outstanding highway obligations, will prove to be formidable barriers. What solution can be looked for, then, which may be universally applicable, and which will permit the realization of extensive new facilities without at the same time increasing the total cost of transportation to a point discouraging the use of the automobile and overburdening the already overburdened consumer? The answer is to be found in precisely the same fact which poses the problem: the fact that we spend so little for roads yet so much for automobiles and their operation. It is in the 90 percent of the highway transportation bill which is represented by vehicle and vehicle-operating costs that the key to greater financial support for the highways lies. By directing our efforts to the reduction of the consumer's expenditures for automobile purchase, gasoline, tires, and similar payments, we might apply some of these savings to the development of highways, thus tending to correct the current one-sided emphasis on expenditures for the vehicle. If automobile transportation is to be safe, efficient, and at the same time economical, this accomplishment, barring government subsidies, is possible only by directing more of the consumer's dollar to highway purposes and a lesser proportion to gasoline, cars, and allied items.

Whether such a readjustment of consumer expenditures might be brought about depends on technological developments and the policies of large segments of industry participating in the manufacture of vehicles, petroleum, tires, and accessories. Principally, however, the answer lies with those who design and manufacture the automobile. The possibilities of entirely new concepts of automobile design, with economy of both first cost and operating cost as their objective, hold the key to the future realization of low-cost automobile transportation. These possibilities, in conjunction with power plant developments and fuel technology, could bring about the reduction in operating costs necessary to release more of the consumer's transportation dollar for the provision of highways capable of accomodating the automobile.

There is nothing impossible of attainment in the suggestion that in the future we might apply more of the consumer's dollar to the

highway and less to the vehicle. The adoption of high compression engines and high octane fuel promises in the near future to save the motorist a billion dollars a year. Numerous other attacks are being made by industry on the high consumption of gasoline. Many new features of automobile design, too, are being developed and tested, and the direction of significant innovations is toward ultimately lower car prices and lower costs of operation.

It should be remembered that the consumer is interested in how much it costs to own and operate an automobile, and the quality of the service. He is concerned over the cost per year or per mile or per month. How much of the total goes to highways and how much to the vehicle is immaterial, except for the methods used to pay the bill, or the increments by which the costs are defrayed. As far as the family budget is concerned, $100 is $100, whether 10 percent is for the highways and 90 percent for the operation of the vehicle, or vice versa. If it is possible in the future, without increasing the total automobile transportation bill, to provide greater financial support for the highway system by reason of savings in the purchase and operation of the vehicle, we will then be witnessing real progress in highway transportation.

INFORMATION NEEDED FOR THE FISCAL AND ALLIED PHASES OF LONG-RANGE HIGHWAY PROGRAM PLANNING

C. A. STEELE
Highway Economist
Public Roads Administration

Planning has now come to be an accepted function in the highway departments of the 48 States and the District of Columbia, although its status and the recognition given to it vary considerably among the States. Certain investigations and research projects that might be acceptably classified as studies preliminary to planning had been made in a few States prior to 1934, but highway planning as such received its greatest impetus by the passage by the Congress of the act, signed by the President on June 18, 1934, which authorizes the use of 1½ percent of the Federal-aid apportionments for "surveys, plans, and engineering investigations of projects for future construction" on any road system. This provision of the law was permissive rather than mandatory, but, under the vigorous support accorded to it by officials of the Bureau of Public Roads, within two years all the States had inaugurated fact-finding studies which came to be known as State-wide highway planning surveys.

Up to the present there have been two phases of planning-survey operations. The initial phase, which was composed of a series of related fact-finding studies, has been completed or practically so in a majority of the States. The primary aim of the initial studies, all of which were set up as one-time projects, was to gather together basic facts and present them in

significant relationships for consideration by highway administrators in connection with the formulation of general administrative policy. It was expected that the individual States would prepare comprehensive reports on these initial investigations that would define the major highway problems facing the various States and suggest possible solutions or at least approaches to solutions to some of them. It was hoped that the information provided would be sufficient to render intelligent policy decisions possible, but no recommendations were to be made on matters of policy.

It soon became evident that if future highway programs were to be planned intelligently the one-time studies would not be enough. For one thing, there were important additional studies that were badly needed, particularly in certain States, but which it had not been possible to incorporate into the initial planning-survey program. Also, it was evident that there would be a continuing need to revise and bring up to date most of the various classes of information collected during the initial study. Accordingly, the Bureau of Public Roads prepared and transmitted to its field staff on September 28, 1938 a memorandum outlining continuing highway-planning activities. This memorandum, with certain revisions and supplements, forms the basis upon which continuing fact-finding studies have been instituted and are now under way in all the States and the District of Columbia.

The philosophy behind the continuing fact-finding activities, which it was recommended should be set up under a separate division of the State highway department, is outlined clearly in a footnote to page 7 of the memorandum:

> "It will be noted that the activities of the fact-finding division as here described do not extend to the function of general planning. It is assumed that this broader function will be exercised by or under the direction of a board or other body representative, at the least, of the several divisions of the State highway department; or, where authorized by law, of the legislature; or of the combined interests and capacities of the legislative and executive branches of government and possible road users and other special interests."

It is evident from the quotation that the term "planning survey" as applied to the existing fact-finding divisions of the State highway departments is, to some extent at least, a misnomer. The term "fact-finding division" is, perhaps, the most accurately descriptive one that can be applied, although some of the States have adopted other designations for their planning surveys which are probably equally suitable.

It is evident, too, that there is no real conflict between the so-called highway planning surveys and the long-range highway plan projects that have been undertaken or are now under way in California, Michigan, and a number of other States.[1] These, when properly conceived and prosecuted, represent an attempt to utilize the factual data obtained by the planning surveys, supplemented with information obtained from other sources, in setting up a long-range plan for the entire highway network of a given State that will provide for the correction of existing deficiencies and the anticipated additional requirements of future years. The undertaking of this function by groups outside the State highway de-

[1] For a discussion of the status of long-range highway-plan projects on about November 30, 1947, see paper presented during 27th Annual Meeting of Highway Research Board by G Donald Kennedy, entitled "Current Long-Range Studies of Highway Modernization Programs." Page 57, this Bulletin

partments is exactly in line with the philosophy expressed in the preceding quotation, and should result in programs that will be given more general acceptance and support than would ordinarily be possible in the case of any program devised and promoted solely by a State highway department, regardless of its merits.

PHASES OF LONG-RANGE PLAN STUDIES

There are four major questions which the long-range highway plan projects seek to answer. Listed in the order in which they logically arise they are as follows:

1. What are the social and economic factors which cause and will continue to cause a demand for the improvement of highway transportation facilities, and how may these factors be measured?

2. What types of highways and how many miles of each type are needed to supply present and anticipated future needs, and what will it cost to own them?

3. Can the people of this State afford to own such a network of highways, and how shall an adequate future highway program be financed?

4. How can an adequate network of highways be administered most effectively?

Consideration of these questions suggests a convenient division of the long-range plan projects into four principal phases for purposes of facilitating most efficient operations: Economic and sociological, engineering, financial, and administrative. The economic and sociological phase deals primarily with factors that influence the demand for highway services, such as population composition and trends; wealth, income, and the characteristics of agricultural, industrial, and commercial development and motor vehicle registrations and use. The engineering phase is concerned mainly with the location, design, construction and maintenance of highways that will be needed to meet these demonstrated requirements; and with the determination of what it will cost to own such a road network. The financial phase must study and offer a solution to the problem of how to finance this network adequately and equitably, and how to fit the highway fiscal program into the general scheme of support for all governmental functions at all levels. The administrative phase is primarily concerned with the development of a plan for administering the highway network most effectively and efficiently.

The same general work-pattern will normally be applied to each of these major phases. This consists of a study of past conditions for the purpose of understanding the present situation; and evaluation of the present situation for the purpose of determining existing inadequacies and inequities; and a forecast of future needs based upon the observed trends of past and present, but giving due consideration to the shortcomings of the present situation.

No strict lines of demarcation can be drawn between the principal phases of the long-range plan study. The number, types, and extent of use of motor vehicles owned by residents of a given State, or brought into it by nonresidents for use there, are basic data needed for the economic phases of the project. However, information about the size, weight, and other physical characteristics of the vehicles and loads moving over the highways; the speeds at which the vehicles of various types and loadings are operated; and the density and placement of the traffic found upon the highways are primary requirements for the engineering phase. Furthermore, data on trends in vehicle ownership and characteristics of use are essential to the evaluation of past and present financial programs and to the

development of better programs for the future.

This situation suggests two preliminary operations: (1) The determination of the types of information needed for each phase of the project, and (2) the assignment to the phase most intimately concerned of responsibility for the collection and primary compilation of segments of basic data that will be needed for two or more phases. The purpose of this inquiry is to consider the types of information that will be required for the financial and closely allied phases of a typical long-range highway plan project, to indicate which of the types of information that will be needed for the financial phase should be originally collected and compiled by the staff assigned to that phase, to indicate in a general way the extent to which the needed information is likely to be available, and also to indicate to a limited extent how this material will ordinarily be applied toward the preparation of the over-all plan.

The term "allied phases" as used through this discussion refers primarily to those subphases of the broad economic and sociological, engineering, and administrative phases of the project for which much of the same information that is needed for the successful completion of the fiscal phase is also required.

PUBLIC ROADS OUTLINE THE BASIS OF THIS INQUIRY

General Administrative Memorandum No. 319 issued by the Public Roads Administration on September 24, 1947, contains an outline for a complete report or series of reports on a State-wide survey for the determination of highway needs and future improvement programs. It is neither expected nor intended that this outline will be adopted in its entirety by any State for such a report. Rather, it is meant only to be used by any State proposing a long-range highway plan study as a guide in setting it up and planning its own report. The outline provides for including in the project report or reports all of the material that the officials of the Public Roads Administration regard as minimum essentials to be covered by a complete survey of this type. (The outline as it appears in the memorandum is included as an appendix to this paper.)

This outline is admirably suited to the needs of this inquiry as a basic study-plan or framework to which a discussion of information needed for the fiscal and allied phases of a long-range highway-plan project can be related. Accordingly, an adaptation of the financial section to the needs of this discussion has been made and is carried in the "Section of sample project outline" column in the accompanying Table 1.

DETERMINING SPECIFIC REQUIREMENTS

It must be recognized that the outline sets up an ideal which may not be completely attainable in any given case. It provides for the presentation of a broad long-range road-improvement program, adequately and equitably financed, efficiently administered, and completely supported by scientific facts rather than theories and suppositions. No account is taken of the availability or unavailability of any of the factual information needed for the development of the plan to be recommended.

The individuals charged with the responsibility of making studies to develop long-range highway plans for any particular State will almost certainly find themselves faced with shortages of essential data. The time and funds allotted for making the long-range plans and preparing the reports presenting them will

probably be so limited in most cases as to preclude much original research by project staffs.

Nevertheless, an outline similar to the Public Roads outline should be prepared as one of the first steps on a long-range highway plan project, and it should in most respects represent the ideal study that the planners hope to achieve rather than the practical modification which they may later be forced to accept. The next step is to determine from the outline what types of data will be needed and whether these are immediately available, could be obtained only after a considerable amount of research and compilation, or could not be obtained at all in the time available by any means at hand. After this step is completed a revision of the original outline to gear it to the existing situation may be in order.

A Method for Determining Data Requirements One approach to the problem of determining what types of data will be needed for the formulation of a long-range highway plan, and whether or not they are available, has been made for the financial and taxation section of the sample project outline, and is presented in Table 1. The same procedure could, of course, be applied to the other sections of the project outline.

The complete outline of the finance and taxation section is entered in the first column of the table (headed "Section of sample project outline"). Sufficient space is allotted to each subsection to provide entry in the other columns of the table of any information applying specifically to that subsection.

The nature of the information required for each individual subsection or group of closely related subsections of the outline is indicated by the entries made in the second column. A decimal system of identification is used in this and the third and fourth columns of the table to prevent misinterpretation as to the relationship between the items in these columns and the individual subitems of the outline.

Where it can be expected that the information required for some subsection of the fiscal study would ordinarily be obtained primarily for some other phase of the long-range plan project this is indicated in the second column. For example, data on population, motor-vehicle registrations, and motor-vehicle use are needed for the correct interpretation of fiscal data, but this is only a secondary application of this information, which is needed primarily for forecasts of population, motor-vehicle registrations, and motor-vehicle use in the economic and sociological phases of the project. Therefore, the fiscal study staff could expect to obtain these data from that source and would not be required to develop them from original sources.

Since this is not a fact-finding project but is instead one in which facts are to be applied to the development of a recommended policy it is the applications to be made which will determine the nature and extent of the information to be compiled. Some of the principal applications that could be expected to be made in any State under ordinary circumstances are listed in the fifth column of the table. In applying this procedure in any given State, it will probably be found desirable to list at least the principal applications to be made of the information called for in the individual sections of the project outline before attempting to list the specific items of information that will be required. As indicated in column five of the table, some of the applications are obvious from the outline itself while others are complex in nature, probably involving

TABLE 1. NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS

SECTION OF SAMPLE PROJECT OUTLINE	NATURE OF DATA REQUIRED	AVAILABILITY		APPLICATIONS	COMMENTS
		PLANNING-SURVEY SOURCES	OTHER SOURCES		
FINANCE AND TAXATION A. HISTORICAL REVIEW AND CURRENT STATUS OF HIGHWAY FINANCE AND TAXATION 1. STATISTICAL REVIEW OF HIGHWAY FINANCES, ALL GOVERNMENTAL UNITS A. RECEIPTS B. DISBURSEMENTS C. DEBT D. INTERGOVERNMENTAL RELATIONSHIPS	ITEM A, 1 1 FOR EACH CLASS OF GOVERNMENTAL UNITS - 1.1 RECEIPTS BY TYPES 1.2 DISBURSEMENTS BY PURPOSES 1.3 DEBT BY TYPES 1.4 INTERGOVERNMENTAL RELATIONSHIPS (PAYMENTS AND RECEIPTS), 1.41 AIDS 1.42 SHARED TAXES 1.43 REIMBURSEMENTS 1.44 JOINT PARTICIPATION 1.5 INFORMATION REQUIRED FROM ALLIED PHASES, 1.51 POPULATION 1.52 MOTOR VEHICLE REGISTRATIONS (BY VEHICLE TYPES) 1.53 MOTOR VEHICLE USE 1.54 HIGHWAY MILEAGES 1.55 WEALTH, INCOME, AND OTHER INDEXES OF ECONOMIC ABILITY 1.56 DATA ON HIGHWAY ADMINISTRATION	ITEMS A, 1-4: 1 DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS - 1.1 BASIC PLANNING-SURVEY FISCAL STUDY (ONE YEAR ONLY) 1.2 CONTINUING FISCAL STUDIES OF PLANNING SURVEYS (LOCAL-ROAD FINANCE STUDIES) 1.3 HIGHWAY DEPARTMENT HISTORY (PREPARED BY PLANNING SURVEYS IN MOST STATES)	ITEMS A, 1-4 10 DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS - 10.1 U.S. BUREAU OF THE CENSUS, 10.11 ANNUAL PUBLICATIONS 10.111 STATE FINANCES, VOL. I, II, III 10.112 CITY FINANCES, VOL. 4, II, III 10.113 COUNTY FINANCES 10.114 GOVERNMENTAL DEBT 10.115 STATE DOCUMENTS 10.116 CITY DOCUMENTS 10.12 SPECIAL DECENNIAL CENSUS PUBLICATIONS (LAST CENSUS WAS 1942) 10.121 COUNTY FINANCES 10.122 FINANCES OF CITIES HAVING POPULATIONS LESS THAN 25,000 10.123 FINANCES OF SCHOOL DISTRICTS 10.124 FINANCES OF TOWNSHIPS AND NEW ENGLAND TOWNS 10.2 PUBLICATIONS AND RECORDS OF STATE AGENCIES 10.21 CENTRALIZED FISCAL REPORTS OR AUDITS 10.22 CENTRALIZED ASSESSMENT RECORDS 10.3 OTHER PHASES OF LONG-RANGE-PLAN PROJECT, 10.31 ECONOMIC AND SOCIOLOGICAL PHASE (POPULATION, MOTOR VEHICLE REGISTRATIONS, MOTOR VEHICLE USE, HIGHWAY MILEAGES, INDEXES OF ECONOMIC ABILITY) 10.32 ADMINISTRATIVE PHASE (DATA ON ADMINISTRATIVE ORGANIZATIONS AND INTERGOVERNMENTAL RELATIONSHIPS)	ITEMS A, 1-4 PRINCIPAL APPLICATIONS - 1. PRESENTATION OF PAST AND PRESENT PICTURE OF HIGHWAY FINANCING AT ALL LEVELS OF GOVERNMENT. 2. DETERMINATION OF INDEXES (PER CAPITA, PER VEHICLE, PER MILE OF HIGHWAY, ETC.) 3. DETERMINATION OF TRENDS 4. INDICATING SHIFTS IN METHODS OF FINANCING AND IN RESPONSIBILITY FOR FINANCING HIGHWAYS 5. DETERMINATION OF INCIDENCE (BURDEN) OF TAXES AND OTHER INCOME REQUIRED FOR THE SUPPORT OF HIGHWAYS (INCLUDING RESPONSIBILITY FOR DEBT RETIREMENT) 6. DETERMINATION OF BENEFITS RECEIVED FROM DISBURSEMENTS FOR HIGHWAYS. 7. MEASURING AND COMPARING DEPENDABILITY AND DESIRABILITY OF VARIOUS INCOME SOURCES.	ITEMS A, 1-4: 1. IF COMPLETE, THE PLANNING-SURVEY SOURCES WILL PROVIDE THE BEST POSSIBLE SOURCES OF HIGHWAY-FINANCE DATA AS THEY ARE ANGLED DIRECTLY TOWARD THE TYPE OF ANALYSIS REQUIRED FOR LONG-RANGE PLANNING. SOME ADDITIONAL INFORMATION (ESPECIALLY FOR EARLIER YEARS) WILL BE NEEDED IN ALL CASES. 2. MUCH OF THE PRINCIPAL USE OF THIS INFORMATION WILL BE IN CONNECTION WITH THE EVALUATION OF PAST AND PRESENT FISCAL POLICIES, AND THE DETERMINATION OF PROGRAMS THAT ARE EQUITABLE AND FEASIBLE. THE PRESENTATIONS IN THE "HISTORICAL" SECTION OF THE REPORT SHOULD, PERHAPS, BE LIMITED TO APPLICATIONS 1-4 AND 7.
2. IMPOSTS UPON PROPERTY FOR SUPPORT OF HIGHWAYS A. GENERAL PROPERTY TAXES (1) TYPES, BASES, RATES (2) EXTENT OF USE, CLASSIFIED BY GOVERNMENTAL UNITS AND ROAD SYSTEMS B. SPECIAL PROPERTY TAXES AND ASSESSMENTS (1) TYPES, BASES, RATES (2) EXTENT OF USE, CLASSIFIED BY GOVERNMENTAL UNITS AND ROAD SYSTEMS	ITEM A, 2: 2 FOR EACH CLASS OF GOVERNMENTAL UNITS - 2.1 TYPES OF IMPOSTS USED, 2.11 FOR GENERAL PURPOSES (INCLUDING HIGHWAYS) 2.12 SPECIFICALLY FOR HIGHWAYS 2.2 BASES (ASSESSMENTS) 2.3 RATES 2.4 EXTENT OF USE 2.5 OTHER CHARACTERISTICS 2.51 PRODUCTIVITY 2.52 DEPENDABILITY				
3. ROAD-USER TAXES A. TYPES, BASES, RATES B. GROWTH AND PRODUCTIVITY C. APPLICATION, CLASSIFIED BY GOVERNMENTAL UNITS, ROAD SYSTEMS, ETC. (1) HIGHWAY USES (2) NONHIGHWAY USES (3) INTERGOVERNMENTAL RELATIONSHIPS D. INCIDENCE	ITEM A, 3: 3 FOR EACH CLASS OF GOVERNMENTAL UNITS LEVYING SUCH TAXES 3.1 TYPES OF IMPOSTS USED 3.2 BASES 3.3 RATES 3.4 HISTORICAL DATA - GROWTH, PRODUCTIVITY, DEPENDABILITY 3.5 ORIGINAL DISPOSITION OF PROCEEDS AND FINAL APPLICATION OF FUNDS BY 3.51 GOVERNMENTAL UNITS 3.52 ROAD SYSTEMS 3.53 PURPOSES, INCLUDING 3.531 ADMINISTRATION 3.532 HIGHWAY 3.533 NONHIGHWAY		11 STATE DATA - 11.1 STATE HIGHWAY DEPARTMENTS 11.11 PERIODIC PUBLISHED REPORTS 11.12 ANNUAL STATE STATISTICS COMPILATIONS FOR PUBLIC ROADS 11.13 DEPARTMENTAL RECORDS 11.2 OTHER STATE DEPARTMENTS AND AGENCIES 11.21 REPORTS AND RECORDS OF STATE AUDITOR (OR SIMILAR OFFICE) 11.22 REPORTS AND RECORDS OF STATE TAX DEPARTMENT (OR SIMILAR AGENCY) 11.23 STATE BUDGETS		

TABLE 1.- NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS (CONTINUED)

SECTION OF SAMPLE PROJECT OUTLINE	NATURE OF DATA REQUIRED	AVAILABILITY		APPLICATIONS	COMMENTS
		PLANNING-SURVEY SOURCES	OTHER SOURCES		
	ITEM A, 3 (CONTINUED): 3.6 INFORMATION NECESSARY TO DETERMINATION OF INCIDENCE, ESPECIALLY DATA FROM ALLIED PHASES LISTED IN THIS COLUMN FOR ITEM A, 1 (SUBITEM 1.5).		12 MISCELLANEOUS DATA SOURCES - 12.1 STATE HIGHWAY DEPARTMENT AND/OR PUBLIC ROADS ADMINISTRATION RSF REPORTS AND SUMMARIES THEREOF (ABOUT 1921-1934) 12.2 RECORDS AND REPORTS OF OTHER GOVERNMENTAL AGENCIES, SUCH AS 12.21 COUNTIES 12.22 CITIES 12.23 SPECIAL DISTRICTS 12.3 REPORTS AND COMPILATIONS BY PUBLIC AND QUASIPUBLIC AGENCIES SUCH AS 12.31 COLLEGES AND UNIVERSITIES 12.32 AMERICAN MUNICIPAL ASSOCIATION 12.33 STATE ASSOCIATIONS OF COUNTY AND LOCAL OFFICIALS 12.34 TAXPAYER ASSOCIATIONS 12.35 CHAMBERS OF COMMERCE 12.36 "FREE LANCE" RESEARCH AGENCIES		
4. OTHER INCOME SOURCES A. TYPES B. PRODUCTIVITY C. EXTENT OF USE	ITEM A, 4: 4 FOR EACH CLASS OF GOVERNMENTAL UNIT 4.1 TYPES SUCH AS 4.11 AIDS 4.12 EARNINGS 4.13 COMMERCIAL REVENUES 4.14 BORROWINGS 4.15 OTHER 4.2 CHARACTERISTICS OF EACH TYPE, 4.21 PRODUCTIVITY 4.22 DEPENDABILITY 4.23 EXTENT OF USE				
8. HIGHWAY TAXATION AND FINANCE IN RELATION TO THE SUPPORT OF OTHER GOVERNMENTAL ACTIVITIES 1. STATISTICAL REVIEW, ALL UNITS OF GOVERNMENT, PAST AND PRESENT A. RECEIPTS B. DISBURSEMENTS C. DEBT D. INTERGOVERNMENTAL RELATIONSHIPS 2. THE ROLE OF PROPERTY TAXES IN GOVERNMENTAL SUPPORT AT ALL LEVELS 3. SPECIAL TAXES FOR GENERAL OR SPECIAL PURPOSES 4. OTHER INCOME SOURCES (E.G., EARNINGS, FEES, COMMERCIAL REVENUES)	ITEM B, 1-4: 1 FOR EACH CLASS OF GOVERNMENTAL UNITS - 1.1 ALL MATERIAL REQUIRED FOR ITEM A. 1.2 SIMILAR MATERIAL FOR FUNCTIONS OTHER THAN HIGHWAYS TO DATA REQUIRED FOR SUBITEMS 1.1 THROUGH 1.4 UNDER ITEM A. 1, AND ALL SUBITEMS UNDER ITEM A.4	ITEM B, 1-4: 1 DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS - 1.1 BASIC PLANNING-SURVEY FISCAL STUDY. 1.2 CONTINUING FISCAL STUDIES OF PLANNING SURVEYS (ORDINARILY INCLUDE ROAD-FINANCE DATA ONLY)	ITEM B, 1-4. 10 DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS - 11 STATE DATA 12 MISCELLANEOUS DATA SOURCES ALL SOURCES LISTED UNDER THESE HEADINGS FOR ITEM A SHOULD BE CANVASSED. SOME, SUCH AS THOSE LISTED UNDER SUBITEMS 10, 3, 11.1, AND 12.1 WILL PROVIDE ONLY HIGHWAY DATA.	ITEM B, 1-4 PRINCIPAL APPLICATIONS 1. INDICATION THROUGH MEDIUM OF HISTORICAL PRESENTATION OF INCREASING IMPORTANCE OF HIGHWAY FUNCTION TO TOTAL FUNCTIONS OF MOST UNITS OF GOVERNMENT. 2. INDICATION OF OTHER SHIFTS IN GOVERNMENTAL ACTIVITY - ADDITION OF SOME FUNCTIONS, GROWTH OF OTHERS, DECLINE (IN RELATIVE IMPORTANCE, AT LEAST) OF STILL OTHERS. 3. DETERMINATION OF INDEXES (E.G., PRICE-LEVEL AND PER CAPITA) 4. INDICATION OF IMPORTANT CHANGES IN METHODS OF FINANCING GOVERNMENTAL ACTIVITIES, AND OF RESPONSIBILITY FOR FINANCING THEM. 5. DETERMINATIONS OF INCIDENCE (BURDENS) FOR GOVERNMENTAL FINANCING 6. COMPARISONS OF BURDENS AND BENEFITS GENERALLY. 7. MEASUREMENT OF RELATIVE "EFFORT" PUT FORTH BY VARIOUS CLASSES OF GOVERNMENTAL UNITS, OR OF TAXPAYERS, IN CARRYING ON GOVERNMENTAL PROGRAMS 8. MEASURING AND COMPARING DEPENDABILITY AND DESIRABILITY OF VARIOUS INCOME SOURCES	ITEM B, 1-4: 1. SINCE THIS IS A HIGHWAY STUDY IT IS NOT TO BE EXPECTED THAT THE PRESENTATIONS OF DATA FOR OTHER GOVERNMENTAL ACTIVITIES WILL BE IN GREAT DETAIL. THE AIM WILL BE ONLY TO INDICATE: A. THE PAST AND PRESENT PLACE OF HIGHWAY ACTIVITIES AS COMPARED TO OTHER ACTIVITIES. B. WHETHER THE DEMANDS FOR OTHER ACTIVITIES ARE GROWING OR NOT. C. WHETHER THE TOTAL BURDENS UPON THE VARIOUS GROUPS OF TAXPAYERS ARE EXCESSIVE. 2. THESE DATA WILL ALSO BE USED SUBSEQUENTLY (SECTIONS E, F, AND G) IN THE EVALUATION OF PAST AND PRESENT FISCAL POLICIES, AND THE DETERMINATION OF PROGRAMS THAT ARE EQUITABLE AND FEASIBLE. THE PRESENTATIONS IN THE "HISTORICAL" SECTION OF THE REPORT SHOULD, PERHAPS, BE LIMITED TO APPLICATIONS 1-4 AND 8.

P-5914

TABLE 1.- NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS (CONTINUED)

SECTION OF SAMPLE PROJECT OUTLINE	NATURE OF DATA REQUIRED	AVAILABILITY		APPLICATIONS	COMMENTS
		PLANNING-SURVEY SOURCES	OTHER SOURCES		
C. COMPARISONS WITH OTHER STATES FOR A SERIES OF YEARS INVOLVING 1. RELATIONSHIP OF HIGHWAY AND OTHER GOVERNMENTAL ACTIVITIES A. YEARS OF SUPPORT B. MAGNITUDE OF (1) RECEIPTS (2) DISBURSEMENTS (3) DEBT C. RELATIVE BURDENS, EFFORT, ETC. 2. SPECIFIC COMPARISONS FOR HIGHWAY FUNCTION A. ORGANIZATION - (1) GOVERNMENTAL UNITS (2) SYSTEMS B. FINANCING - (1) SUPPORT (2) DISBURSEMENTS (3) DEBT (4) RELATIVE BURDENS, EFFORT, ETC. 3. MEASURES OF RELATIVE ABILITY OF STATES TO FINANCE GOVERNMENTAL OPERATIONS A. AREA B. POPULATION (1) TOTAL (2) RURAL-URBAN DISTRIBUTION (3) COMPOSITION C. ECONOMY (1) TYPE (2) WEALTH AND INCOME D. POTENTIAL ABILITY TO OWN AND USE MOTOR VEHICLES	ITEM C, 1-3 1. FOR EACH CLASS OF GOVERNMENTAL UNITS 1.1 ALL MATERIAL REQUIRED FOR ITEMS A AND B 1.2 SIMILAR MATERIAL FOR EACH STATE WITH WHICH COMPARISON IS TO BE MADE (ORDINARILY IN MUCH LESS DETAIL) 1.3 SOME INDICATIONS OF FUTURE SITUATIONS (FROM OTHER PHASES OF PROJECT FOR THIS STATE; PROBABLY FROM OUTSIDE SOURCES FOR OTHER STATES) 1.31 POPULATION (INCLUDING DISTRIBUTION AND COMPOSITION) 1.32 WEALTH AND INCOME 1.33 MOTOR-VEHICLE OWNERSHIP AND USE	ITEM C, 1-3 1. DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS 1.1 BASIC PLANNING-SURVEY FISCAL STUDIES (FOR EACH STATE INVOLVED). 1.2 CONTINUING FISCAL STUDIES OF PLANNING SURVEYS (FOR EACH STATE INVOLVED) 1.3 MOTOR-VEHICLE-ALLOCATION STUDIES OF BASIC PLANNING SURVEYS FOR EACH STATE TO BE COMPARED WITH THIS STATE (DATA FOR THIS STATE SHOULD BE FURNISHED BY OTHER SECTIONS OF PROJECT STAFF) 1.4 ROAD-USE STUDIES OF BASIC PLANNING SURVEYS FOR EACH STATE TO BE COMPARED WITH THIS STATE (DATA FOR THIS STATE SHOULD BE PROVIDED BY OTHER SECTIONS OF PROJECT STAFF) 1.5 ANY SPECIAL FORECASTS (SUCH AS HAVE BEEN MADE IN SEVERAL STATES) OF - 1.51 POPULATION 1.52 MOTOR VEHICLE OWNERSHIP AND USE 1.53 INCOME FROM MOTOR-VEHICLE TAXATION 1.54 WEALTH AND INCOME	ITEM C, 1-3 10. ALL CLASSES OF GOVERNMENTAL UNITS 11. STATE DATA ALL SOURCES LISTED UNDER ITEM A, INCLUDING LOCAL COUNTERPARTS OF STATE, COUNTY, OR LOCAL SOURCES, MAY NEED TO BE CANVASSED FOR EACH STATE INVOLVED. 12. MISCELLANEOUS DATA SOURCES 12.1 ALL SOURCES LISTED UNDER ITEM A, INCLUDING LOCAL COUNTERPARTS OF STATE, COUNTY, OR LOCAL SOURCES, MAY NEED TO BE CANVASSED FOR EACH STATE INVOLVED. 2.2 STUDENSKI, PAUL, MEASUREMENT OF VARIATIONS IN STATE ECONOMIC AND FISCAL CAPACITY, BUREAU MEMORANDUM NO. 50, U. S. SOCIAL SECURITY BOARD, 1943.	ITEM C, 1-3 PRINCIPAL APPLICATIONS 1. INDICATION THROUGH MEDIUM OF LIMITED HISTORICAL PRESENTATION (PROBABLY "KEY" YEARS ONLY) OF INCREASING IMPORTANCE OF HIGHWAY FUNCTION AND HOW PROVISION HAS BEEN MADE FOR MEETING ADDED DEMANDS IN EACH OF THE STATES COMPARED. 2. SIMILAR INDICATION OF OTHER SHIFTS IN GOVERNMENTAL ACTIVITY. 3. COMPARISON OF METHODS OF FINANCING HIGHWAY AND OTHER ACTIVITIES FROM STANDPOINT OF- A. CLASSES OF UNITS RESPONSIBLE B. TYPES OF INCOME USED BY EACH TO FINANCE PROGRAMS, AND EXTENT OF RELIANCE UPON EACH TYPE C. THE DEBT SITUATION 4. COMPARISONS OF - A. INCIDENCE (BURDENS) OF TAXES AND OTHER IMPOSTS USED TO FINANCE MAJOR FUNCTIONS. B. EFFORT PUT FORTH, AS MEASURED BY, (1) WEALTH (2) INCOME C. ADEQUACY AND EQUITY OF FISCAL SYSTEMS NOW IN USE D. POTENTIAL ABILITY TO FINANCE FUTURE GOVERNMENTAL PROGRAMS	ITEM C, 1-3 1. BEST SINGLE CONTACT FOR OBTAINING DATA FROM ANOTHER STATE WILL ORDINARILY BE THE PLANNING SURVEY OF THAT STATE. PUBLIC ROADS FIELD AND HEADQUARTERS PERSONNEL CAN BE CALLED UPON FOR ASSISTANCE. 2. THE EXTENT TO WHICH COMPARISONS ARE MADE WITH OTHER STATES WILL DEPEND UPON THE PROBLEMS PREVAILING IN STATE UNDERTAKING LONG-RANGE PROJECT.

TABLE 1.- NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS (CONTINUED)

SECTION OF SAMPLE PROJECT OUTLINE	NATURE OF DATA REQUIRED	AVAILABILITY		APPLICATIONS	COMMENTS
		PLANNING-SURVEY SOURCES	OTHER SOURCES		
). PRINCIPLES AND POLICIES OF HIGHWAY FINANCE AND TAXATION 1. HISTORICAL REVIEW A. TRADITIONAL REVENUE SOURCES, GROWTH, EXTENT OF USE, PARTIAL OR COMPLETE ABANDONMENT, RELATION OF FINANCING OF OTHER GOVERNMENTAL ACTIVITIES B. DEBT (1) TYPES (2) EXTENT OF USE (3) EFFECT ON FISCAL SYSTEM C. LEGISLATIVE AND ADMINISTRATIVE ATTITUDES AND POLICIES COMPARED WITH RECOGNIZED PRINCIPLES, ESPECIALLY WITH RESPECT TO (1) INCOME SOURCES (2) EARMARKING OF REVENUES-DIVERSIONS (3) SHARING REVENUES (4) BORROWING (5) TAX AND DEBT LIMITATIONS 2. SPECIAL STUDIES OF SPECIFIC ITEMS A. THE PROPERTY TAX (1) TYPES IN USE (2) ASSESSMENT PRACTICES (3) RATES - LIMITATIONS (4) DEPENDABILITY (5) USES B. MOTOR-VEHICLE-USER TAXES (1) TYPES IN USE (2) BASES AND RATES (3) LIMITATIONS (4) FUTURE PROSPECTS C. DEBT (1) EXTENT PERMITTED (2) RETIREMENT REQUIREMENTS (3) REIMBURSEMENT ARRANGEMENTS (4) PRESENT STATUS AND FUTURE OUTLOOK (5) DEBT VS. "PAY-AS-YOU-GO".	ITEM D, 1, 2 1. FOR ALL CLASSES OF GOVERNMENTAL UNITS 1.1 TYPES, BASES, MEASURES, RATES, DISPOSITION OF TAXES IMPOSED 1.2 ASSESSMENT SCHEDULES AND PROCEDURES 1.21 ASSESSMENT METHODS 1.22 AMOUNTS 1.23 RELATION TO FULL VALUE 1.24 EQUALIZATION 1.25 PROCEDURES FOR REASSESSMENT, INCREASE, OR ABATEMENT 1.26 LIMITATIONS 1.3 TAX LEVIES 1.31 HOW AND WHEN MADE 1.32 LIMITATIONS 1.4 TAX COLLECTION PROCEDURES 1.41 WHEN DUE 1.42 HOW COLLECTED 1.43 DELINQUENCIES 1.44 SEIZURE AND SALE OF PROPERTY 1.5 DEBT PROVISIONS 1.51 AUTHORITY TO INCUR DEBT 1.52 REQUIREMENTS ON ISSUANCE 1.53 LIMITATIONS 1.54 REIMBURSEMENT ARRANGEMENTS	ITEM D, 1, 2 1. DATA FOR ALL CLASSES OF GOVERNMENTAL UNITS 1.1 NARRATIVE OF BASIC PLANNING-SURVEY FISCAL STUDIES 1.2 NARRATIVE AND EXPLANATORY MATERIAL ACCOMPANYING SUBMITTALS OF DATA COLLECTED IN CONTINUING FISCAL STUDIES 1.3 HIGHWAY DEPARTMENT HISTORY PREPARED BY PLANNING SURVEY	ITEM D, 1, 2 10 ALL CLASSES OF GOVERNMENTAL UNITS 10.1 STATE STATUTES AND SESSION LAWS 10.2 "TAX SYSTEMS", PUBLISHED OR SUPPLEMENTED ANNUALLY NOW PUBLISHED BY COMMERCE CLEARING HOUSE, FORMERLY BY TAX RESEARCH FOUNDATION (BOTH CHICAGO, ILLINOIS) 10.3 REPORTS OF STATE EQUALIZATION AGENCIES 11 STATE DATA 11.1 STATE TAX DEPARTMENT REPORTS (SOMETIMES GIVE DATA FOR SUBORDINATE UNITS ALSO) 11.2 REPORTS OF MOTOR-VEHICLE REGISTRATION, MOTOR-FUEL TAXATION, AND CARRIER REGULATION DEPARTMENTS. 12 MISCELLANEOUS DATA SOURCES SAME, IN GENERAL, AS THOSE LISTED UNDER SUBITEM 12, ITEM A.	ITEM D, 1, 2 PRINCIPAL APPLICATION EVALUATION OF PRESENT TAX AND REVENUE SYSTEM FOR THE PURPOSE OF DETERMINING WHAT PRINCIPLES AND POLICIES HAVE DICTATED ITS ADOPTION, AND DETERMINING WHAT CHANGES WILL BE NEEDED TO PROVIDE ADEQUATE SUPPORT FOR FUTURE NEEDS.	ITEM D, 1, 2 1. MAINLY TEXT WITH MINIMUM OF STATISTICS. 2. QUESTION OF EQUITY OF EXISTING TAX SYSTEM TO BE TOUCHED UPON ONLY HERE, PRINCIPAL DISCUSSION TO COME IN SUBSECTION F OF FINANCE AND TAXATION SECTION.

TABLE 1.- NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS (CONTINUED)

SECTION OF SAMPLE PROJECT OUTLINE	NATURE OF DATA REQUIRED	AVAILABILITY: PLANNING-SURVEY SOURCES	AVAILABILITY: OTHER SOURCES	APPLICATIONS	COMMENTS
E. ESTIMATION OF REQUIRED ADDITIONAL HIGHWAY REVENUE 1. ESTIMATE BY YEARS OF FUTURE REVENUE TO BE EXPECTED FROM EXISTING TAXES AS EXISTING RATES, ALLOCATED TO EXISTING AND REVISED ADMINISTRATIVE SYSTEMS A. PROPERTY TAXES B. ROAD-USER TAXES C. OTHER TAX REVENUES D. FEDERAL AID E. OTHER INCOMES 2. COMPARISON, BY REVISED ADMINISTRATIVE SYSTEMS AND BY YEARS, OF EXPECTED REVENUES DEVELOPED IN E. 1, WITH ESTIMATES OF EXPENDITURES REQUIRED TO CARRY OUT PROPOSED PROGRAM IN PERIOD DECIDED UPON. 3. POSSIBILITY AND DESIRABILITY OF BORROWINGS FOR NEW PROGRAM A. SCHEDULE OF BORROWINGS, FOR EACH SYSTEM THAT MIGHT BE UNDERTAKING TO COMPLETE PROPOSED PROGRAM AT DESIRED RATE B. CONDITIONS OF PROPOSED DEBT ISSUES (1) TYPES (2) RETIREMENT PROVISIONS (3) INTEREST RATES 4. DETERMINATION OF ADDITIONAL REVENUE REQUIREMENT BY YEARS TO SUPPORT PROPOSED PROGRAM, INCLUDING PROPOSED BORROWINGS, FOR EACH REVISED ADMINISTRATIVE SYSTEM	ITEM E, 1-A 1. FOR EACH CLASS OF GOVERNMENTAL UNITS 1.1 FORECASTS FROM OTHER PHASES THAT CAN BE USED IN MAKING REVENUE ESTIMATES, 1.11 POPULATION 1.111 COMPOSITION 1.112 DISTRIBUTION 1.12 WEALTH AND INCOME 1.13 MOTOR-VEHICLE OWNERSHIP AND USE 1.2 SCHEDULES OF PRESENT TAX BASES AND RATES 1.3 POSSIBILITIES OF ISSUING NEW DEBT; EXPECTED INTEREST AND OTHER COSTS. 2. FOR PROPOSED REVISION OF ADMINISTRATIVE SYSTEMS (FROM ENGINEERING PHASE) 2.1 NATURE OF REVISION; RELATION TO EXISTING SYSTEMS 2.2 ESTIMATED TOTAL AND ANNUAL COSTS OF PROPOSED PROGRAM FOR 2.21 CONSTRUCTION 2.22 MAINTENANCE 2.23 ADMINISTRATION 2.24 OTHER ITEMS 2.3 CHANGES IN MEANS OF SUPPORT DICTATED BY ADMINISTRATIVE REVISIONS			ITEM E, 1-A PRINCIPAL APPLICATIONS 1. DETERMINATION OF THE EXTENT TO WHICH THE PROPOSED PHYSICAL PROGRAM CAN BE FINANCED FROM EXISTING INCOME SOURCES IF PRESENT TAX BASES AND RATES REMAIN IN EFFECT. 2. DETERMINATION OF THE EXTENT TO WHICH THE PROPOSED PROGRAM CAN OR SHOULD BE SUPPORTED BY NEW BORROWINGS AND THE COST OF SUCH BORROWINGS. 3. DETERMINATION OF THE AMOUNT, IF ANY, OF ADDITIONAL REVENUES TO BE NEEDED IN EACH YEAR COVERED BY THE FORECAST AFTER THE DETERMINATIONS OUTLINED IN 1 AND 2, ABOVE, HAVE BEEN MADE	ITEM E, 1-A EXCEPT FOR THE INFORMATION ON THE NATURE AND EXTENT OF THE PROPOSED PROGRAM TO BE OBTAINED FROM THE ENGINEERING PHASE, IT SHOULD NOT BE NECESSARY TO OBTAIN ANY NEW DATA FOR THIS PART OF THE FISCAL STUDY.
F. EQUITABLE ADJUSTMENT OF OVERALL HIGHWAY TAX SCHEDULES TO OBTAIN REQUIRED ANNUAL REVENUE 1. DETERMINATION FOR EACH REVISED ADMINISTRATIVE SYSTEM OF EQUITABLE SHARE OF TAX BURDEN TO BE BORNE BY A. ABUTTING PROPERTY B. COMMUNITY GENERALLY C. MOTOR-VEHICLE USERS 2. DETERMINATION FOR EACH ADMINISTRATIVE SYSTEM, BY YEARS, OF ADDED REVENUES TO BE RAISED EQUITABLY BY TAXES ON A. ABUTTING PROPERTY B. COMMUNITY GENERALLY C. MOTOR-VEHICLE USERS 3. RECOMMENDED ADJUSTMENT OF IMPOSTS UPON ABUTTING PROPERTY TO PRODUCE REVENUES DETERMINED TO BE EQUITABLY COLLECTIBLE FROM THAT SOURCE, BY SYSTEMS BY YEARS	ITEM F, 1 1. FOR EACH ADMINISTRATIVE SYSTEM 1.1 CHARACTERISTICS OF ROAD USE (FROM ECONOMIC AND SOCIOLOGICAL PHASE) 1.2 MEASURES OF VALUE OF ROADS TO ABUTTING PROPERTY 1.3 MEASURES OF VALUE OF ROADS TO COMMUNITY GENERALLY ITEM F, 2-D 1. FOR EACH ADMINISTRATIVE SYSTEM 1.1 PORTION OF COST OF PROGRAM FOR EACH SYSTEM TO BE BORNE BY EACH INTEREST GROUP (FROM APPLICATION OF PERCENTAGES DEVELOPED UNDER F,1 TO TOTAL SYSTEM COSTS ESTIMATED BY ENGINEERING PHASE (SEE ITEM E)). 1.2 AMOUNTS TO BE PROVIDED BY BORROWINGS, PROPOSED RETIREMENT PROVISIONS, EXPECTED COSTS OF BORROWINGS (FROM ITEM E).		ITEM F, 1-D 10. STUDIES OF BENEFITS CONFERRED BY HIGHWAYS 10.0 LINDMAN, BERTRAM H. A PROPOSED SYSTEM OF HIGHWAY FINANCING FOR THE STATE OF CALIFORNIA, JOINT FACT-FINDING COMMITTEE ON HIGHWAYS, STREETS, AND BRIDGES, CALIFORNIA LEGISLATURE, 1946 10.2 PUBLIC AIDS TO DOMESTIC TRANSPORTATION, BOARD OF INVESTIGATION AND RESEARCH, H. DOC. 159, 79TH. CONG., 1ST. SESS., 1945 10.3 PUBLIC AIDS TO TRANSPORTATION, VOL. IV, PUBLIC AIDS TO MOTOR VEHICLE TRANSPORTATION, FEDERAL COORDINATOR OF TRANSPORTATION, 1940. 10.4 BREED, C. B., OLDER, CLIFFORD; AND POWNS, W. S., HIGHWAY COSTS, ASSOCIATION OF AMERICAN RAILROADS, 1939	ITEM F, 1-D PRINCIPAL APPLICATION THE INTENT OF THIS DETERMINATION IS TO ARRIVE AT PERCENTAGES OF SUPPORT OF EACH SYSTEM THAT SHOULD BE BORNE BY EACH BENEFICIARY GROUP, TO APPLY THESE TO THE ESTIMATED COSTS OF THE PROGRAM PROPOSED FOR EACH SYSTEM, AND, FINALLY, TO DETERMINE THE EXTENT OF THE ADJUSTMENTS THAT MUST BE MADE TO THE EXISTING STRUCTURE OF SUPPORT TO MAKE IT BOTH ADEQUATE AND EQUITABLE. THE NEED FOR INCOME FROM NEW SOURCES WILL BE INDICATED BY ANY ANTICIPATED FAILURE OF EXISTING SOURCES TO MEET THE ESTIMATED NEEDS.	ITEM F, 1-D 1. THERE ARE SEVERAL RECOGNIZED THEORIES BY WHICH APPROXIMATIONS OF BENEFITS ACCRUING TO THE MAJOR INTERESTS SERVED BY THE ROAD NETWORK (I.E., THE INTEREST OF LAND ACCESS, THE PUBLIC, GENERAL WELFARE, INTEREST, AND THE INTERESTS OF MOTOR-VEHICLE USERS) MAY BE MADE. THOSE ADMINISTERING THE PROJECT MUST DECIDE WHICH BEST FITS THEIR NEEDS, AND MAKE THEIR BENEFIT DETERMINATIONS ACCORDINGLY. 2. UPON THE GENERALLY RECOGNIZED ASSUMPTION THAT THE BURDEN FOR THE SUPPORT OF HIGHWAYS SHOULD FALL UPON THE VARIOUS INTERESTED GROUPS ABOUT IN PROPORTION TO THE BENEFITS RECEIVED, THE THEORIES REFERRED TO IN THE PRECEDING COMMENT ALSO SERVE AS BASES FOR THE DETERMINATION OF THE COST BURDENS TO BE ASSIGNED TO THE INDIVIDUAL GROUPS.

P-4091

TABLE 1.- NATURE, AVAILABILITY, AND APPLICATION OF FISCAL AND ALLIED INFORMATION REQUIRED FOR LONG-RANGE HIGHWAY PLAN PROJECTS (CONCLUDED)

SECTION OF SAMPLE PROJECT OUTLINE	NATURE-OF-DATA REQUIRED	AVAILABILITY		APPLICATIONS	COMMENTS
		PLANNING-SURVEY SOURCES	OTHER SOURCES		
ITEM F (CONTINUED) 4. RECOMMENDED ADJUSTMENT OF EXISTING TAXES AND PROPOSAL OF OTHER TAXES TO PRODUCE REVENUES DETERMINED TO BE EQUITABLY COLLECTIBLE FROM COMMUNITY GENERALLY, BY SYSTEMS BY YEARS 5. BALANCE OF REQUIRED REVENUE, BY SYSTEMS BY YEARS, FROM A. MOTOR-VEHICLE USERS B. SOURCES OTHER THAN MOTOR VEHICLES AND PROPERTY 6. INTERRELATION OF MOTOR-VEHICLE, USER TAXES, ADVANTAGES AND APPROPRIATE USES A. REGISTRATION AND ALLIED TAXES B. MOTOR FUEL TAXES C. CARRIER TAXES 7. PRINCIPLES OF DISTRIBUTION OF MOTOR-VEHICLE-USER IMPOSTS AMONG VARIOUS CLASSES OF MOTOR VEHICLES, AND DETERMINATION OF AN EQUITABLE SYSTEM OF DISTRIBUTION, INCLUDING BASES, FEE SCHEDULES AND ALLOCATIONS AMONG SYSTEMS A. REGISTRATION AND ALLIED TAXES B. MOTOR-FUEL TAXES C. CARRIER TAXES 8. RECOMMENDED REVISIONS OF MOTOR-VEHICLE-USER TAXES TO PRODUCE DESIRED YIELD ON EQUITABLE BASIS, ALSO RECOMMENDED ALLOCATION A. REGISTRATION AND ALLIED TAXES B. MOTOR-FUEL TAXES C. CARRIER TAXES 9. BALANCE OF REVENUE (IF ANY) TO BE OBTAINED FROM SOURCES NOT PREVIOUSLY CONSIDERED, PROPOSAL OF A. SOURCES B. BASES AND RATES C. PRODUCTIVITY D. DISTRIBUTION	ITEM F (CONTINUED) 1.3 EXPECTED FUTURE INCOMES FROM PRESENT SOURCES (FROM ITEM E). 2. FOR EACH CLASS OF GOVERNMENTAL UNITS - 2.1 INFORMATION ON POSSIBLE NEW SOURCES OF REVENUE		ITEM F (CONTINUED) 10.5 DILLMAN, GROVER C.; LOCKLIN, D. PHILIP; WILSON, G. LLOYD; AND WORLEY, JOHN S., HIGHWAY COSTS AND MOTOR VEHICLE TAXATION, ILLINOIS HIGHWAY USERS CONFERENCE, 1939. 10.6 THE ECONOMICS OF HIGHWAY PLANNING, TECHNICAL BULLETIN NO. 7, OREGON STATE HIGHWAY DEPARTMENT, 1937. 11 INFORMATION ABOUT POSSIBLE NEW SOURCES OF REVENUE FOR VARIOUS CLASSES OF GOVERNMENTAL UNITS 11.1 FEDERAL, STATE, AND LOCAL GOVERNMENTAL FISCAL RELATIONS, S. DOC. NO. 69, 78TH. CONG., 1ST. SESSION, 1943. 11.2 HILLHOUSE, A. M. AND MAGELSSEN, MURIEL WHERE CITIES GET THEIR MONEY, MUNICIPAL FINANCE OFFICERS ASSOCIATION, CHICAGO, 1945 11.3 BLAKEY, ROY G. AND BLAKEY, GLADYS C. SALES TAXES AND OTHER EXCISES, PUBLIC ADMINISTRATION SERVICE, CHICAGO, 1945 11.4 STATE-COLLECTED MUNICIPALLY SHARED TAXES, REPORT NO. 161, AMERICAN MUNICIPAL ASSOCIATION, CHICAGO, 1946. 11.5 AMERICAN MUNICIPAL NEWS, PUBLISHED MONTHLY BY AMERICAN MUNICIPAL ASSOCIATION		ITEM F (CONTINUED) THE RECOGNIZED BENEFIT-COST THEORIES ARE OF TWO TYPES, AS INDICATED BELOW: A. THEORIES FOR THE DETERMINATION OF BENEFITS ACCRUING TO EACH MAJOR-INTEREST GROUP: (1) ADDED EXPENDITURE (2) DIFFERENTIAL BENEFITS (3) RELATIVE USE (4) PREDOMINANT USE (5) DEMAND FOR SERVICES B. THEORIES FOR THE DETERMINATION OF BENEFITS ACCRUING TO EACH CLASS OF HIGHWAY USER (1) DIFFERENTIAL COST (2) GROSS TON-MILE (3) OPERATING COST (4) DIFFERENTIAL BENEFITS (5) DEMAND FOR SERVICES 3. THIS OPERATION WILL REQUIRE A "CUT AND TRY" PROCESS TO DEVELOP THE MOST SATISFACTORY FISCAL PROGRAM. IT MAY BE FOUND THAT THE DESIRED PHYSICAL PROGRAM CANNOT POSSIBLY BE FINANCED BY ANY MEANS AT HAND WITHIN THE TIME LIMIT SET. IF SO, IT MUST BE REVISED TO A BASIS THAT CAN BE SUPPORTED. FISCAL PROGRAM RECOMMENDED MUST BE COMPLETE IN INDICATING SOURCES AND AMOUNTS OF SUPPORT FOR EACH ROAD SYSTEM AND UNIT OF GOVERNMENT HAVING HIGHWAY RESPONSIBILITY. CONSIDERATION MUST BE GIVEN TO A. NEEDS FOR AND POSSIBILITIES OF NEW REVENUE SOURCES B. CONSIDERATIONS FOR OR AGAINST FINANCING OF CONSTRUCTION BY "PAY-AS-YOU-GO" FINANCING INSTEAD OF BORROWING.
C. RESUME' OF PROPOSED FINANCING PLAN WITH SPECIAL REFERENCE TO 1. SOURCES 2. BASES AND RATES 3. PRODUCTIVITY 4. ALLOCATION BY SYSTEMS 5. RELATION TO FINANCING OF OTHER GOVERNMENTAL ACTIVITIES	ITEM C, 1-5 1. ELEMENTS OF FINANCIAL PLAN DEVELOPED UNDER ITEM F. 2. FISCAL REQUIREMENTS OF OTHER GOVERNMENTAL FUNCTIONS (FROM ITEM A).		ITEM C, 5 10 SOURCES GIVING INFORMATION ABOUT FISCAL ABILITY OF STATES 10.1 STUDENSKI, PAUL, MEASUREMENT OF VARIATIONS IN STATE ECONOMIC AND FISCAL CAPACITY, BUREAU MEMORANDUM NO. 50, U. S. SOCIAL SECURITY BOARD, 1943	ITEM C, 1-5 PRINCIPAL APPLICATION DEVELOPMENT AND PRESENTATION OF COMPLETE PLAN FOR FINANCING PROPOSED HIGHWAY PROGRAM TO BE SUBMITTED WITH IT TO ADMINISTRATORS AND LEGISLATURE.	ITEM C, 1-5 A THEORETICALLY SOUND FISCAL PROGRAM SHOULD BE DEVELOPED UNDER ITEM F. IN THIS SECTION THIS PROGRAM SHOULD BE TESTED AS TO A. ITS REASONABLENESS WHEN COMPARED WITH THE FISCAL REQUIREMENTS OF OTHER FUNCTIONS B. ITS ADMINISTRATIVE AND LEGISLATIVE PRACTICALITY REVISIONS OF THE THEORETICAL PLAN DICTATED BY THESE TESTS SHOULD BE INCORPORATED INTO THE PROGRAM TO BE RECOMMENDED.

two or more sections of the outline, and are not so definitely indicated. Such applications will usually call for the compilation of more information than would appear to be required from a section-by-section study of the outline.

The listing of source material in the third and fourth columns of the table is divided between "planning-survey sources" and "other sources" for the reason that the planning-survey sources are ordinarily those most complete and best adapted for these purposes, although they must, of course, be supplemented in many instances. A canvass of planning-survey data will often indicate where further information can be found most readily and in most usable form. For these reasons a careful study of planning survey sources before any others are sought is considered to be most desirable.

Historical Studies of Finance and Taxation It is to be expected that the fiscal phase of a long-range highway plan project will include the detailed analysis of highway finance and taxation called for in subsection A of the finance and taxation section of the sample project outline. A general statistical review and a detailed discussion of property taxes and road-user taxes for the support of highways are essential to the evaluation of past and present fiscal policies and the determination of future programs that will be both equitable and feasible. In nearly every instance the data presented and the text discussion for this section will be much more extensive and detailed than will be the case with respect to subsection B which considers the importance of highway taxation and finance in relation to the support of other governmental activities. Although no proposed program for highway financing can be expected to receive general support which does not give due recognition to the financial needs of other governmental and quasigovernmental functions, there will usually be no need for the exhaustive detail in these presentations which is absolutely necessary for an adequate presentation of the highway finance problem.

Comparisons among States must not be regarded too seriously but they do have considerable value to a study of this type, particularly so for those States in which the highway finance and taxation problems are most severe. For that reason the presentations called for by subsection C of the financial section of the sample outline will vary considerably according to the needs of the individual States. The best comparisons can probably be made with other States in the same geographic region or with those in other parts of the country having generally similar characteristics.

The study of principles and policies governing highway finance and taxation provided for in subsection D of the fiscal and tax study outline is intended to provide a qualitative supplement to the statistical study of highway finance and taxation called for in subsection A. It should indicate the reasons for many of the situations revealed by the statistical studies, and should yield a clear picture of the principles and policies that have dominated highway finance and taxation up to the present time. Above all, it should indicate three things clearly: (1) The nature and extent of fiscal and tax schemes that are permissible under existing laws; (2) The extent to which the principles and policies in effect in the State under consideration agree or disagree with recognized principles and policies of highway finance and taxation; and (3) the probable reception which any proposed innovations in taxation and finance are likely to receive. The importance of this subsection warrants careful

study of all the data sources available and adequately detailed interpretation of the findings.

Financial Requirements of the Physical Program All of the basic information required for subsection E of the fiscal and tax section of the outline should be available either as a product of work already done in the financial analysis or from other phases of the long-range plan project. Thus, the estimates of future revenue to be expected from existing imposts continued at present rates will be predicted upon forecasts of population, wealth and income, and motor-vehicle ownership and use, which should be available from the economic and social phases of the project to which the bases and rates available from the fiscal study will be applied in determining income from each source. The fiscal study analysis of the present debt situation and of the principles and policies that have governed the financing of highways in the State up to now will indicate the desirability and the practicability of relying upon borrowing to finance some portion of the proposed construction program.

The determinations of fact made in the administrative and engineering phases of the project should be sufficient to permit the preparation of a program which will be complete in all the following details: (1) Necessary administrative reclassification and reorganization of the highway network; (2) nature and extent of physical improvements required to make the network adequate; (3) period within which these improvements should be completed; (4) provision for reconstruction needed during this period; (5) requirements for adequate maintenance; and (6) estimated total and annual costs of the program. The final product of this phase of the fiscal analysis will be an indication for each year of the future period covered by the program of the additional revenue required to support that part of the program proposed for each administrative system.

Developing a Fiscal and Tax Program The analysis called for by subsection F of the outline will ordinarily be the most difficult portion of the finance and tax study. It is based upon the assumption that taxation for the support of highways should be assessed primarily in proportion to the benefits received rather than according to the ability of individual taxpayers to bear these burdens. It is rendered especially difficult by the absence of any universally accepted theory for the determination of the portion of the total tax burden that should be borne by each of the three major interests - land access, the general public welfare, and motor-vehicle users - served by the highway and street network, or for the further determination of the benefits accruing to each of the several classes of motor-vehicle users. Some help toward the choice of a theory or theories which will best suit the needs of an individual State can be obtained from the published references listed in the "other sources" column. These references are of two types: (1) More or less objective studies by supposedly disinterested researchers, and (2) products of specific-interest groups that naturally reflect their attitudes and policies toward the problems.

A careful appraisal of a number of the recognized theories for apportioning highway taxes among the major interest groups, and for apportioning motor-vehicle taxes among classes of users, is contained in a report prepared by Mr. G. P. St. Clair, of the Public Roads Administration, which bears the title 'Suggested Approaches to the Problem of Highway Taxation." This report has not yet been published, but a

digest thereof is included in the *Proceedings* of the Twenty-Seventh Annual Meeting of the Highway Research Board(See p.1, *Proceedings*).

This portion of the analysis will require the application of a "cut and try" process to develop the most satisfactory fiscal and tax program. It may even be found, after careful consideration, that there is not enough fiscal ability in a State to finance the entire proposed physical improvement program within the time limit set and also carry on other necessary governmental activities. If so, it will be necessary to revise the physical program to one that can be supported. For this reason it would seem to be most important that in the case of any State in which the financial problem is an especially serious one this analysis should have been completed before any recommended physical program is released for public consideration.

It may be that the determination will indicate that some units of government will not be able to finance their share of the proposed program from existing revenue sources, but that they can carry their share of the load if new revenue sources can be found. Under such circumstances a careful study of the possibilities of obtaining revenue from various types of new sources is called for, inasmuch as the fiscal plan will not be complete if suggestions as to possible revenue sources and indications of their productivity are not made. Five of the best known published sources of information about possible new sources of revenue are listed in the "other sources" column of the table.

In developing the recommended fiscal and tax program, due consideration must be given to debt-service requirements of the various units of government for both outstanding debt and any debt that may be recommended to be incurred in connection with the program. Adequate consideration must also be given to the possible further development of intergovernmental relationships such as tax sharing, the granting of aids, and joint participation in the financing of highway activities.

The last subsection of the financial and tax section of the sample outline calls for a resume of the proposed financing plan and will, in effect, provide for a final consideration of the over-all plan from the standpoint of its reasonableness when compared with the fiscal requirements of other governmental functions and its administrative and legislative practicability. Any revisions of the theoretical plan dictated by these tests should then be made, after which the fiscal and tax program to be submitted to administrative officials, the State legislature, and the public, can be prepared. It may even be found desirable to submit a number of alternate programs calling for different rates of completion and corresponding variations in annual fiscal requirements. Then it will become possible for the legislature and the taxpayers to make the final decision as to how rapidly they desire to achieve a completely adequate network of highways.

THE ADEQUACY OF AVAILABLE INFORMATION

Since the funds, personnel, and time available for the completion of most long-range highway plan projects will be such as to preclude any considerable amount of original data collection and analysis, the early discovery of the best and most complete sources of information becomes a prime essential to the successful completion of any such project. For this reason critical evaluation of the most commonly found data sources is in order.

Value of Data from Basic and Continuing Planning-Survey Studies It is evident that if all of the basic studies of the initial phase of highway-planning-survey operations have not already been completed, or practically so, in a given State the preparation of a scientifically based long-range highway plan for the State will be rendered extremely difficult. The development of a plan for California was hindered considerably by the fact that no road use study has been made in that State.

It is frequently argued that the basic studies made in the initial phase of planning-survey operations and not since repeated or brought up-to-date are so far out-of-date that they will now have no value in connection with the preparation of a long-range highway plan. From the standpoint of automobiles and motor busses this argument is fallacious because most of the passenger motor vehicles in use today are not essentially different in form, size, weight, and operating characteristics from those that were using the highways ten years ago, when most of the studies were made. Even in the case of trucks and other highway freight-hauling vehicles the changes that have occurred in the basic forms of the vehicles have been relatively insignificant. The most important change has been in the weight and capacity distribution of the vehicles in use, and criteria are available that make it possible to estimate this trend with reasonable accuracy. The operating characteristics of the individual classes of freight-carrying vehicles have changed only moderately, and the extent of these changes can be approximated from other data available.

The intervention of the war unquestionably slowed up the development of both the motor vehicle and the highway. Furthermore, the almost complete stoppage during the war years of the production of vehicles designed for civilian use has resulted in the retention in service of many motor vehicles manufactured ten or more years ago which would have been scrapped long before now under ordinary circumstances.

Although highway traffic has surged to new high levels since the ending of hostilities, there are positive indications that the travel habit patterns of most users of motor vehicles are not essentially different now from what they were in 1936 and 1937. The Public Roads Administration has based its recent estimates of total travel during 1946 upon this assumption. By applying to relationships developed from basic planning-survey studies such corrections as are dictated by changes in registrations, fuel consumption, and observed traffic on rural roads, it has been possible to arrive at estimates of rural and urban traffic, classified according to travel performed by passenger- and property-carrying vehicles, for recent years, that are believed to be reasonably accurate. Similar techniques can be applied to other segments of basic planning-survey data to make them usable in developing future highway programs.

In those States in which the recommended continuing highway-planning-survey program has not yet been completely established, it will be found extremely difficult to make scientific determination of present conditions and deficiencies or of future needs. The continuing studies were designed both to complement and to supplement the basic planning-survey program. The procedures developed for the compilation and analysis of the information sought in both the basic and continuing fiscal studies have been oriented toward the preparation of long-range highway programs. Therefore, a minimum of revision and retabulation of the data available from these sources will be needed

to make them usable for that purpose. Consequently, if the basic fiscal study is complete and is supplemented by continuing fiscal studies that are complete and up-to-date the combination will provide in most States the best single primary source of much of the fiscal information needed for the preparation of a long-range highway plan.

The recommended basic fiscal study covered all financial transactions of all the units of government of a State for all purposes during a single year, and deviations from the recommended study were few. The recommended continuing fiscal study program calls only for an annual compilation and analysis of the financial transactions for highway purposes of all units below the State level. The annual statistics on State highway finance compiled for the Public Roads Administration by the State highway departments (usually by the planning-survey organizations) can readily be combined with the data obtained in the continuing fiscal studies to yield a complete annual picture of highway financing in that State, provided that the continuing fiscal study is complete and up-to-date in its coverage.

Because of the difficulty of obtaining information about the fiscal transactions of incorporated places in some States, this feature of the continuing local-road-finance studies as outlined by the Public Roads Administration was not made a requirement until recently. At present approximately 30 States are engaged in the annual collection and analysis of highway-finance data for incorporated places, while more than 40 are carrying on the annual collection and analysis of similar data for counties and/or local rural governmental units.

In most of the States the only information available from planning-survey sources that will indicate the relationship of the highway-finance picture to the total picture of governmental finance in the State are the compilations prepared in connection with the basic fiscal study. A few States, perhaps more foresighted than the rest, have included the complete fiscal activities of counties and local rural units in the scope of their continuing fiscal studies. These States will be fortunate indeed, when it comes to preparing long-range plans. However, the Public Roads Administration has not recommended the inclusion of information on other than highway activities in the continuing fiscal studies primarily because of the belief that this would render them too cumbersome to be kept up-to-date, and also because Public Roads officials have been of the opinion that usable and reasonably complete information on governmental finance generally could be obtained from compilations made by the U. S. Census Bureau and other agencies.

The "narrative reports" on the basic fiscal studies of most States contain a detailed discussion of the entire tax and revenue system of the State and its subordinate units as it existed when the study was made. Discussions of valuation procedures, tax and debt limitations, and of all aspects of intergovernmental relationships are usually found there also. Subsequent changes in the tax system, in assessment procedures, in tax and debt limitations, or in intergovernmental relationships that affect the highway function will ordinarily be reported in either the annual State highway statistics submittals to Public Roads or in the explanatory material prepared to support the county and local road finance data compiled in the continuing fiscal studies.

The planning surveys of most of the States have also compiled State highway department histories. The majority of these contain financial

statistics and other information for the earlier years that will be of great value to the long-range plan projects.

Other Highway Department and Public Roads Sources The annual compilation of the State highway departments for the Public Roads Administration of statistical information regarding motor vehicle registrations, fuel consumption, State taxation of highway users, disposition of State motor-vehicle-user revenues, and State highway finances generally will provide a reasonably comparable series of data for at least the last 25 years. This information, supplemented with data obtainable from highway department and other State reports, should provide practically all the information needed for a historical study of the growth in the number and use of motor vehicles, motor-vehicle taxation, and the financing of State highways.

The collection of information about the financing of rural roads under the jurisdiction of county and local governments was begun in a rather crude way by the Bureau of Public Roads and the States more than 25 years ago. These data obtained were not nearly as complete as those available on State highway financing and were sometimes developed by expansion of rather unsatisfactory samples, but they do give a general indication of the extent and nature of the highway fiscal operations of such rural units during earlier years. Files of these earlier reports may be available in some of the State highway departments, or in the district or division offices of the Public Roads Administration. Some of these data are still on file in the Washington office of the Public Roads Administration as also are the summary tabulations for all States prepared therefrom.

This method of collecting financial statistics for roads under the jurisdiction of counties and local rural units was discontinued in the early 1930's, just a year or two before the basic fiscal studies of the highway planning surveys were made in most States. However, it should be possible in the majority of States to develop a reasonably satisfactory historical picture of the financing of rural roads not under State control by combining these data with those available from planning-survey sources and making estimates for missing years.

The information available in most States about the financing of streets in incorporated places is rather meager. The Bureau of Public Roads and most of the States made no attempt to collect such information prior to the beginning of planning-survey operations except in connection with a few special fiscal and economic studies. As a result of these conditions it is not possible in any State to present a long-term historical picture of the financing of streets in incorporated places from planning-survey and other State highway department sources alone.

Other Major Sources of Fiscal Data The number of sources of governmental finance data available outside the planning survey will vary considerably from State to State. The one universal source of this type is, of course, the publications of the U. S. Bureau of the Census. Its Governments Division annually publishes at least four series of fiscal reports: one on State finances; one on county finances; one on the finances of the larger cities; and one on governmental debt generally. At the present time no data are collected or published for any city having a population of less than 25,000 according to the 1940 census. This lower limit has varied, however, and has been at 30,000 and 100,000 population at various times.

The Governments Division also compiles and publishes at ten-year intervals a decennial census of governments which theoretically includes data for all governmental units. The last decennial census covered 1942. Budgetary limitations and changes in policy have acted together to make the Census Bureau data on governmental finance somewhat less satisfactory as a source of material for a long-range plan project than they might be expected to be, but the publications of the Governments Division do offer a valuable source of collateral information.

The extent of coverage of Census Bureau data on governmental finance can be indicated by a few statistics. There were in the United States in 1942 a total of 46,184 recognized governmental units other than school districts, of which there were about 108,000. The units other than school districts for which data were obtained for the decennial census totaled 25,583. These included all of the 48 States, all but 32 of the 3,315 incorporated places having populations of 25,000 or more inhabitants, and about half of the 14,146 smaller incorporated places. All but 83 of the 3,050 operating counties reported, but less than 60 percent of the 17,341 townships and rural towns furnished data. Information was received from less than 40 percent of the 8,332 special-district governments. Much of the information about school-district finances was received from other units of government. Estimates were made for the units of all classes from which no data were obtained.

During recent years the annual statistical compilations of the Governments Division have been based to some extent upon sampling. Data are obtained from each State and for each incorporated place having 25,000 or more inhabitants, but the totals for counties are based largely upon information received from approximately 1,000 counties chosen as being representative of all counties in the United States.

In the average State it is not too difficult to obtain information in considerable detail on the current financial transactions of the State and on the State debt situation. At present nearly all States require the reporting of information on county and local debt to some central State agency. Two-thirds now require complete fiscal reporting by counties and about one-half require similar reporting by all local units. As might be expected, the value of material available from such sources varies considerably among the States. Some, Massachusetts, New York, and Wisconsin, for example, request and get accurate and comprehensive statements from their subordinate units which include detailed breakdowns of receipts as to sources, of expenditures according to function, and of debt according to purpose. In other States, of which Virginia is one, provision for collecting such information is made but not strongly enforced, while in others, including Oklahoma and South Carolina, the information obtained is either incomplete, so inaccurate, or so lacking in detail as to be of little value for long-range highway plan projects. The Public Roads Administration has suggested that the planning surveys make the fullest possible use of all centrally collected data for counties and local units in connection with the continuing fiscal studies.

It has been indicated that State laws sometimes provide for centralized reporting by counties but do not require it of other units. In a number of these States, however, some or all classes of local units are required to file annual financial reports at the county seat. For example, the North Dakota town-

ship officials must file annual statements of receipts and disbursements with their respective county auditors. Although these statements are little more than lists of cash items received and warrants drawn on the township treasury, they are nevertheless extremely valuable as a source of data for the continuing highway fiscal study in that State. The information available in the township reports must be retabulated in order to make it usable, but this is by no means an impossible task because the average number of entries is relatively small.

There are some States in which no report to either the State or county officials is required of any of the subordinate units, but in which State laws require the publication of some sort of annual report by each unit. As a general rule these reports do not provide very satisfactory functional classifications of disbursements, and sometimes can be made usable only by obtaining interpretations of the items reported direct from the local officials themselves.

The laws of practically all States require that the books of counties and local units be audited at more or less regular intervals, which usually vary from one to three years. Where no reports of any kind are submitted to any central agency, or published, these audits form the only readily available source of obtaining fiscal data from these governmental units. In some States, auditing service is provided at or near cost to the subordinate units, and where this is done it is usually possible to obtain access to a file of the audits in a central State office. Otherwise, copies of the audits must be obtained by the planning surveys from either the individual units or the firms making the audits, or where this is not possible, they must be inspected in the offices of the individual units.

There are some States in which the only method of obtaining financial statistics on highway or other phases of governmental operations is by visiting the office of the individual units and obtaining the data directly from their books. This is, of course, an expensive and time-consuming process but is being relied upon to obtain information for the continuing fiscal studies in some States. Under these circumstances the planning surveys usually obtain the fiscal data desired through field visits to a limited sample of the units below the county level. The data so collected are frequently supplemented by such information as can be obtained through the use of questionnaires sent to all such units. The Public Roads Administration has recommended that where this procedure is followed the sampling be limited entirely to the incorporated and unincorporated places having small populations, and that data be obtained directly from all counties and from all incorporated places having populations of 5,000 or more. This lower population limit for incorporated places was decided upon as there are relatively few such places in most States and also because the 5,000-population figure is the lower limit of the application of urban Federal aid under the provisions of the 1944 Federal-Aid Act.

Intergovernmental transfers of funds sometimes provide a source of information that can be used in making estimates for units for which no data are available, and also as a check on the accuracy of information obtained from other classes of units. For example, State highway aid payments to counties and local units can be compared with the receipts reported by these units in checking the accuracy of data obtained from them. Due consideration must be given, of course, to the effect that differ-

ences in fiscal periods covered and time lags occuring during transfers will have on such reconciliations. In a number of States the counties collect all taxes and pay to other governmental units the shares to which they are entitled. The records of such payments have often been used to good advantage in developing estimates of fiscal data for units for which other information is lacking.

The sample outline for the long-term project report provides for comparisons among States. The two best channels for obtaining information for other States readily are probably the publications of the Census Bureau already referred to, and the planning surveys of the various States. Statistical publications of the Public Roads Administration will also be helpful.

APPLICATION OF FINANCIAL DATA

Fiscal and allied data will be applied in at least four ways in the determination of a long-range highway plan for any given State: First, they will be necessary for an adequate understanding of the present situation; second, they will be needed for the forecasting function; third, they will be required for the development of a better and more equitable financial scheme for the State; and fourth, they will be required for the development and support of formal proposals that will be offered as a result of the survey.

Preparation of Forecasts Financial data will be applied in three ways in the preparation of forecasts. First, historical data, including information on present conditions, will be needed to estimate the dollar requirements of the proposed physical program. This may include determination of the estimated needs for construction and maintenance as well as those for administration, debt service, and other highway purposes. Although the requirements for construction and maintenance will probably be estimated by the staff engaged in the engineering phase of the work, the requirements for administration, debt service, and other miscellaneous items will often, of necessity, be determined almost entirely by the financial staff.

The second step in the forecasting function will be the determination of expected incomes from present sources of revenues, assuming the continuation of existing tax rates. To do this it will be necessary, of course, to make estimates of expected trends in property valuations, motor-vehicle ownership and use, carrier operations, and any other similar factors that will have a bearing on future governmental incomes for highway purposes.

Finally, the forecast must take into account the expected ability of the public to support such programs as are contemplated. For this determination it is necessary to consider the entire picture of public finance, giving due consideration to such items as possible increases in requirements for public welfare, health, education, etc. Consideration must also be given to what the future sociological and economic resources of the State are likely to be; its population, the nature and extent of its agriculture and industry, and the wealth and income of its citizens.

Development of Better Systems of Support It is recognized that in almost all States the current provisions for financing their highway networks are somewhat out of line; only mildly so in some cases, but to a considerable degree in others. It is frequently complained that the cost of constructing and operating the city street system impinges too heavily upon the property tax payer and not enough upon the motor-

vehicle user. On the other hand, there are instances in which motor vehicle users are being taxed to support highways that should be financed largely, if not entirely, for property-tax revenue.

The development of better and more equitable schemes for financing highways that will overcome the more serious shortcomings of the present schemes requires two major determinations which are among the most important functions required of the financial phase of the long-range-plan projects. The first is an estimation of the benefits accruing to and the costs that should be borne by the various interest groups that benefit from the highway network. The second is the determination of how the burden to be borne by highway users generally shall be apportioned among the various classes of highway users. An allied problem, as indicated in subsection F of the sample project outline is that of gearing these findings into the existing revenue structures of the State and its subordinate governmental units.

There is fairly universal agreement that the highway function is one of the few governmental functions that should receive most of its support from imposts levied upon a "benefit" rather than upon an "ability to pay" basis. The apparent reason for this view is that two of the three major interests served by the highway network are more private than public in character. These are the interest of access to land and improvements, which service is indispensable to personal, family, and business activity, and the interest of the motor-vehicle user in having available facilities upon which his own vehicles or those owned by others but utilized by him may be operated for any legitimate purpose he may choose.

The third major interest, the general-welfare or public interest, is more nearly similar in character to most of the governmental functions that are customarily supported almost entirely upon the "ability to pay" principle. This interest is not only represented by the use of roads in transacting public business, in national defence, in providing protection to persons and property, and in furnishing employment during periods of depression, but also through the provision of an intermediate service between that provided to abutting property and that provided to the motor-vehicle user who wishes to travel beyond "neighborhood" bounds. This intermediate or "neighborhood" service concept is rather indefinable but its existence is clearly recognizable. The service provided by the three blocks of pavement between the block in which a certain shopper lives and that in which the store at which she trades is located is of this type.

There is a considerable degree of parallelism between the major interests served by the highway network and the major sources that have been relied upon in the past for revenues for the support of the highway function. These are taxes upon property, direct taxes upon motor-vehicle users, and appropriations from general governmental revenues. These sources furnish a foundation upon which a more equitable structure of support can be based. One of the pressing needs of highway finance is to adjust tax schedules so as to bring the major interests served and the major revenue sources into balance.

It has been pointed out that there are several recognized theories by which highway benefits and costs can be apportioned among the beneficiary groups, and also that there are several theories by which the benefits accruing to and the costs to be borne by individual groups of highway users may be determined. The theories for determining the benefits and costs to be

apportioned among the major interest groups are commonly designated as follows: (1) Added-expenditure theory, (2) theory of differential benefits, (3) relative-use theory, (4) predominant-use theory, and (5) demand for services. Those by which benefits and costs may be apportioned among the various classes of motor vehicle users are usually referred to as follows: (1) Differential cost theory, (2) gross ton-mile theory, (3) operating cost theory, (4) theory of differential benefits, and (5) demand theory.

None of these theories has received universal acceptance but each has some merit. The planners in any individual State will need to consider all of them, decide upon the ones they will accept and devise their theoretical financial schemes accordingly. Consideration of the strong and weak points of individual theories is not within the province of this paper.

The scheme for financing the long-range highway program that will ultimately be recommended by the planners will probably not be the "ideal" scheme because practical considerations will indicate the impossibility of its application now in that form. The governmental organization of a State, its tax structure, and the temper of its legislative body and executive officials often dictate modifications of ideal schemes to make them workable and acceptable under prevailing conditions. Furthermore, the ideal may impose a greater burden on certain segments of the public than they can or will pay. Then, too, consideration must be given to the size of the over-all highway program that can be financed concurrently with the other activities that will be engaged in by any State and its subordinate political divisions. The final proposal will undoubtedly be a result of a trial and error process adopted to find the optimum road program that will be as equitable as possible and still receive general acceptance. The fiscal program finally recommended should clearly indicate the reliance to be placed by each level of government upon each type of income, and should contain definite recommendations concerning the desirability of financing construction programs from current revenues or from borrowings. The recommendation should also contain reference to specific sources of new revenues that will need to be tapped by some units, particularly cities, if they are to carry their share of the added burden necessary to provide an adequate road network.

APPENDIX

OUTLINE OF COMPLETE SURVEY REPORT

The following suggested outline for a report or series of reports on a complete long-range highway-needs survey in a typical State was appended to the Public Roads Administration's General Administrative Memorandum No. 319 issued September 24, 1947. The section headed "Finance and Taxation" formed the basis for the outline presented in Table 1 of this paper, to which most of the text discussions refer.

INTRODUCTION

A. Auspices of the survey
B. The place of highway transportation in the economy of the State
C. The complementary relationship of highways and vehicles
D. Statement of the problem
1. Essential coordination of (a) vehicle and traffic regulation, (b) highway design standards, and (c) vehicle and road user taxation
2. Highway improvement lags
a) Pre-war deficiencies
b) Wartime deferments
c) Postwar obstructions
3. Necessity of plan to meet future highway needs
4. Essential coordination of Federal-aid, State, county, and city highway programs
5. Requisite intergovernmental administrative relations
6. Needed revision of laws

HISTORY OF HIGHWAY DEVELOPMENT IN THE STATE

A. General historical review
B. Indices - historic trends
1. Population; distribution of governmental subdivisions, and proximity to highway and street networks
2. Highway and street mileages by systems and surface types
3. Vehicle registration by trucks, busses, and passenger cars
4. Vehicle-miles of travel by highway systems
5. Vehicle sizes and weights
C. Governmental participation
1. Federal
2. State
3. County (township)
4. City.
D. Investment in highways
1. Amount
2. Sources
3. Distribution by systems
E. Results of highway development to date
F. Comparison with other States

CHARACTERISTICS OF ROAD USE

A. Variation in traffic volume; averages; peaks and their significance in highway design
B. Range of trips
C. Origins and destinations of travel
D. Speeds
E. Effects of capacity and other highway characteristics
F. Kinds of vehicles (sizes and weights)
1. Passenger cars
2. Busses
3. Trucks
4. Trailers
G. Service rendered
1. To national defence
2. To agriculture
3. To industry and business
4. To social welfare; schools, churches, mail service, etc.
5. Recreational

6. Other service
H. Interstate travel
I. Accidents

FUTURE DEVELOPMENT OF THE STATE AND ITS SUBDIVISIONS

A. Anticipated normal growth
1. Population
2. Industrial
3. Agricultural
4. Other aspects
B. Factors that may alter normal growth
C. Dependence on motor transport and highways
D. Highway transport
1. Vehicle registration
2. Vehicle-miles of travel
3. Sizes and weights of vehicles
4. Dependence on highway facilities
E. Coordination of highway and other forms of transportation

CLASSIFICATION OF ROAD SYSTEMS

A. The need for classification
B. Classification according to service rendered
C. Classification according to governmental responsibility
D. The Federal-aid Highway Act of 1944
E. Legal classification in the State
F. Service rendered (in percentage of total vehicle-miles) by road systems as now classified in the State
G. Reasonable partitionment of service (in percentage of total vehicle-miles) to be expected by revised road systems
H. Comparisons and recommendations of revised system classification

STANDARD OF ROAD IMPROVEMENT

A. Basic standards of vehicle size and weight
B. Basic standards of vehicle speed
1. Maximum for design of highway curvature, sight distance, etc.
2. Operating average, for design of highway capacity
C. Standards of road design
D. Right-of-way standards
E. Bridges and grade separation structures
F. Recommendations for adoption in the State

STANDARDS OF ROAD OPERATIONAL IMPROVEMENT

A. Rural operation
1. Traffic control devices
2. Highway lighting
B. Urban operation
1. Traffic control devices
2. Other measures, such as one-way streets
C. Vehicle parking
Note: The discussion under this head may be expanded to cover a general consideration of off-street parking facilities and truck and bus terminals, if feasible.
D. Traffic law enforcement
E. Road maintenance standards
F. Recommendations for adoption

ELEMENTS OF ROAD COST

A. Factors affecting service life of highways
1. Structural deterioration
2. Functional obsolescence
3. Depressions, wars
4. Available revenues
5. Construction policies and practices
6. Degree of maintenance
B. Estimation of remaining service life of existing roads, streets, and bridges; and determination of needed future program of replacement
C. Construction costs
1. Costs of various elements, grading, surfacing, structures, etc.
2. Effect of standards of structural and geometric design and location
3. Salvage of prior construction
D. Maintenance costs

1. Standards of maintenance
2. Effects of design
3. Effects of deferred maintenance
4. Effects of traffic

E. Price index

FUTURE ROAD IMPROVEMENT PROGRAM

A. Criteria and methods employed in determining needs

B. Summary of determined existing deficiencies and additional foreseeable needs

C. Proposed program of improvements during a defined future period

D. Estimated costs of the improvement program, including itemized construction, maintenance, administrative and other costs, by years of the period defined

FINANCE AND TAXATION

A. Historical review, current status and principles

1. Past methods of highway and street financing within the State

2. Statistical review of past highway revenues, expenditures and indebtedness of the State and its subdivisions, including intergovernmental aids or transfers for highway purposes

3. Property taxes for support of highways and streets

a) Past and present uses; for city streets, rural highways; for highway administrative systems

b) Tax rates and assessments, history

c) Limitations of use of; statutory; practical, in view of property taxation for other purposes

d) Prospects of future use for highway purposes

4. Road-user taxes

a) Past and present uses; for city streets, rural highways; for highway administrative systems; for non-highway purposes

b) Bases and rates of existing taxes

c) Discussion of various types; justification; incidence upon vehicles of different types, sizes, and classes of use, and upon urban and rural vehicle users

d) Prospects of future use and revenue productivity

5. Other sources of highway revenue; taxes; special assessments; present use justification, prospects of future use, and revenue productivity

B. Estimation of required additional highway revenue

1. Estimate of future revenue, by years, to be expected from existing taxes at existing rates, allocated to existing, and revised administrative systems

a) Property taxes
b) Road user taxes
c) Other tax revenue
d) Federal aid

2. Comparison, by revised administrative systems, and by years, of expected revenue from existing sources and rates with estimate of annual expenditures, by systems and years, required to carry out proposed program in period decided upon

3. Proposed program of borrowing (if any)

a) Determination, for each system, of schedule of borrowings required to complete proposed program at desirable rate

b) Conditions of proposed bond issues (interest rates and annual amounts, retirement schedules, etc.)

4. Determination of additional revenue requirement, by years, to support proposed program, with borrowing as proposed, for each revised administrative system

C. Discussion of equitable adjustment of overall highway tax schedules to obtain required revenue

1. Determination, for each administrative system as revised, of equitable share of tax burden to be borne by abutting land and property, the general community, and motor vehicle users, respectively

2. Determination, by revised administrative systems, and by years, of total and requisite additional revenues equitably to be raised, to carry out proposed program, by taxes on:
   a) Abutting land and property
   b) The general community
   c) Motor vehicle users

3. Recommended adjustment of taxes and assessments on abutting land and property to produce revenues determined to be equitably collectable from that source; by revised administrative systems

4. Recommended adjustment of general property taxes, and proposal of other tax bases and rates, to produce revenues determined to be equitably collectable from the general community; by revised administrative systems

5. Balance of revenue required, by revised administrative systems and total, from road users, and other sources, except property

6. Discussion of interrelation of motor fuel taxes, vehicle license fees and other methods of road-user taxation, and advantages and appropriate uses of each method

7. Determination of amounts of road-user revenue to be raised by taxation of motor fuel; proposed adjustment of rate of tax to produce the determined amounts; and requisite allocation of yield among revised administrative systems

8. Balance of revenue required, by revised administrative systems and total, from taxes and imposts on motor vehicles, and other sources, except property and motor fuel

9. Discussion of principles of distribution of motor vehicle imposts among the various classes and sizes and weights of vehicles, and determination of an equitable system of distribution

10. Determination of appropriate bases and a schedule of vehicle license fees and other imposts to raise revenues to be collected from those sources; requisite allocations of total yield among revised administrative systems

11. Balance of revenue (if any) to be collected from sources not previously considered, and proposal of sources and rates necessary to produce required amounts; allocation to revised administrative systems

D. Resume of proposed financing measures, in respect to revised administrative systems, revenue sources, tax rates, and proposed changes in tax rates, etc.

HIGHWAY ADMINISTRATION

A. History and current status
   1. The State highway department
      a) Brief statement of its history
      b) Current status
         (1) Scope of jurisdiction with respect to the several administrative systems
         (2) Powers and responsibilities
         (3) Character of organization
   2. Powers, responsibilities, jurisdiction, and organizational character of other highway agencies
      a) Counties
      b) Other rural highway agencies
      c) Urban highway agencies
   3. Intergovernmental relations
      a) State aid to counties, cities, and other civil subdivisions
         (1) Methods of apportionment; description and critical appraisal
         (2) Extent, character, and effectiveness of administrative, engineering, and fiscal control by State
      b) Participation by counties and other civil subdivisions in the support of State highways
      c) County and local participation in Federal-aid secondary and urban programs
      d) Cooperation between State highway department and county and local highway agencies
         (1) Establishment of coop-

erative relations, advisory groups, and procedures for settling difficulties

(2) Provision of technical assistance

B. Recommendations in the interest of efficient and economical administration

1. State highway department

a) Changes in jurisdiction, powers, and responsibilities

b) Changes in character of organization

2. Changes in powers, responsibilities, jurisdiction and organizational character of county and local highway agencies

3. State aid

a) Changes in methods of apportionment

b) Recommended measures of administrative, engineering, and fiscal control by State

4. Measures to promote cooperative intergovernmental relationships

5. Other recommendations

HIGHWAY VEHICLE AND TRAFFIC REGULATION

A. History of the development of vehicle and traffic in the State, and statement of principal present regulations

B. Proposal of desirable amendments of the existing regulations, and the timing of such amendments, consistent with the safe and efficient use of highways as they now exist and as they will be improved by the program proposed

C. Enforcement of traffic regulations

CONCLUSIONS

A. Summary of the principal recommendations of the report

B. Proposal of legal and other action required to give effect to the recommendations.

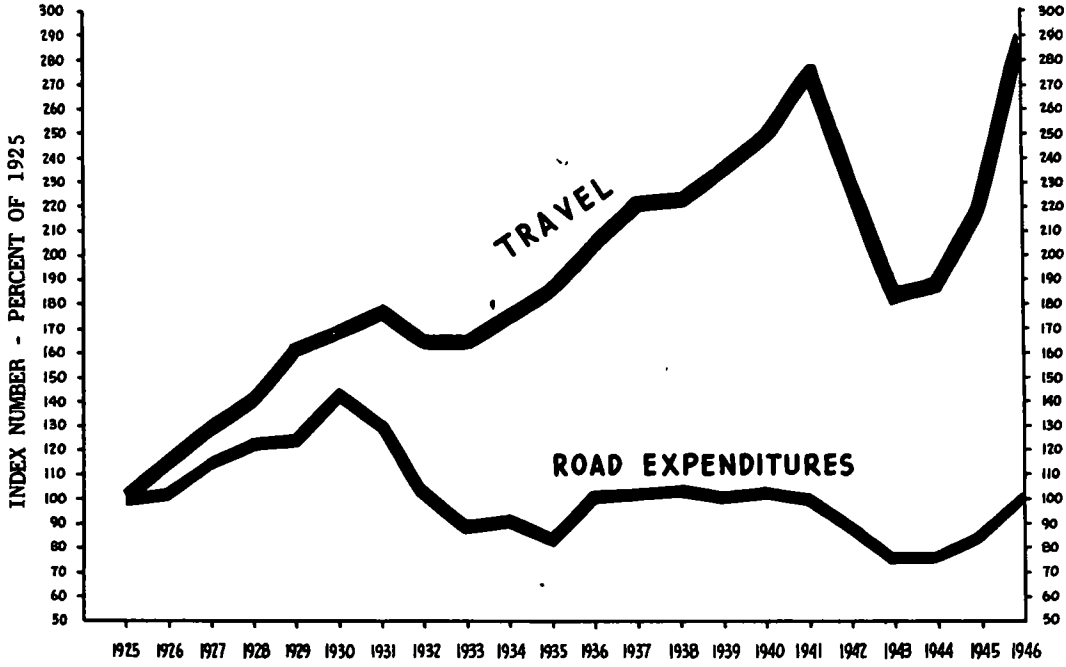
HIGHWAY REVENUE AND EXPENDITURE TRENDS

BERTRAM H. LINDMAN
Highway Specialist
American Automobile Association

The Public Roads Administration has published much excellent highway financial data. From the data contained primarily in their HF and DF tables, I have prepared several charts for popular presentation. It is my purpose to point up certain trends in highway financing. I shall also bring out some of the deficiencies in available data and emphasize the need for more adequate statistics if those in the highway field are to have a clear understanding of the highway financing problem, particularly as it relates to county roads and city streets.

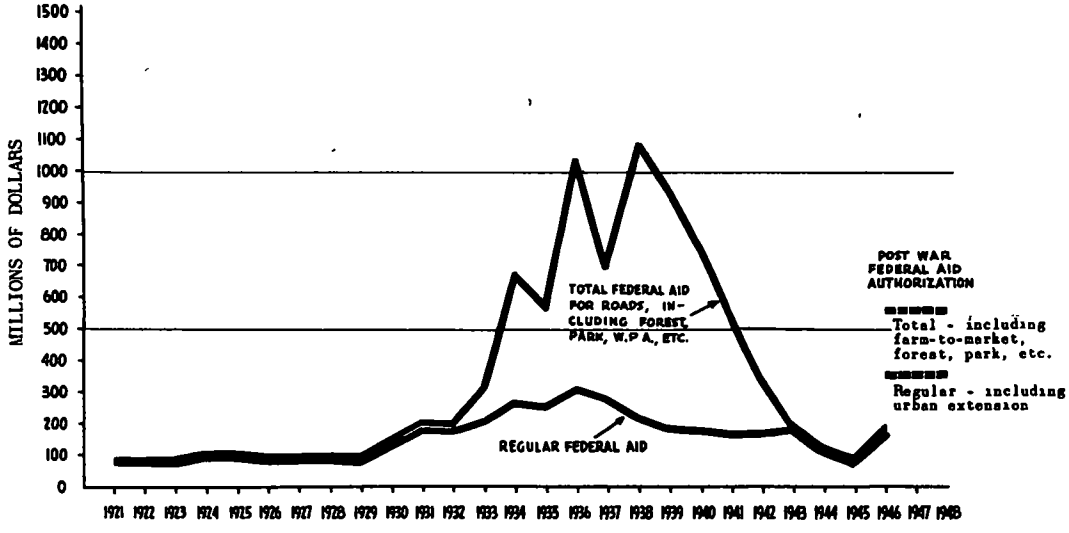
On the first chart, the line labeled "TRAVEL" is in terms of gasoline consumption, upon which data has been kept since 1925. The amount consumed during that year is taken as the index number 100. This line has a steep upward trend all the way except for a slight dip during the depression and a considerable dip during the war, and in 1946 reached a new high approximately three times that of 1925.

While travel has been increasing, the total expenditure for roads, streets, and highways as represented by the other line, ended with the



Expenditures for construction, maintenance, and administration on all roads and streets

Chart 1. Travel Reaches New High But Road Expenditures Are at 1925 Level



Federal-aid system designated prior to Highway Act of 1944

Chart 2. Highway Revenue:
Regular Federal-aid Reaches New High

same amount in 1946 as it started with in 1925; $1.7 billion. This expenditure increased to $2.5 billion in 1930; dropped below the 1925 amount during the depression; returned to the 1925 level during the middle thirties; dropped during the war, and returned to the pre-war level in 1946.

1948. However, at the present rate of construction, this figure will not be reached during 1947.

Also shown is the cumulative total of regular Federal-aid and other funds such as those for forest roads, park roads, WPA, and secondary or farm-to-market roads. This total reached a maximum of

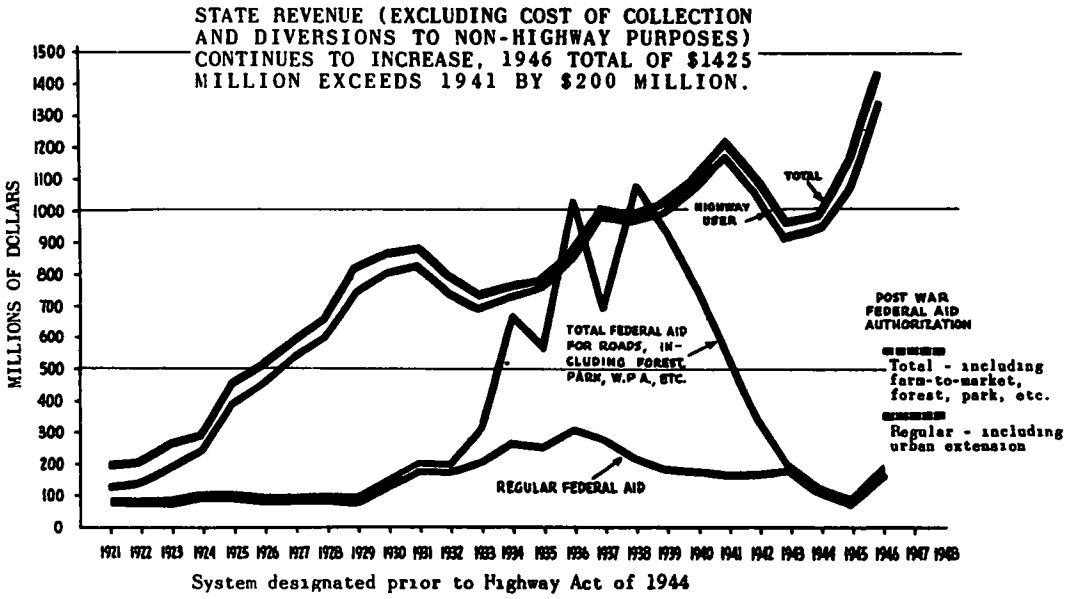
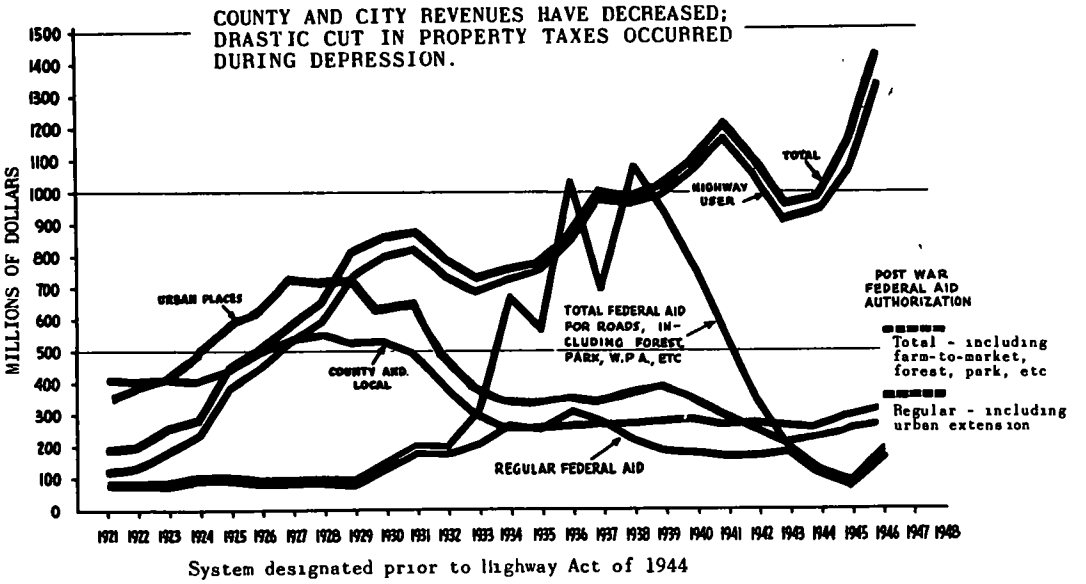


Chart 3. Highway Revenue

This total expenditure includes construction, maintenance, and administration for all roads, streets, and highways. Relief construction for "make work" road expenditures such as WPA are excluded. Expenditures shown for the latter years are PRA preliminary estimates.

The second chart shows regular Federal aid ranging from $77 million in 1921 to $92 million in 1929, then crossing the $200 million mark in 1933 and the $300 million mark in 1936; receding to a low of $75 million in 1945, and finally increasing to $167 million in 1946. The lower broken line shows for the Federal-aid Highway System, including urban extensions, post-war authorizations of $350 million annually for the years 1946, 1947, and over one billion in 1936 and 1938, and then dropped off. The post-war authorizations are $565 million annually, but at the current rate of construction the amount of Federal revenue actually contributed will be far less.

Chart 3 is an overlay to Chart 2. The top line represents the total state highway revenue contributed to roads, and the lower line, which closely follows the top line, represents the portion contributed by highway users. These lines started at $196 and $110 million, respectively, in 1921, increased rapidly except for set-backs during the depression and during the war, and reached $1.425 and $1.37 billion, respectively, in 1946. These last figures are of course only prelimi-



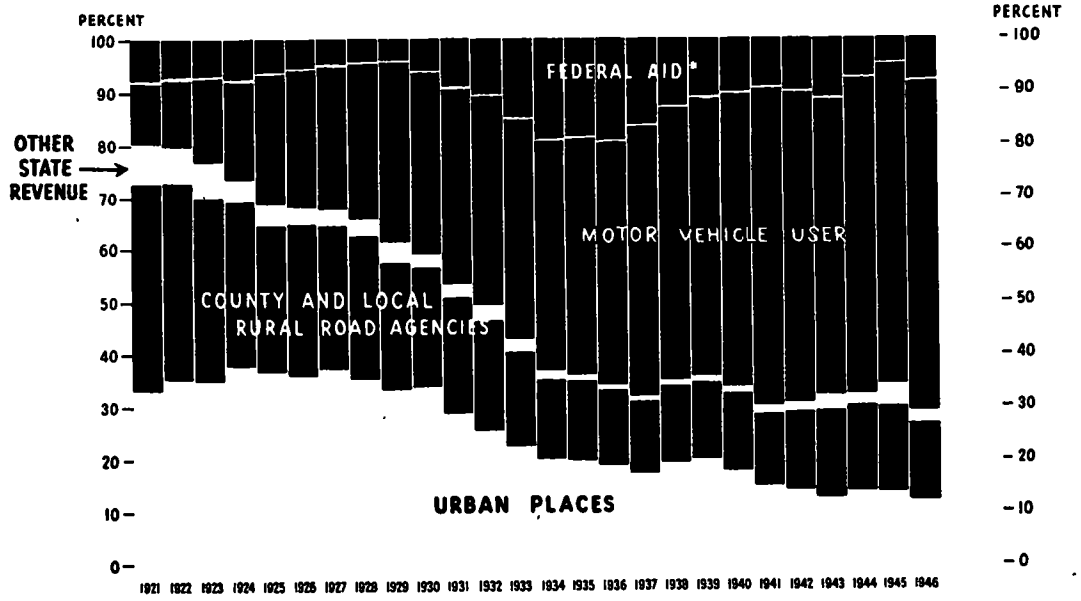
System designated prior to Highway Act of 1944

Chart 4. Highway Revenue

nary estimates.

In Chart 4 two other lines are added. One represents the contributions of county and local rural road agencies to roads. This line started at $400 million in 1921; increased to $550 million in 1928; dropped to $251 million in 1934; increased to $282 million in 1940; decreased during the war; but turned up to an estimated $314 million in 1946.

The other new line represents the contribution from urban places which started at $337 million in 1921; climbed to $787 million in 1930; decreased to $335 million in 1935; increased slightly for a



* WPA AND OTHER FEDERAL RELIEF FUNDS EXCLUDED

Chart 5. Motor Vehicle Users Providing More and More of Highway and Street Revenue; 63 Percent in 1946

while; decreased during the war; and increased to an estimated $255 million in 1946.

Although the revenue provided by counties and cities is primarily free from property taxes, local motorist user taxes for 1941 are estimated at $38 million.

of 70 percent of the total in 1921 but less than 30 percent in 1946. This decrease is indicative of the withdrawal of property tax support for roads and streets. In fact, in several States the entire cost of all rural roads is defrayed by state highway user revenues.

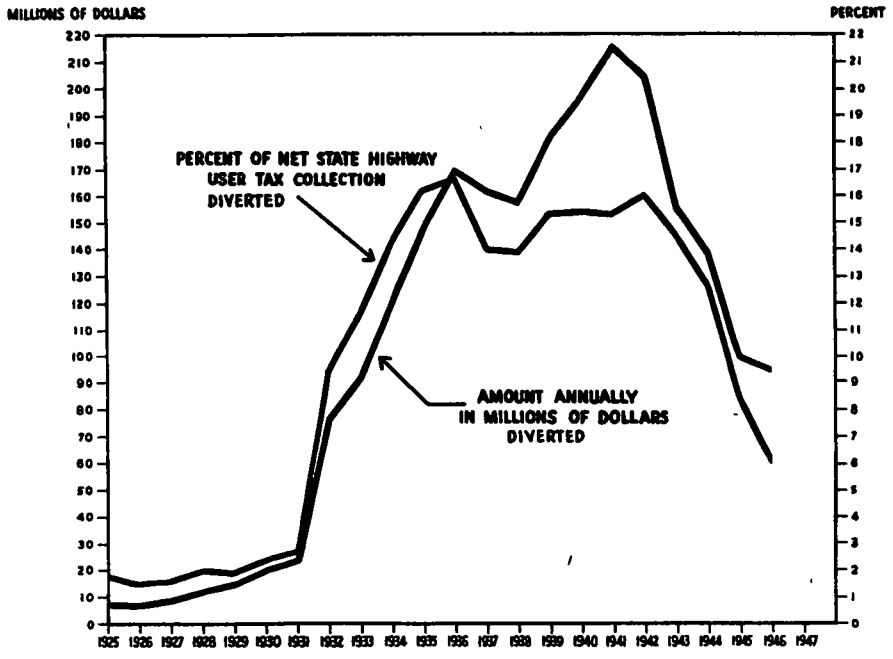


Chart 6. Fight Against Diversion Showing Results; Diversion of State Highway User Taxes to Non-Highway Purposes Reduced $120 Million

The fifth Chart shows the percentage distribution of total revenue for all roads, streets, and highways by source of revenue. Across the top is the regular Federal-aid contribution which amounted to 8 percent of the total in 1921; decreased to 3.8 percent in 1929; increased to 20 percent in the middle thirties; decreased to 4 percent in 1945; and increased to 8 percent in 1946.

Just below is the state highway user portion which was 12 percent in 1921 and increased to 63 percent in 1946.

The county and city contributions, shown below, were in excess

The sixth Chart shows that the fight against diversion is showing results. Diversion of state highway user taxes to non-highway purposes has been reduced $120 million. From 1925 to 1931 diversion was nominal, then it turned sharply upward, reached a peak of $215 million in 1941, and since then has curved sharply downward, reaching $95 million in 1946.

This chart also shows the percentage of total state highway user taxes diverted. A peak of 15 percent was attained in 1938 and again in 1941 from which the line drops sharply to 6 percent in 1946.

The seventh Chart is a map show-

ing the diversions of state highway user taxes to non-highway purposes by states in 1946. The 19 white states on this map had no diversion in 1941 or 1946. The 19 black states reduced the amount of diversion between 1941 and 1946, and the 10 crosshatched states increased the amount of diversion.

war years.

The total of state highway user taxes distributed to county and local roads is understated to the extent that it does not include a figure for the State of Delaware. That state classified all its rural roads as state highways and has no separate accounting for them. The

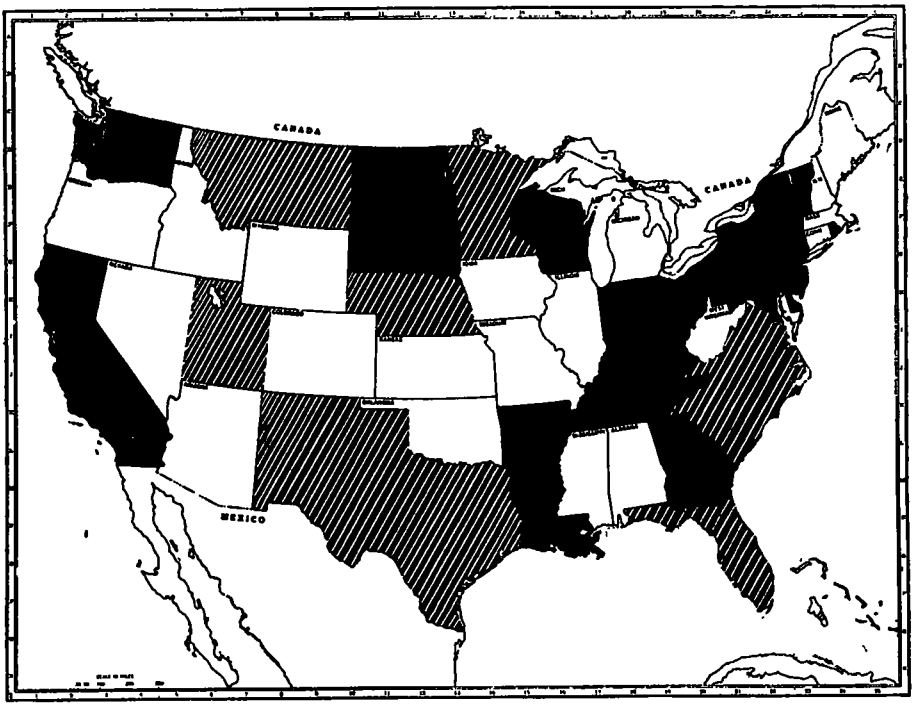


Chart 7. Diversions of State Highway User Taxes to Non-Highway Purposes by States in 1946

The eighth Chart shows that the amount of state highway user taxes distributed to county and other local roads was about $80 million in 1925 but has increased sharply since then, except for the war years, to a total of $392 million in 1946.

This chart also shows that the percentage of total state highway user revenue distributed to county and local roads increased from 19 in 1928 to over 25 in 1946. This upward trend continued through the

States of North Carolina, Virginia, and West Virginia likewise classify all their rural roads as state highways, but do account for county and local roads separately.

The amount of state highway user taxes expended on county roads is overstated by an unknown amount to the extent that certain counties expend their allotments on city streets. It would be very helpful if the Public Roads Administration financial tables could be refined to show as city street funds those

state funds that are transferred to the counties and by them either transferred to the cities or expended upon city streets.

Locally collected highway user funds are not included in these charts. In a few states these amounts are substantial.

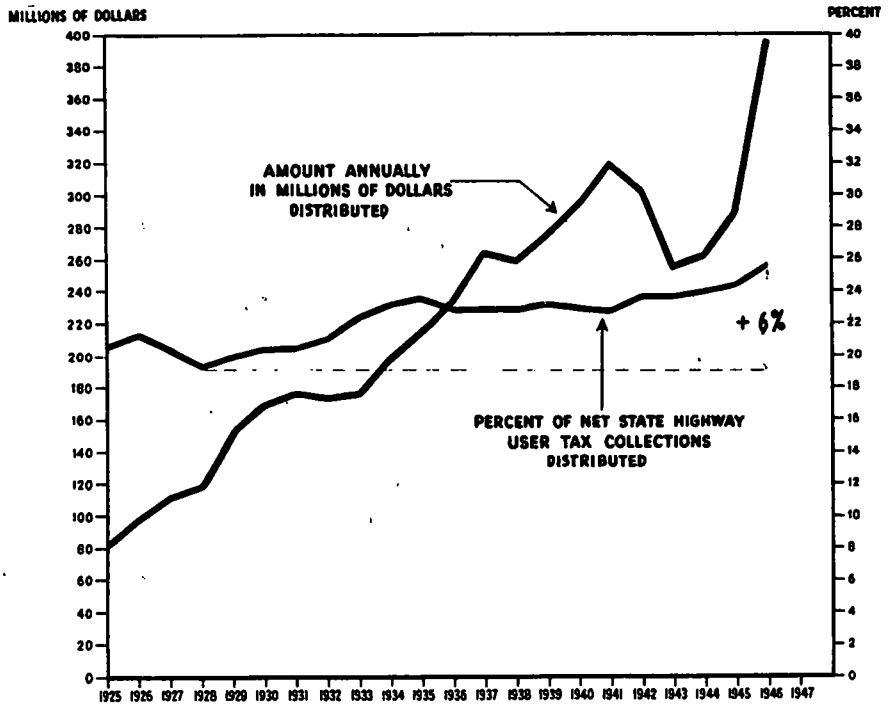


Chart 8. Distribution to Local Roads Increasing; Quarter of State Highway User Taxes Now Going to County and Other Local Roads

During this period (1925-1946) when highway user funds were being used in increasing amounts on county roads, the need for such funds was reduced by transfers of substantial mileages of the more heavily traveled county roads to the state highway system.

It is significant to note that in 1941 when county roads were receiving 25 percent of the state highway user revenues, they were carrying only 14 percent of the traffic. In other words, the amount of state collected highway user revenues expended on local roads is in excess of the gasoline tax earned or generated by local road use. This excess actually represents revenue earned or generated by city street traffic. The unfairness of this situation is emphasized by the urgent need of cities for highway improvements to remedy traffic congestion.

The ninth Chart is a map which shows that the percentage of state highway user taxes distributed to county roads varies greatly from state to state. However, it should be interpreted in the light of limitations on the underlying data which are discussed in connection with the preceding chart.

The tenth Chart shows that the amount of highway user taxes distributed to city streets increased from $4 million in 1925 to $62 million in 1946. Except for a dip during the war years, this line has had a sharp upward trend.

The percentage of state highway

user taxes distributed to local city streets is shown to increase from less than one percent in 1925 to more than 4 percent in 1942 and has decreased slightly since then.

However, these figures have severe limitations. They do not include state highway funds expended under state supervision on streets that are extensions of state highways, for such funds are treated as state highway expenditures. Furthermore, it is possible that city allotments of state funds may also have been expended on these extensions of state highways. A more detailed accounting of state highway user funds expended in urban areas is highly desirable.

The amount of state highway user funds contributed to city streets is understated to the extent that funds allocated to counties are expended on city streets.

It should be noted that the amount of state highway user funds contributed to city streets is far less than the amount contributed to county roads.

The map in Chart 11 shows that a few states contributed substantial amounts to local city streets but that most states did not.

The data upon which this map is based are subject to the same limitations as the data presented in the preceding chart.

So much for highway revenue and expenditure trends. The next chart (No. 12) deals with highway construction costs, and the next two maps (Charts 13 and 14) with the spread of toll roads and highway study committees. These are included because of their direct bearing upon highway financing.

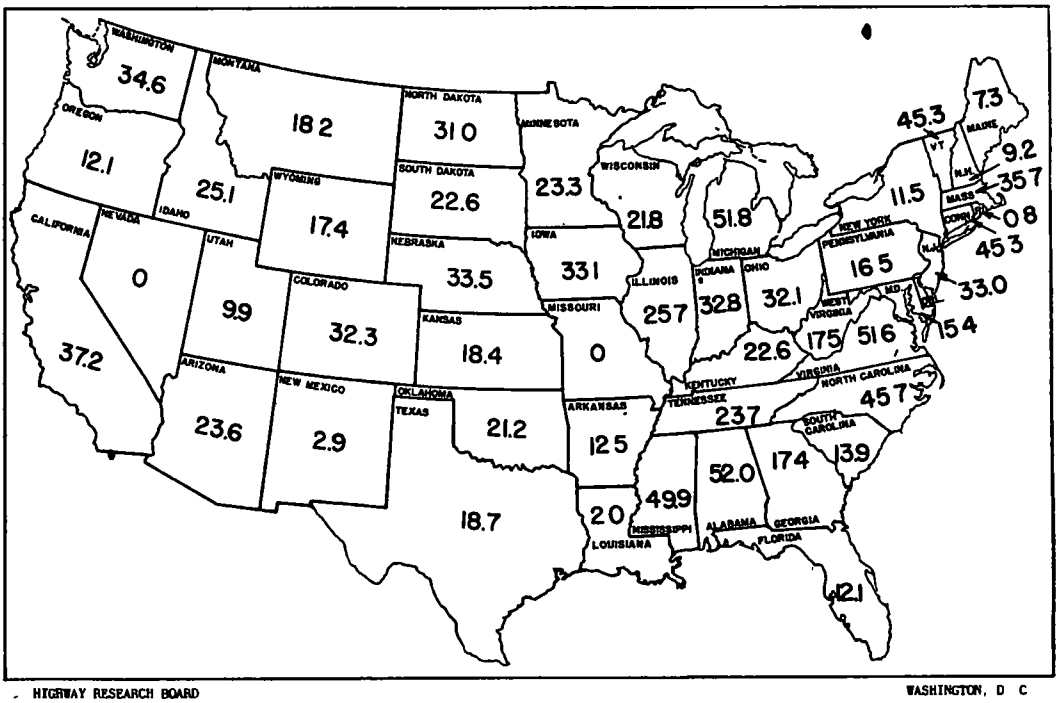


Chart 9. Distribution of state highway user taxes to county and other local roads ranged from zero percent to 52 percent in 1946.

Chart 12 shows how the cost of constructing a composite mile of highway has varied from 1925 through the first three-quarters of 1947. The index number 100 represents the average annual cost of a composite mile of highway between 1925 and 1929.

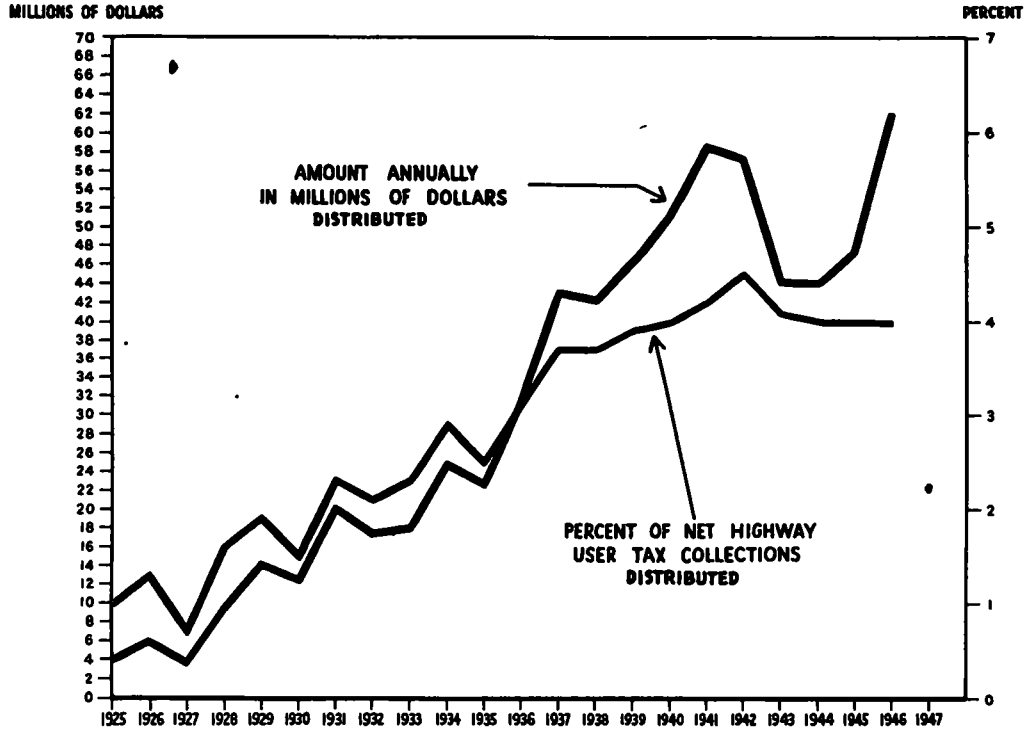


Chart 10. Distribution to Local City Streets Increasing; Four Percent of State Highway User Taxes Now Going to Local City Streets

The line had a downward slope from 107 in 1925 to 61 in 1932; recovered to about 84 in 1934; eased off to 72 in 1940; climbed to 127 in 1943; decreased to 112 in 1945; and increased to 142.9 in September 1947.

The foregoing percentages do not reflect the cost of constructing a mile of highway to *modern* standards. A highway today requires more grading, concrete, steel, etc., than it did between 1925 and 1929, hence the percentage increase in the per mile cost of construction is actually much greater than the chart indicates.

The map (Chart 13) shows the status of toll roads. In the five grey states (Connecticut, Florida, New York, Pennsylvania, and Maine) toll roads are now in existence, and in the seven black states, toll roads have been authorized.

Toll bridges and toll tunnels are excluded from this presentation.

The rapid spread of toll roads should be regarded as symptomatic of a serious deficiency in our present method of financing the main highways which is primarily by highway user taxes on a pay-as you-go basis. It is true that many miles of these main highways carrying many thousands of vehicles daily are congested and hazardous and some means must be found for reconstructing them. However, to

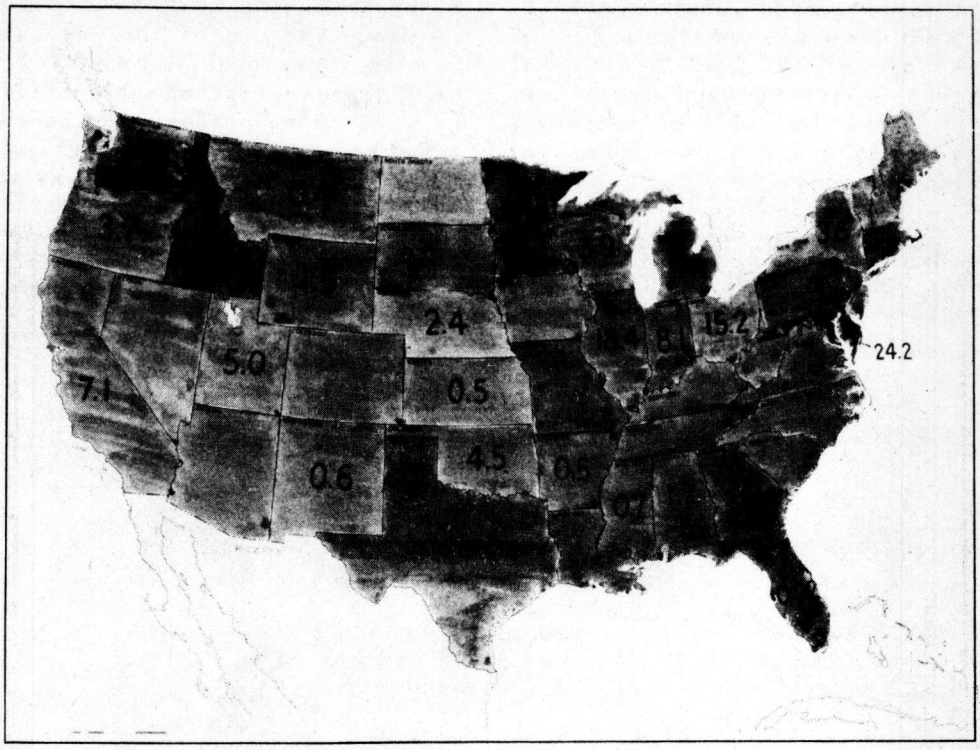


Chart 11. Distribution of state highway user taxes to local city streets ranged from zero percent to 24 percent in 1946.

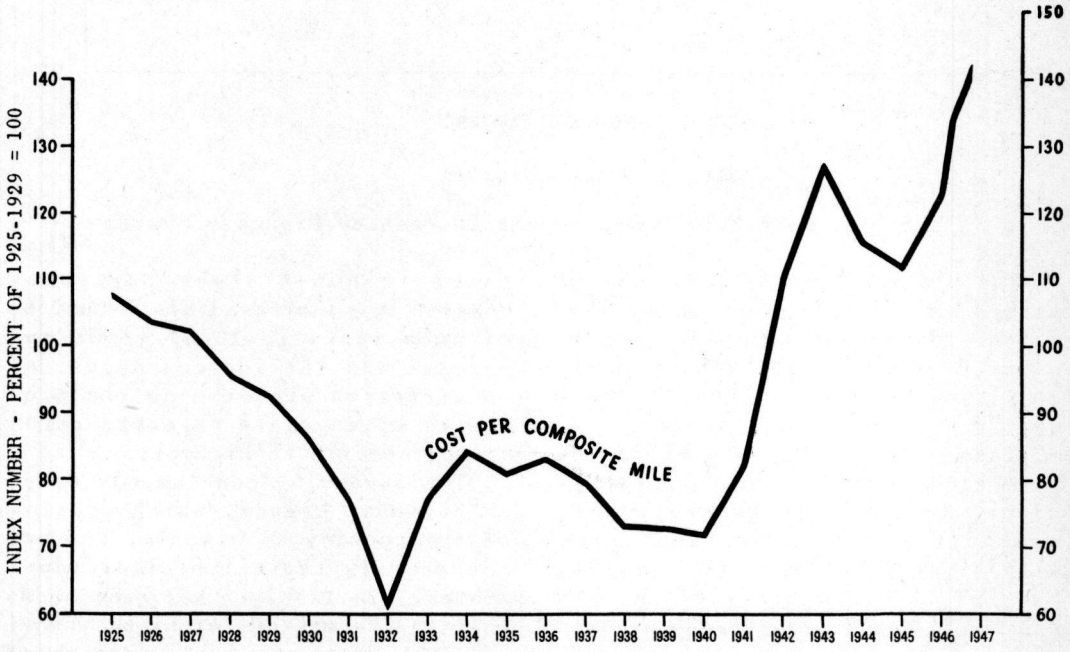


Chart 12. Highway Construction Costs 90 Percent Above 1937-1941

turn to toll roads, rather than to correct any mis-application of funds or to levy such additional taxes as may be proved necessary, is an expedient which could easily spread and destroy our system of public highways.

financing.

Since the end of the war, highway user revenues and Federal aid have increased rather substantially. Part of this increase is attributable to the drastic reduction in diversions of state highway user

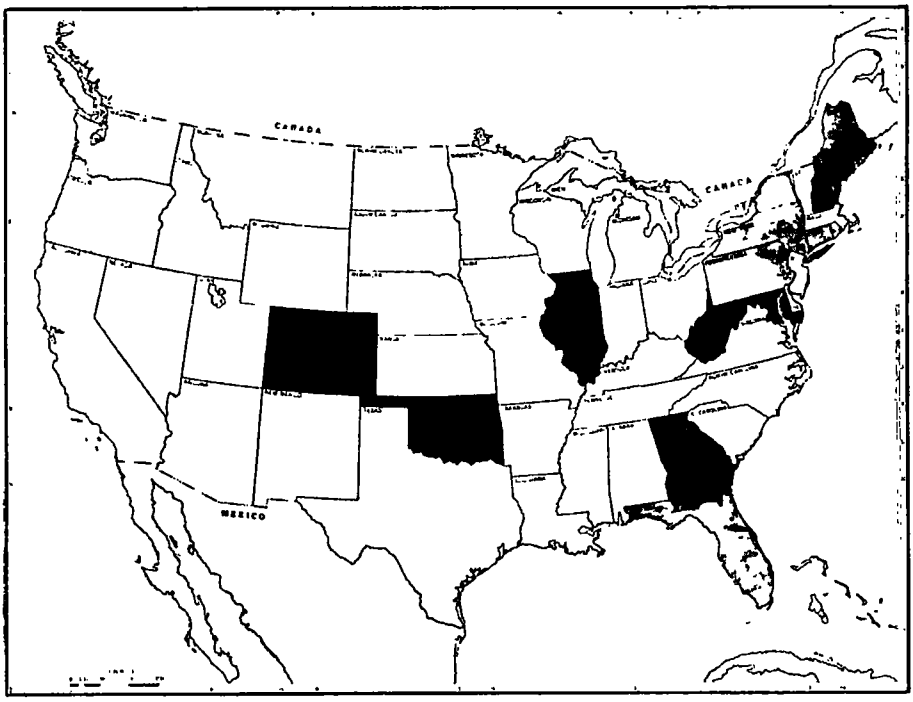
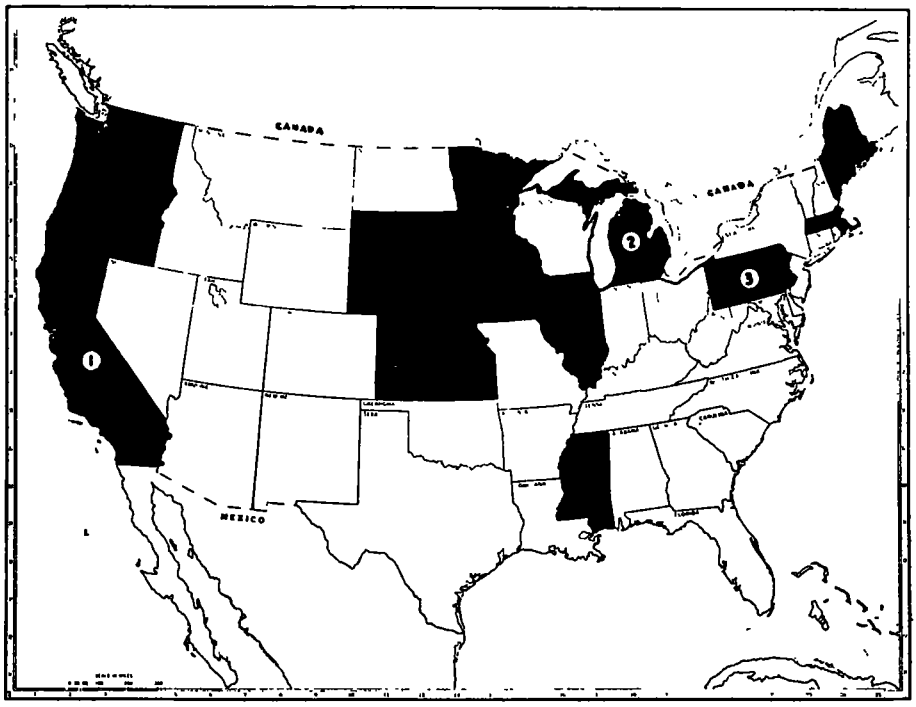


Chart 13. More Toll Roads Menace Interstate Highways System

The map in Chart 14 shows the 14 states in which highway study committees have been created. A complete discussion of highway study committees is presented in Mr. Kennedy's paper (see p. 57).

This paper has been a brief review of highway revenue and expenditure trends. In general, past expenditures have not kept pace with highway travel. As a result, many of the main highways in both urban and rural areas are congested and a substantial number of states are turning to the toll method of taxes to non-highway purposes. However, the increased distributions of such funds to local roads and streets and the increased cost of construction are dimming the prospects of an early reconstruction of the needy main highways.

The foregoing conclusions based on national trends, which typical of the country as a whole, are not necessarily typical of individual states. In fact, it has been shown that in the mis-use of highway user revenue and in the authorization of toll roads, the situation varies



① STUDY COMPLETED
② A NON-LEGISLATIVE COMMITTEE
③ COMMITTEE CONTINUED

Chart 14. Highway Study Committees Created in 14 States

greatly from state to state. Therefore, the recent trend toward the establishment of state highway study committees is a highly commendable one.

CURRENT LONG-RANGE STUDIES OF HIGHWAY MODERNIZATION PROGRAMS

G. DONALD KENNEDY
Vice-President
Automotive Safety Foundation

Addressing a highway planning symposium at the University of Michigan in February 1938, Mr. Herbert S. Fairbank outlined the objectives of the planning surveys which were then in their second year by saying that "the highway planning survey is not a report. It is a full-length view of our highway situation and it fits the day-to-day needs of common-sense highway administration. The establishment of a road program

rationally developed is the final objective of the highway planning survey."

In the short period between Mr. Fairbank's remarks and the start of World War II, noticeable progress was made toward the objective he outlined, the surveys having furnished a variety of new and useful tools to highway administrators, thereby aiding them in the fulfillment of their public duties in the best possible manner.

Major accomplishments resulting from the surveys included the preparation of road inventory maps and diagrams; complete analyses of highway traffic; the study of auto trip lengths and the exploration of traffic volume variations; careful investigation into the demand on highway systems by urban and rural users; and detailed compilations of public finance.

In addition to these were the studies of apportionment of road user taxes; of highway costs and studies of vehicle movements and of vehicle sizes and weights so that the life expectancy of our present road plant is well understood.

These are but a few of the accomplishments of the continuing operation we call the Highway Planning Survey as carried on jointly by state highway departments and the Public Roads Administration under the terms of the Federal Highway Act.

The war's impact placed a tremendous burden on our highway plant as the replacement of worn out and obsolete road sections was almost completely curtailed and manpower shortages placed severe restrictions on planning research.

The 1944 amendment to the Federal Aid Highway Act expanding the activity of planning work is a result of a new awareness of the survey's importance to road management problems.

Congressional provision for a three-year postwar program in December 1944 restored the opportunity for even greater achievement by planning agencies.

Now state legislative bodies have placed a burden on the planning surveys as information is sought on which to base the programs so essential to restore and advance highway systems.

Beset on several sides by postwar demands for state financial assistance, legislators have been perplexed in attempting to solve highway needs and in deciding how tax income should be apportioned to the governmental jurisdictions controlling roads.

NEW APPROACH DEVELOPED

This dilemma has brought about a new approach to highway programming but the data and methods devised in 12 years of highway surveys are still the foundation and chief source of information.

With administrators and legislators alike now seeking the immediate establishment of sound road programs, the ultimate objective of the surveys becomes immediate and calls for reporting of the first rank.

An appropriate analogy between the continuing operations of the planning surveys and the type of reporting now being accepted may clarify this relationship. The engineer who is engaged in stream gauging seeks to determine the dynamics and flow of a wide and deep river. He must observe the differences in current at varying points in the river's cross-section and study the water's velocity to gauge the total product of the stream.

The present studies of highways at this particular point in time cut across the flow of highway planning work to measure activities in progress at many different points. Such an activity, it seems, might well be justified at perhaps 10-year intervals.

What, then, should be the scope of the current long-range studies for highway modernization programs?

To solve the problems facing the administrators, engineers, and legislators, the studies must project into the future. This means studying the impact of motor transportation on the state's future economy and it means particularly studying any important changes in the character of motor transport likely to be developed by vehicles or drivers.

To do this we must project important indices based on trends already fairly apparent. Such data must include population studies, motor vehicle registrations, especially larger trucks, vehicle use in terms of mileage and fuel consumption, the occurence of accidents and the history of the system's development.

Further, we must study the nature of road use, traffic pattern variations, travel origin and destination, speed problems, the kind of vehicles in use, and other elements of traffic and human behaviour. Roads must also be classified according to a pattern of use and jurisdiction and a recommended classification plan prepared as an approach to the problem of road need determination.

Standards for road improvement are those which may be adopted when a road is rebuilt or which can be tolerated for a number of years until there are funds available to rebuild it.

In order to secure the most economical and effective maintenance and the most efficient traffic control, standards for highway operation as well as construction must be accepted.

Expansion of the data to extend to all city streets and county roads is imperative. Obviously the study involves every phase of highway engineering practice.

From facts thus harvested, then, a program of needs can be prepared with cost estimates determined for a given number of years as it is only by the application of this all-inclusive technique that a state can arrive at a thorough and dependable long-range highway modernization program.

Especially important is the physical make-up of the finished study. It is essential that all technical verbiage and exposition be distilled thoroughly so that the report in its final printed form can be clearly understood by the non-professional mind. In this connection graphs, charts, photographs, and other visual devices for explaining conclusions or facts, in many cases will serve a better purpose, from the point of view of the lay intellect, than will written discussion. The physical make-up of the report should be, of course, as attractive as can be devised by modern publishing standards.

This process of study and reporting has been approved by such organizations as the American Association of State Highway Officials, the Public Roads Administration, and the Highway Research Board.

The purpose of this paper is to explore the extent to which states are now engaged in this type of activity and the kind of arrangements that are made for its execution.

To accomplish this purpose, a preliminary questionnaire was sent to the various states through the offices of the Highway Research Board on October 28, 1947, to determine whether or not such activity was contemplated. On the basis of information derived from this questionnaire a second and more extensive set of questions was sent to states which indicated plans for long-range studies. These well-answered inquiries have been utilized in preparing this paper. Other records, too, have been examined, including many state planning reports.

We especially wanted to ascertain

whether a particular study is sponsored by a legislature, a highway department, a highway user group, or some other agency. We are interested in knowing if its scope includes urban streets and county roads as well as state highways. We are interested in knowing the method of financing; to whom the survey is addressed, and whether or not it will find its way into the legislative halls; what organizational effort is being made for the survey; and we are interested in knowing in some detail the scope of the survey and the objective information to be obtained.

An up-to-the-minute report, then, on survey activity in the several states, will show us the current status of such work.

STATES IN WHICH STUDIES ARE UNDERWAY OR COMPLETE

CALIFORNIA, the nation's fastest growing state, is where necessity first created demand for this type of study. In 1945, the legislature authorized creation of an interim fact-finding committee with seven members from each house and an advisory group made up of highway users and public officials to study the state's highway needs and to report its findings to the 1947 session.

The Automotive Safety Foundation loaned staff to study the engineering phases of the problem. Bertram Lindman surveyed the financial and tax aspects.

In all, a total of $130,000 was appropriated by the state. The results were reported to the interim committee, which then presented its recommendations to the legislature.

The California survey was based on all the factors mentioned earlier as proper and essential elements of such a study.

PENNSYLVANIA in 1946 engaged the Brookings Institution to make a study of highway taxation and its allocation to local jurisdictions. This study indicated a need for improved administrative techniques as well as jurisdictional changes and the state now plans a survey of its roads to be completed January 1, 1949.

MICHIGAN's needs also demanded such a report for the chief automobile producing state. The Michigan Good Roads Federation, a non-profit organization with a long background of successful support for highway development, raised funds and secured a director to complete a thorough study which was financed by the State Highway Department and the Public Roads Administration. This engineering survey is nearly completed.

KENTUCKY, in July 1947, engaged the Public Administration Service to study administration and financing of Kentucky highways. Such a report was submitted in October. It outlines methods for establishing a highway classification, the development of engineering standards, and estimated cost of a proposed program. The Kentucky commissioner of highways now states that he has authorized a survey for the purpose of developing a six-year program of improvements.

WASHINGTON followed the California pattern and the work is now going on there under an interim legislative committee with Automotive Safety Foundation staff members loaned to direct the engineering phases of the survey. A total of $75,000 has already been appropriated for the work by the legislature.

OREGON, like Washington, followed the pattern set by California and the work there is now under way with Automotive Safety Foundation representatives loaned to direct the engineering phases of the

project.

The *KANSAS* legislature earlier in 1947 authorized an interim committee of two senate members, two house members and 18 members appointed by Governor Frank Carlson to make an interim survey of highway needs. An appropriation of $25,000 was voted for the survey which is now getting started. It will be completed early next fall. The Automotive Safety Foundation has loaned staff to assist in the engineering phases.

NEBRASKA's unicameral legislature has directed its Legislative Council, an interim group, to cooperate with a citizen's committee, appointed by Governor Peterson, composed of 35 members, many of whom are representatives of highway users groups, to study the state's highway needs. Financed as a Federal Aid highway project, the survey is under way and will be completed in the latter part of 1948 under the supervision of staff members loaned by the Automotive Safety Foundation.

COLORADO reports that at this time it plans no survey but Governor William L. Knous has requested the Highway Research Board to look into the state's highway organizational needs, and it is likely that recommendations will be made for deeper studies.

EARLIER HIGHWAY PLANNING EFFORTS

Published earlier this year, "Wisconsin Highway Planning Survey-Activities and Findings, 1939-1945" is a thorough study which covers in considerable detail the major factors involved in arriving at a complete long-range program. This study was conducted by the State Road Commission.

CONNECTICUT's Highway Department completed a survey, "Connecticut's Road Program," late in 1946. In the course of the study, all the major elements of the problem, except administration, were examined with an eye to the eventual creation of a system which can meet any demands on it in the predictable future.

VIRGINIA's Highway Commission earlier in 1947 finished a survey called "A Twenty Year Plan for the Development of Virginia Highways." This survey creates a program for getting a large portion of the state's unsurfaced roads onto a paved basis.

VERMONT finished a survey in 1940. "Needed Highway Improvements in Vermont" was its title and the study was undertaken by the Highway Department planning survey in cooperation with the Public Roads Administration. This study did not delve into problems of administration.

WEST VIRGINIA finished a study in 1941 titled "West Virginia Highways-Preservation and Development, 1940-1960." Like other of the earlier studies, however, this one also did not go into problems connected with the development of urban streets, administration, and financing. The survey was made by the State Road Commission.

MARYLAND's last survey, was one called "Maryland Highway Needs" completed in 1940. It was designed to create a program lasting until 1960. It did not consider thoroughly such major factors as urban streets.

The *DISTRICT OF COLUMBIA*, a completely urban area insofar as highway problems go, has made a study which covers its needs, although spot and local surveys including origin-destination checks will continue to be made as needed.

STATES WHICH PLAN NO ACTION NOW

ALABAMA indicates that it contemplates no study in the immediate future, but that eventually one will be made by the Highway Department through its statewide highway planning survey in cooperation with the Public Roads Administration. When this study will be made and the method of appraisal have not yet been decided.

OKLAHOMA lists no action, but reports that public hearings are being held throughout the state with highway needs expressed by local groups by priority, the suggested improvements to be assembled by the Highway Department looking to an overall long-range program.

SOUTH CAROLINA plans no immediate study as there are reported to be no "legislative" problems there at the moment calling for such a report.

UTAH's plans call for no survey now although the Utah Legislative Council, an interim committee of the legislature, is interested in activity for devising a program by planning.

WYOMING has no immediate plans for action. Officials there report "the necessary studies and statistical data to determine highway needs is obtained from continuing studies carried on by our planning survey."

MISSOURI, NEVADA, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, and *RHODE ISLAND* also indicate they plan no studies in the immediate future. *LOUISIANA* has not answered questionnaires seeking data on its intentions.

SURVEYS AUTHORIZED BY LEGISLATIVE MANDATE

At the last session of the *ILLINOIS* legislature, a commission was created consisting of six members of the house, six of the senate, and five citizens to formulate a comprehensive highway program for the state. The commission is to report its findings in March 1949, to the legislature. For the survey, $25,000 was appropriated.

IOWA established a joint committee of citizens and members of the legislature to investigate primary and secondary road problems and related financial problems.

MAINE's Highway Commission was authorized to resume a postponed state-wide planning survey to recommend financing mechanics for a program of highway improvement at the next legislative session in January 1948. The work was done by the highway department in cooperation with the Public Roads Administration. Approximately $50,000 was spent for the study.

In *MASSACHUSETTS*, the legislative committees on highways and motor vehicles were authorized to sit during the legislative recess, to study and recommend a program of highway and traffic improvements to the legislature by December 1948. Expenses will be met from the Highway Fund.

MINNESOTA created an interim commission on highways consisting of five representatives and five senators with an appropriation of $20,000 set aside for a survey, results of which were, at the time, expected to be presented to the legislature in mid-April of 1948. The study was made by Highway Department personnel assisted by County Highway Engineers' Association and the League of Municipalities.

MISSISSIPPI State Highway Department officials planned an outline, presented to the legislature in

January 1948, of the need for a study of the road and street systems. If the legislature decides such a need exists it is the thought of the department that a joint legislative committee be named to make a survey.

SOUTH DAKOTA's legislature has named an interim committee to supervise a survey which is scheduled for completion by January 1949. No definite sum has been set aside for financing the study which will be carried on by the State Highway Commission although there is not now an adequate staff to assure completion of the work.

OHIO's legislature will probably reconsider a proposal to authorize a highway study to create a long-range plan. Favorable action by the legislature in this matter is sought by the Highway Department. At the regular session earlier in 1947 the proposal was not approved. Meanwhile, the state's Highway Planning Survey has continued its regular work in the field.

SURVEYS AUTHORIZED BY ADMINISTRATIVE DIRECTIVE

ARIZONA's Highway Commission is undertaking a survey which will be conducted by the Highway Department and which is reported to cover the entire ground of various road and street classifications as well as administration, financing, construction, and maintenance. No definite sum has been set aside for financing the study which will take about a year to complete.

In *ARKANSAS* the State Highway Commission also has authorized a survey on which about $75,000 will be spent during the six months in which the study will be made. This survey will cover all the essential ground as outlined by a definition of such studies.

DELAWARE's Highway Department has ordered a study to be made by the Traffic Planning Division which is currently undertaking tentative surveys of all roads, but is not considering problems of administration or maintenance. Officials report that no specific fund has been appropriated for the study which is due to be finished in January 1949. As yet, a definite course of action to be followed in the development of a long-range program has not been decided upon.

FLORIDA reports its State Road Department conducts a survey with its own funds on a continuing basis for the use of the department in programming future improvements.

GEORGIA's Division of Highway Planning has been instructed by Highway Department officials to prepare a report carrying information on state roads, county roads on the secondary system, and urban streets on primary and secondary systems as well as those on the interstate system, The other major phases of a modern planning survey are reported to come within the scope of the study.

In *IDAHO*, the Bureau of Highways has ordered a study by the Highway Planning Survey, but no outline of procedure has yet been set up nor has a budget yet been devised. City streets will not come under surveillance of the proposed survey.

INDIANA's study, authorized by the Highway Commission, calls for completion in August 1948, with an expenditure of approximately $40,000. The engineering staff of the Commission which is conducting the study will make its report to the Commission.

MONTANA's Highway Planning Survey Section in cooperation with Public Roads Administration is undertaking

a complete survey of every essential phase of planning work financed by state and Federal funds. No deadline for completion of the study has been set. The study is a resurvey of one which has been going on continuously since 1936 and is being made to re-examine the financial and economic ability of the state to continue its program of construction and maintenance on the mileage now included in the primary and secondary systems.

NEW HAMPSHIRE reports it is starting a survey in cooperation with Public Roads Administration officials. The study, scheduled for completion in September 1948, will not include an appraisal of county roads or city streets, but other major aspects will be surveyed. The State Highway Department has authorized the study.

NEW JERSEY's current survey being undertaken by the Highway Department's Division of Planning and Economics covers the outlining of a comprehensive state highway system needed in the next 30 years, and is nearly complete. A 10-year program calling for the expenditure of $600,000,000 has also been studied by the Division, although no official action has been taken.

Hampered by manpower shortages, New Jersey has not included county roads or urban streets in its survey.

The *NEW YORK* Department of Public Works has ordered a survey which will not, however, investigate county road or maintenance needs. No deadline has been set for completion of the survey nor has any fixed fund been appropriated. The work will be undertaken by department personnel.

TENNESSEE reports it plans a complete survey of each major phase of its highway system.

TEXAS is now completing an examination of its state roads and a partial survey of county roads and city streets. Ordered by the State Highway Commission, it is staffed by Highway Department personnel and was designed to develop an estimate of the state's large highway system. Officials expect its completion early in 1948.

SUMMARY

A round-up of the states shows that nine surveys are in progress or complete; six, plus the District of Columbia, have made earlier efforts; 12 plan no action; eight are now authorized by legislatures; and 13 are authorized by administrative directive.

There appears to be developing a new high degree of interest and enthusiasm as states step up the tempo of their search for a solution to the long-range highway problem. Technical standards of surveys may vary in the different states, but it is apparent that a new awareness of the importance of finding an answer to the problem is everywhere.

Just so long as this enthusiasm and interest is sustained, and they must be if our roads are to catch up with the demands on them, there seems good reason to hope that all the states will eventually tackle the problem with studies patterned on the best techniques yet devised.

NATIONAL RESEARCH COUNCIL

The National Research Council is a cooperative organization of the scientific men of America. Its members include, however, not only scientific and technical men but also business men interested in engineering and industry. It was established in 1916 by the National Academy of Sciences.

The Charter of the National Academy of Sciences, under a special act of the Congress approved by President Lincoln in 1863, provides that "the Academy shall, whenever called upon by any Department of the Government, investigate, examine, experiment, and report upon any subject of science or art."

DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH

OFFICERS AND EXECUTIVE COMMITTEE

Chairman ..... FREDERICK M. FEIKER

Vice-Chairman ..... HAROLD K. WORK

Executive Secretary ..... LOUIS JORDAN

LYMAN J. BRIGGS, WILLIAM B. KOUWENHOVEN, THOMAS H. MACDONALD

HIGHWAY RESEARCH BOARD

The Highway Research Board is organized under the auspices of the Division of Engineering and Industrial Research of the National Research Council. Its purpose is to provide a national clearing house for highway research activities and information. The membership consists of 36 technical, educational, industrial, and governmental organizations of national scope. Associates of the Board are firms, corporations, and individuals who are interested in highway research and who desire to further its work.

The Board provides a forum for the discussion and publication of the results obtained by individual research workers; organizes committees of experts to plan and suggest research work and to study and correlate the results; publishes and otherwise disseminates information; provides a research information service; and carries on fact finding investigations. With the cooperation of the highway departments of the states and Territories and the Public Roads Administration, the Highway Research Board conducts a Highway Research Correlation Service, to aid the many highway research agencies to correlate their work through personal visits, conferences, committee work, and dissemination of pertinent information.

The Highway Research Board is not responsible for the statements made or opinions expressed in its publications.