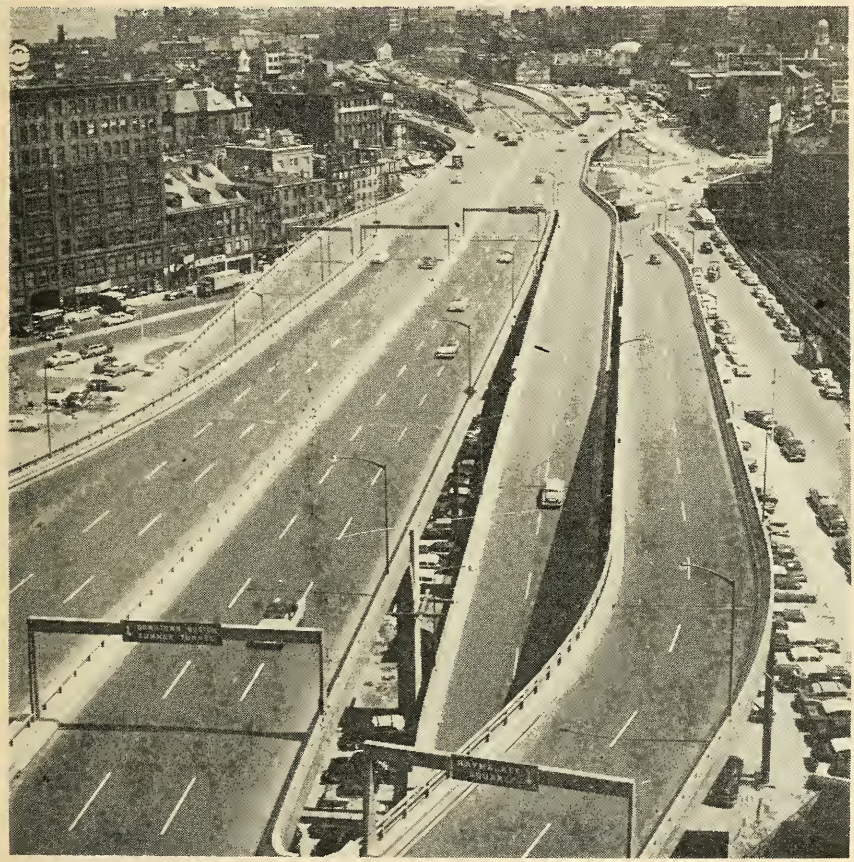
ANNUAL REPORT

Bureau of Public Roads

FISCAL YEAR 1956



The Boston (Mass.) Central Artery brings the Interstate System into the heart of the city

DEPARTMENT OF COMMERCE

U. S. DEPARTMENT OF COMMERCE

SINCLAIR WEEKS, Secretary

BUREAU OF PUBLIC ROADS

CHARLES D. CURTISS, Commissioner

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ANNUAL REPORT OF THE BUREAU OF PUBLIC ROADS

Introduction

PROGRESS IN HIGHWAY IMPROVEMENT in fiscal 1956[1] was notable because improvement of Federal-aid highways and of highways in general reached new high levels and also by reason of the action of the Federal Government in assuring completion of a 41,000-mile National System of Interstate and Defense Highways in the following 13 to 15 years.

Expenditures for highway construction and rights-of-way on all streets and highways were estimated at $4.3 billion in the calendar year 1955 and $4.9 billion in 1956. This record-breaking rate was due in part to increased highway travel resulting in greater motor-vehicle revenues for highways. The mileage traveled on main rural highways increased by 4.8 percent during the fiscal year.

The Federal legislation of 1954, increasing Federal funds apportioned to the States from $575 million in each of the fiscal years 1954 and 1955 to $875 million in each of the years 1956 and 1957, had a pronounced effect. In the total program supervised by the Bureau of Public Roads, 23,800 miles of highway improvements were completed at a total cost of $1.3 billion during fiscal 1956.

There was good progress in construction of highways of all classes. Sections of expressways were under construction in nearly all large cities, many miles of main highways between cities were improved, monumental bridges across large waterways were being built, and the rapid construction of secondary roads that began at the end of the war continued.

During the year the cost of highway construction labor increased 2.2 percent, that of materials 4.8 percent, and of equipment 7.1 percent. The weighted average increase was 4.2 percent.

The decline in highway construction bid prices that continued through the previous fiscal year was reversed in fiscal 1956. Prices in the fourth quarter of fiscal 1956 were 7.8 percent above those for the same period of the previous year but 2.9 percent below the 1953 peak.

During the year 3,443 contracts for Federal-aid projects were awarded to 1,872 contracting firms, averaging 1.8 contracts per contractor. Bids per job averaged 5.7. (These figures do not include contracts for 2,746 secondary road projects administered under a special plan.)

The year will be significant in highway history because it marks the end of discussion of what should be done to create an adequate system of main highways to serve the Nation and the adoption of a firm policy that will result in creation of such a system in 13 to 15 years.

Proposal of such a system was first made in a Bureau of Public Roads report to Congress in 1939. The recommendations made were given effect in the highway legislation of 1944, authorizing designation of a National System of Interstate Highways 40,000 miles in extent. Designation of 37,700 miles of inter-city routes of the system was made in 1947, but there was no provision of funds that gave promise of completion of the system in any predictable period of time.

In July 1954, President Eisenhower sent a message to the Governors' Conference calling for "a grand plan for a properly articulated (highway) system that solves the problem of speedy, safe transcontinental travel — intercity transportation — access highways — and farm-to-market movement — metropolitan area conges-

[1] The fiscal year extended from July 1, 1955, to June 30, 1956.

tion — bottlenecks — and parking." The message met with strong support, both from the conference and the public. In September 1954 the President appointed an advisory committee, popularly known as the Clay Committee, to recommend a general plan for dealing with the problem. Preliminary data from a highway needs study by the States and Public Roads were used by the committee in reaching its conclusions.

The reports of the committee and Public Roads, which were submitted to Congress, struck a responsive chord. The findings played a vital part in shaping the Federal-aid Highway Act of 1956—legislation that marks the beginning of a new period in highway improvement throughout the country.

A section of the Interstate System about 15 miles west of Baltimore, Md., that coincides with U. S. 40. Center planting will prevent headlight glare. This completed highway does not meet the new standards in all respects, for while important cross roads have grade separations some county roads cross at grade and there are a few private entrances. No commercial establishments have direct access.

New Highway Legislation

The Federal-aid Highway Act of 1956, approved June 29, 1956, authorized the greatest long-range road-building program ever undertaken. It authorizes a total amount of $24,825,000,000 for the Interstate System for the 13-year period beginning July 1, 1956, and ending June 30, 1969, as follows:

Fiscal year	*Authorization*
1957	[2] $1, 000, 000, 000
1958	1, 700, 000, 000
1959	2, 000, 000, 000
1960	2, 200, 000, 000
1961	2, 200, 000, 000
1962	2, 200, 000, 000
1963	2, 200, 000, 000
1964	2, 200, 000, 000
1965	2, 200, 000, 000
1966	2, 200, 000, 000
1967	2, 200, 000, 000
1968	1, 500, 000, 000
1969	1, 025, 000, 000
Total	$24, 825, 000, 000

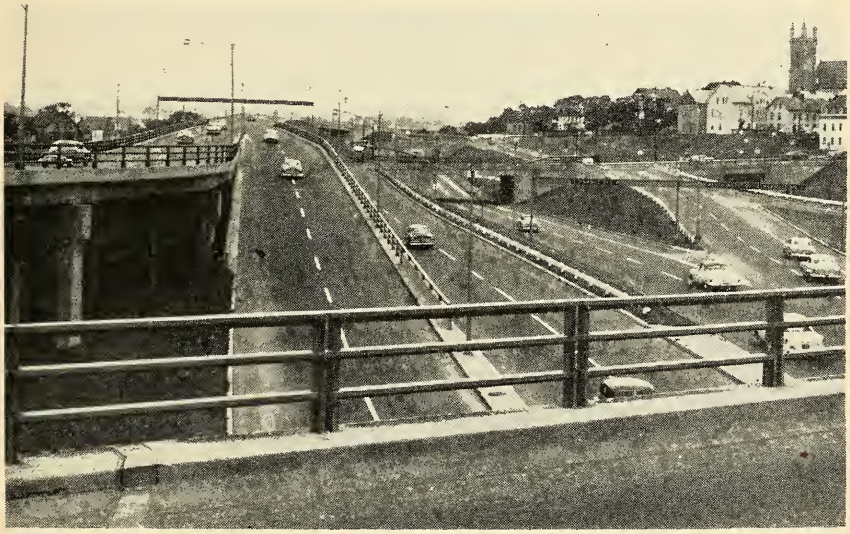
[2] In addition to the $175 million already authorized for 1957.

This amount, together with about $2.6 billion to be contributed by the States under the program, will provide an Interstate System designed to meet the traffic anticipated in 1975. Except for approximately 7,000 miles of 2-lane highways in lightly traveled areas, this system will consist of 4-, 6-, and 8-lane divided highways, with urban connections, interchanges, and bypasses. The Act also increased the maximum mileage limitation of the Interstate System from 40,000 to 41,000 miles, and changed its full title to the National System of Interstate and Defense Highways.

The amounts authorized for the Interstate System for the fiscal years 1957, 1958, and 1959 are required to be apportioned in accordance with the formula prescribed in the Federal-aid Highway Act of 1954, in which population counts two-thirds and area and post-road mileage one-sixth each. For each of the remaining 10 years, the Interstate System funds are to be apportioned in the ratio that the estimated cost of completing the system in each State bears to the total estimated cost of completing the entire system. Periodic revised estimates are to be prepared, subject to review by Congress. Interstate System funds authorized by this Act are to be expended on a 90-percent Federal, 10-percent State matching basis.

In addition to providing for the urgently needed completion of the Interstate System, the new legislation made provision for increased Federal aid for the Federal-aid primary highway system, Federal-aid secondary highway system, and for their extensions within urban areas. The 1954 Act had authorized a total of $700 million for these systems for each of the fiscal years 1956 and 1957. The 1956 Act authorized a total of $125 million for the fiscal year 1957 (in addition to the $700 million previously authorized), $850 million for the fiscal year 1958, and $875 million for the fiscal year 1959. These amounts were to be divided 45 percent to the Federal-aid primary system, 30 percent to the Federal-aid secondary system, and 25 percent to their urban extensions.

The additional sums authorized by the 1956 Act for the fiscal year 1957 were apportioned to the States immediately upon the signing of this legislation by the President, on June 29, 1956.



The Olneyville Expressway in Providence, R. I.

The Act permits any State to transfer up to 20 percent of its apportionment for the Federal-aid primary and secondary systems, and extensions thereof within urban areas, from one category to another. Previously, transfer up to 10 percent was permitted. Interstate funds cannot be transferred.

The 1956 Act contained several new provisions which are applicable only to the Interstate System. Among these are:

1. Interstate funds are not to be apportioned to any State that permits the Interstate System to be used by vehicles with weights in excess of 18,000 pounds per single axle, or tandem-axle weight of 32,000 pounds, or with overall gross weight in excess of 73,280 pounds, or with a width in excess of 96 inches, or the corresponding maximum weights or widths permitted under State law or regulation in effect on July 1, 1956, whichever is greater.

2. Standards governing the physical dimensions, control of access, and other design features shall be approved by the Secretary in cooperation with the State highway departments and shall be adequate to accommodate traffic forecast for the year 1975.

3. Minimum rates of wages paid on projects on the Interstate System are required to be established by the Secretary of Labor after consultation with the State highway departments. These rates are not to be less than those prevailing for the same type of work on similar construction in the immediate locality.

4. Toll roads may be included in the Interstate System if suitably located and meeting the Interstate standards. Federal aid cannot be used on their construction or improvement, but can be used on their approaches if the toll road is to become free when the bonds are retired and if there is a reasonably satisfactory alternate free route to bypass the toll section. Congress indicated, in the Act, its intent to consider at a future time whether or not the States should be reimbursed for previously constructed toll and free portions of the Interstate System.

5. The Secretary of Commerce, when requested by a State, may acquire rights-of-way, including control of access, for the Interstate System, where the State cannot now promptly acquire and take possession of needed land. Such rights-of-way will later be deeded back to the States, providing satisfactory control of access is assured.

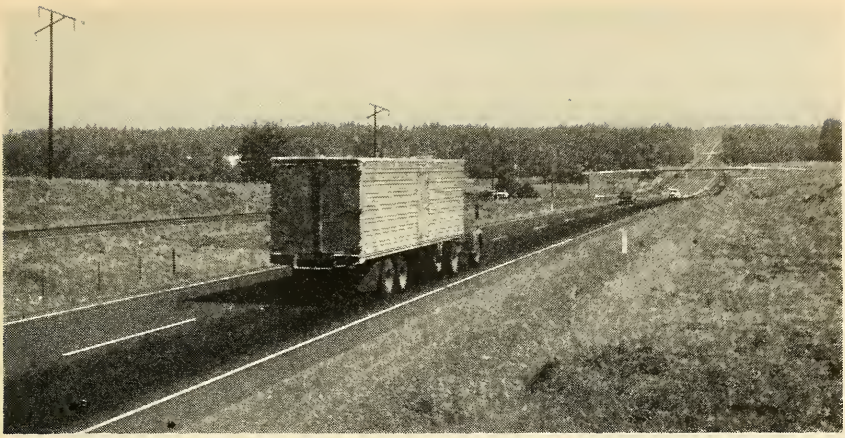
6. Agreements with State highway departments for Interstate projects must contain a clause providing that the State will not add points of access to, or exit from, a project without prior approval of the Secretary.

The Act makes apportioned Federal-aid funds available for acquisition of rights-of-way on any of the Federal-aid systems in anticipation of construction to fall within 5 years.

Federal aid for improvement of primary and secondary systems is extended to Alaska for the first time. Special provisions governing apportionment and matching were enacted. The Act requires the transfer to the Department of Commerce from the Department of the Interior of its functions pertaining to roads in Alaska.

The new legislation provides for a number of important studies and reports, including periodic revised estimates of the cost of completing the Interstate System, a study of equitable tax allocations, a report on maximum desirable dimensions and weights of vehicles, and a highway safety study.

Title II of the new Act, cited as the Highway Revenue Act of 1956, requires earmarking and putting into a special trust fund revenues estimated to amount to $38.5 billion in the 16-year period beginning July 1, 1956. About two-thirds of this amount will come from highway taxes already in effect when the Act was passed, and one-third will come from new taxes and increases in present rates.



The Portland–Salem Freeway in Oregon serves 8,000 vehicles daily. Savings to motorists using this route rather than the old road are estimated at $2,700,000 a year.

The 1956 Act increases from $10 million to $30 million the emergency fund authorization to be available in each year for the repair and reconstruction of highways and bridges on the Federal-aid systems damaged as the result of disaster.

The Federal-aid Program

The Federal-aid highway program gathered momentum during the year in response to the increase in the annual authorization rate from $575 million (for fiscal years 1954 and 1955) to the $875 million provided (for fiscal years 1956 and 1957) by the Federal-aid Highway Act of 1954. The apportionment of $875 million authorized for fiscal 1957 was made on August 9, 1955. This authorization and remaining balances of prior authorizations, together with State and local matching funds, financed the program carried forward during the year. Additional 1957 funds totaling $1,125 million, provided by the Federal-aid Highway Act of 1956, were apportioned June 29, 1956, but had no effect on activity during the fiscal year.

Completions of all classes of Federal-aid and Federal projects during the year accounted for the improvement of 23,828 miles of roads. Included were 6,673 miles of highways and 1,290 bridges on the Federal-aid primary highway system outside of cities, 957 miles of highways and 599 bridges on urban portions of the Federal-aid primary and secondary highway systems, 15,289 miles of roads and 1,886 bridges on secondary or farm-to-market roads, and 909 miles of highways in National forests, parks, and parkways, and on flood-relief projects. The long-range program of eliminating hazards at railway-highway grade crossings was advanced during the year by elimination of 212 crossings, reconstruction of 27 inadequate grade-crossing structures, and protection of 305 crossings by the installation of flashing lights or other appropriate safety devices.

The mere figure of a certain number of miles of highway completed during a year's period does not furnish a true measure of the highway facilities provided for traffic, since a considerable mileage has more than 2 traffic lanes. The major portion of improvements financed from urban and interstate funds consists of 4-lane and 6-lane construction. Table 6 in the appendix shows, by class of fund and by State, the mileages of completed improvements having 2 lanes, 4 lanes, and 6 lanes or more. Table 7 shows, in summary, that the 22,675.2 miles com-

Benefits to be brought to cities by Interstate express routes are illustrated by this route entering Atlanta, Ga. Fifty thousand vehicles use this expressway each day, at a speed of 48 miles per hour, as compared with 16 miles per hour on city streets. Time-saving to drivers amounts to 3 million hours annually.

pleted during the year included 1,430.3 miles of 4-lane highways and 116.6 miles having 6 lanes or more. Thus, the year's Federal-aid completions provided the equivalent of 48,677 miles of single-lane construction.

Practically all States were allotting funds apportioned for the fiscal year 1957 to programed projects. Projects for the construction of 26,983 miles were programed during the year. Contracts were awarded during the year for improvements to 25,045 miles of highways and streets. Construction put in place during the year amounted to $722 million of Federal funds, the second successive annual increase of 14 percent over the preceding year. Construction was under way or scheduled to start soon on 26,402 miles of highways and streets, at the year's end. Tables in the appendix show details of accomplishments during the year and status of the program at the end of the year.

Classes of Federal-aid work

Federal-aid highway authorizations since World War II have provided Federal funds for three classes of highways—primary, secondary, and urban. A total of $550 million was authorized for these three classes of highways for each of the fiscal years 1954 and 1955. This was increased to $700 million for 1956. A total of $825 million was provided for 1957, $700 million by the Federal-aid Highway Act of 1954 and $125 million by the Federal-aid Highway Act of 1956.

Beginning with the fiscal year 1954, annual authorizations have been made specifically for improvement of the National System of Interstate and Defense Highways, although even prior to that time primary and urban Federal-aid funds were available and were used for Interstate System improvements. Starting with initial annual amounts of $25 million for 1954 and 1955, Interstate System authorizations were increased by the Federal-aid Highway Act of 1954 to $175 million for each of the years 1956 and 1957. The Federal-aid Highway Act of 1956 inaugurated a long-range program for the intensive development of the Interstate System, as discussed in the preceding section of this report.

Federal-aid primary highway system.—Federal funds for the Federal-aid primary highway system have been provided continually since the Federal Highway Act

in 1921 made provision for its designation. The system is made up of the principal highways of the Nation and includes 216,314 miles of rural highways and 18,593 miles in urban areas (including the Interstate System). Primary fund authorizations amounted to $247.5 million for each of the fiscal years 1954 and 1955, $315 million for 1956, and $371.25 million for 1957.

Federal-aid secondary highway system.—The Federal-aid secondary highway system includes important farm-to-market routes, rural mail routes, and school-bus routes. The system as designated at the end of the year totaled 520,371 miles, including extensions in urban areas. Funds for secondary routes have been included regularly in Federal-aid authorizations beginning with the fiscal year 1938. Secondary fund authorizations amounted to $165 million for each of the fiscal years 1954 and 1955, $210 million for 1956, and $247.5 million for 1957.

Federal-aid system extensions in urban areas.—Federal funds have been provided specifically for improvement of Federal-aid primary extensions in urban areas continually since 1946. Provision of this separate authorization for urban work evidenced congressional concern over the seriousness of urban traffic congestion. Urban fund authorizations amounted to $137.5 million for each of the fiscal years 1954 and 1955, $175 million for 1956, and $206.25 million for 1957. Approximately 15 percent of all primary funds allotted to projects have been utilized for improvements in urban areas. A provision of the 1954 Act made urban funds available also to finance improvements on urban extensions of the Federal-aid secondary system. Previously there had been no provisions whereby Federal funds could be used on improvements to these urban extensions of secondary routes.

The Buffalo (N. Y.) Skyway, a 49-span structure passing over a river, a canal, two railroads, the Niagara Thruway, and a number of city streets, carries about 18,000 vehicles a day and relieves congestion in the main business district.

National System of Interstate and Defense Highways.—The National System of Interstate and Defense Highways is an integrated network of routes that connect our country's principal metropolitan areas, cities, and industrial centers, serve the national defense, and connect at suitable border points with routes of continental importance in Canada and Mexico. As such, the system includes most of the heaviest-traveled main arteries of the Nation.

Interstate System routes are included in and constitute the most important portions of the Federal-aid primary system. The Interstate System is limited by law to 41,000 miles, of which 40,000 miles were designated by the end of the fiscal year. The system was being reviewed at the end of the year for the purpose of designating the remaining mileage.

The Federal-aid Highway Act of 1952 provided the first Federal funds authorized specifically for improvements to the Interstate System. The $25 million authorization for each of the fiscal years 1954 and 1955 was made available on the regular matching basis of 50-percent Federal and 50-percent State funds. The annual authorization rate was raised to $175 million by the Federal-aid Highway Act of 1954 for each of the fiscal years 1956 and 1957. The matching basis for these funds was revised to provide 60-percent Federal and 40-percent State shares.

The Federal-aid Highway Act of 1956, approved June 29, 1956, authorized a total of $24.825 billion over a 13-year period for the Interstate System. The matching basis for these funds was further revised to a 90-percent Federal and 10-percent State basis.

Status of work at end of fiscal year

Improvements to 25,343 miles of highways and streets and construction of 5,829 bridges were included in the active Federal-State cooperative program at the close of the fiscal year (table 5 of appendix). These figures include projects for which plans had been approved or construction had been started but was not yet completed. The estimated total cost of this work was $2.5 billion, including $1.3 billion of Federal funds. Grade-crossing work included in the active program consisted of elimination of 453 railway-highway grade crossings, reconstruction of 51 inadequate grade-separation structures, and the protection of 366 railway-highway grade crossings by installation of flashing lights or other appropriate safety devices.

Photo by Merle Junk, Olympia, Wash.

There is full control of access on this section of Interstate System corresponding to U. S. 99 south of Tacoma, Wash. Daily traffic is about 25,000 vehicles.

The active program of highway improvements in National forests and parks, public lands, and the restoration of flood-damaged roads and bridges involved improvements to an additional 1,059 miles at a total estimated cost of $74.8 million, of which $62.0 million were Federal funds.

Highway Design Standards

Approval of the Federal-aid Highway Act of 1956 assured construction on the Interstate System of controlled access highways connecting and passing through or skirting the principal urban areas of the country. Clearcut policies and standards became necessary for the expeditious and uniform planning and design of facilities to be provided by this program.

The 1956 Act provided for the adoption of geometric and construction standards for the Interstate System in cooperation with the State highway departments. The American Association of State Highway Officials, with Public Roads cooperation, was completing a revision of its standards adopted in 1945 for the Interstate System. (The revised standards were completed and approved by Public Roads on July 17, 1956.)

These standards provide the broad framework of guidance in highway design, but purposely omit the great mass of policy, procedures, and detail needed by design engineers. Such material is available for rural highways in *A Policy on Geometric Design for Rural Highways*, prepared by State highway department and Public Roads engineers, working in the Committee on Planning and Design Policies of the American Association of State Highway Officials. This policy was adopted and published by the Association in 1954.

For some years Public Roads representatives have also worked with engineers of the State highway departments in the same committee, preparing similar policies and design guides for urban arterial highways. The committee was completing work on this assignment, to be titled *A Policy on Arterial Highways in Urban Areas*, and it was expected to be ready for letter ballot of the States by the end of 1956. This book will also be published by the American Association of State Highway Officials.

These two design policies, and the standards adopted for the National System of Interstate and Defense Highways, prepared the way for the use of uniform up-to-date design criteria, providing for effective execution of the Interstate System program and for those highway features which will result in the maximum degree of safety and utility. The policies are, of course, equally useful in the design of rural roads and arterial urban highways other than the Interstate System.

The National System of Interstate and Defense Highways

Designation of the National System of Interstate Highways was authorized by Congress in the Federal-aid Highway Act of 1944, with a limitation of 40,000 miles. (The act of 1956 authorized an additional 1,000 miles and amended the system name to the National System of Interstate and Defense Highways.) First efforts in designation were devoted to selection of city-to-city routes, and a nationwide network of 37,700 miles was officially designated in 1947. At that time the remaining 2,300 miles available within the 40,000-mile limit were reserved for routes into, through, and around cities. After the States were canvassed to determine their desires, and consultation with the Department of Defense, the general locations of the 2,300 miles of routes in and around cities were designated in September 1955.

The States have continued economic and engineering studies to determine the most feasible specific locations on which Interstate routes may be developed to the standards justified for these important highways. By the end of the year

12,200 miles of detailed locations had been selected and approved. The studies thus far completed indicate that the alinement of existing highways can be used for the development of the Interstate facility for about one-third of the Interstate System and the remaining two-thirds will be on new location.

Pursuant to the provision of the Federal-aid Highway Act of 1956 to expand the Interstate System to 41,000 miles, the States were requested to propose additional routes for consideration. It was planned to select the additional 1,000 miles of Interstate routes following procedures and using criteria similar to those adopted in selection of the 40,000-mile system.

Afternoon peak traffic on the Edsel Ford Expressway in Detroit. Traffic is estimated at 100,000 to 115,000 vehicles per day. Federal funds have been used in the gradual improvement of this route since 1945. New legislation will permit more rapid construction of the unfinished portion.

Access will be controlled on all sections of the Interstate System. Control of access to the system routes from adjacent property and intersecting roads is considered particularly important. Through traffic cannot flow safely and freely where vehicles are permitted to enter and leave (many of them making left turns) at business places, residences, and minor side roads. All entrances to and exits from the system will be at planned locations only, and these facilities will be designed to enable vehicles to enter and leave the highway in safety both to themselves and to the main traffic stream.

Grade separations generally will carry cross roads over or under the routes of the system. Where necessary, in developed areas, frontage roads will be provided on one or both sides. In sparsely settled rural areas, where traffic volumes are low, intersections at grade will be permitted under certain conditions and if no appreciable hazard is created.

There will be no railroad grade crossings; and there will be no traffic lights or stop signs for the Interstate System traffic.

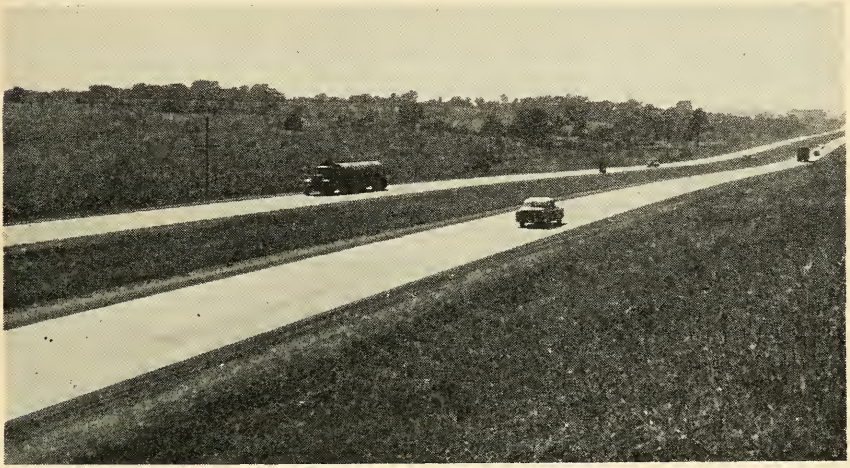
The 1956 Act provides that service stations and other commercial establishments are to be kept off the right-of-way. Needs of the motorist will be taken care of by private businesses established off the right-of-way, at or near access points.

Improvement of Urban Highways

The improvement of major urban highways was of increasing concern to State highway departments. Cooperative projects on urban extensions of Federal-aid primary and secondary highway systems were financed by the several classes of Federal funds available for such work.

Programs were approved during the year which included projects in urban areas for a total estimated cost of $555 million, the Federal contribution being approximately $290 million. Work completed during the year cost $434 million for 957 miles. The Federal contribution was $217 million.

The planning and initiation of construction of expressways in urban areas was stimulated by recent emphasis given to the Interstate System. Notable examples are the Eastshore Freeway, Bayshore Freeway, and Banfield Expressway on the West Coast, the Toledo Expressway, Congress Street Expressway, and New Orleans approaches to the Mississippi River Bridge in the midwest, parts of the New York State Thruway, Schuylkill Expressway, and Westchester-New England Thruway in the east. Construction of urban expressways absorbed about one-third of all Interstate funds allotted to projects for which plans were approved, and largely accounted for additional projects programed for future construction. Contracts were negotiated by the State highway departments with private consulting engineers for the design of many of these complex urban projects.



On the Interstate route between St. Paul and Chicago, near St. Paul, this section coincides with U. S. 12.

In addition to the construction of expressways, many city streets were converted to higher type traffic facilities: 84 percent of all the Federal-aid urban funds for which plans were approved were assigned to divided highways. Streets carrying smaller volumes of traffic, but still of considerable importance to the municipality served, were also improved with Federal-aid urban funds. These projects generally were on the Federal-aid primary system but some provided urban connections to the Federal-aid secondary system. The funds authorized by Congress for expenditure in urban areas only were augmented by other classes of Federal-aid funds: 15 percent of Federal-aid primary funds, 2 percent of Federal-aid secondary funds, and 31 percent of Federal-aid Interstate funds were used in urban areas, resulting in a total of 32 percent of all Federal-aid funds being used for this purpose. (The use of Federal-aid secondary funds was limited to 8 northeastern States with high population density and several States having control of all highways.)

The need for much larger expenditures in urban areas was evidenced by the number of projects listed by State highway departments as improvements on which they intended to request Federal-aid urban funds from future apportionments. These estimates, provided by 36 States, totaled $700 million (295 projects).

Improvement of Primary Highways

During the fiscal year, improvements involving Federal-aid primary funds were completed on 6,749 miles of the Federal-aid primary highway system at a total cost of $526,582,539, of which $273,684,002 were Federal funds. Completed work involved 5,609 miles of bituminous and concrete surfacing, 1,125 bridges over streams, and 112 bridges over highways to facilitate the free flow of traffic. In the interest of reducing the hazards of travel, 89 railway-highway crossings were eliminated by grade-separation structures, 17 separation structures were reconstructed, and 126 grade crossings were protected by the installation of signal devices.

An additional 6,977 miles of improvements, estimated to cost $675,631,586 and involving $353,135,967 of Federal-aid primary funds, were programed during the year. Plans for many of these proposed improvements and for projects previously programed were approved as submitted by the State highway departments so that at the close of the year 8,857 miles of primary highway improvements, having an estimated cost of $985,503,427, were under construction or ready for advancement to the construction stage. The need of divided highways to provide greater safety for highway traffic was recognized by an increasing amount of such highway construction being included in the Federal-aid highway program.

The Windsor section of the Hartford–Springfield Expressway, a relocation of U. S. 5 in Connecticut.

Secondary or Farm-to-Market Roads

The Federal-aid secondary program continued its fast-moving pace. The 15,137 miles improved during the year accounted for 67 percent of the total miles improved on all Federal-aid systems.

Since the beginning of the program under the 1944 Act, 125,193 miles of Federal-aid secondary system improvements have been completed in 3,006 counties. About five-sixths of the improvements made serve rural homes, areas, and communities reached directly for the first time with Federal-aid highway improvements. The other one-sixth are located on roads previously improved with Federal aid but which required further improvement such as widening or strengthening to keep up with the increased use which almost inevitably follows the initial improvements. All projects for improvement are selected and the specifications determined by the

State highway departments and their respective counties, acting in cooperation with each other, with final Bureau approval.

Some 3,500 Federal-aid secondary projects are awarded to contract in some 2,000 counties each year. As many as 400 projects have been awarded in a single State in one year and there are 9 States in which an average of more than 100 projects are awarded each year.

The Federal-aid secondary system now includes 520,371 miles (including extensions in urban areas), an increase of 12,695 miles during the year. All roads in the system were selected by the State highway departments in cooperation with their respective local highway officials prior to consideration and approval by Public Roads. System increases are being requested annually by the States at a rate almost equal to the net miles improved each year. The net miles improved with Federal-aid secondary funds, since the beginning of the program under the 1944 Act, totals about one-fourth of the total miles in the system. This indicates that the system, made up as it is of the more important secondary roads, has many segments considered to be adequate for the time being without expenditure of Federal-aid funds for further improvement. As reconstruction or higher type improvements become increasingly necessary on these segments it is expected that the requests for system expansion will decline.

The new plan for administration of the Federal-aid secondary program, initiated under the provisions of the 1954 Act, was operative in 37 States. Under this plan a State may request and the Secretary of Commerce may approve the transfer of much of the engineering and administrative responsibility for Federal-aid projects for the improvement of secondary roads to the State highway department by blanket approval of the State's standards and procedures and acceptance of the State's certificate for each project that the approved standards and procedures have been followed.

The States not operating under the new plan at the close of the year were: Arizona, Delaware, Idaho, Indiana, New Jersey, New Mexico, North Dakota, Ohio, Oklahoma, Washington, and West Virginia.

Highway Improvements Under Direct Supervision of Public Roads

The Bureau of Public Roads continues to receive and administer directly annual appropriations for the major highways through National forests, and performs a large amount of highway engineering and construction for other Federal agencies as required by law and as may be requested for specific projects. The branches of the Government receiving direct appropriations for the construction and maintenance of roads and calling upon Public Roads for assistance include the Departments of Agriculture, Defense, and Interior, and the Atomic Energy Commission. During the fiscal year, the expenditures for highway work under direct supervision of Public Roads amounted to $54,108,847.

The following tabulation indicates the volume of highway work as of June 30, 1956, in which the engineering and construction services of Public Roads were actively engaged (the figures include estimated costs of work programed or in a more advanced stage):

Bureau of Public Roads:	
Forest highways	$45, 724, 180
Special Tongass Forest highways (Alaska)	668, 480
Federal lands	200, 000
Miscellaneous access roads	150, 000
National Park Service:	
Park roads	15, 165, 515
Parkways	20, 074, 230

Forest Service: Forest development roads (including beetle-control roads)	$13, 284, 325
Bureau of Indian Affairs: Indian reservation roads	10, 526, 894
Department of Defense: Access roads	3, 888, 843
Atomic Energy Commission: Access roads	1, 435, 040
Bureau of Land Management	6, 061, 875
Total	$117, 179, 382

Forest highways

Forest highways are those main and secondary roads within or adjacent to the National forests, which compose approximately one-tenth the area of the United States. The forest highway system, totaling 24,260 miles, is located in 39 of the 48 States and in the Territories of Puerto Rico and Alaska. Table 16 of the appendix indicates, by forest road class, the system mileage in each State or territory.

A considerable mileage of the forest highway system is coincident with the Federal-aid and State highway systems. Forest highways are important to the Federal Government and to the residents of the States, counties, and local communities within and adjacent to the National forests. They carry most of the transcontinental traffic across the Rocky Mountain area of the West and a considerable amount of the interstate traffic over the lesser mountainous barriers in other areas.

The routes composing the forest highway system were initially selected during the period 1916 to about 1923 in accordance with the principles set by the Federal-aid Road Act of 1916 and the Federal Highway Act of 1921. The routes then selected have constituted the system with but comparatively few changes.

While cooperative efforts of the States, counties, and the Federal Government have resulted in progressive improvements over a period of many years, the recent highway needs study revealed that a total expenditure of approximately $1,337,000,000 (Federal, State, and local funds) over a 10-year period would be necessary to improve the forest highway system and make it adequate to serve the increased traffic anticipated.

Togwotee Pass forest highway in Wyoming. This is a through route leading to Grand Teton and Yellowstone National Parks.

During the fiscal year, Public Roads completed improvements on 701 miles of forest highways at a cost of $23,028,706, of which $21,376,979 were Federal funds. Table 17 of the appendix indicates these completions and reports the totals by States for projects programed, authorized, and under construction at the close of the year. Some typical forest highway improvements are described in the following paragraphs.

Klamath River highway.—The Klamath River forest highway route, 130 miles in length, follows the Klamath River and serves large virgin timber areas in the Klamath and Six Rivers National Forests of northern California. In order to facilitate the plan of the Forest Service to accelerate the harvest of mature timber, three forest highway projects aggregating 11.1 miles, including a major bridge over the Scott River, were completed or placed under construction during the year at a total estimated cost of $905,000. The bridge replaces a structure lost by flood last winter and was being rushed to completion before the next anticipated flood season.

U. S. 50 – Glenbrook, Nev.—The section of U. S. 50 serving the east shore of Lake Tahoe in Nevada is a forest highway. Traffic of 5,000 vehicles per day is common during the summer. In order to relieve congestion, a section of 4-lane divided highway 0.6 mile in length was being constructed at a cost of approximately $885,000. The project includes driving a 400-foot tunnel through Cave Rock parallel to an existing tunnel. This construction was financed by $590,000 of forest highway funds and $295,000 of State funds.

Mt. Evans forest highway.—In 1920, Public Roads constructed a forest highway from Idaho Springs, Colo., southwesterly up Chicago Creek to Echo Lake, where it connects with a road leading east to Denver, thus forming a link in a very scenic and popular loop drive. At Echo Lake it also connects with a road leading to the top of Mt. Evans, one of the two peaks in the State over 14,000 feet in elevation that may be ascended by automobile. Increased traffic rendered the old road dangerously inadequate in width and alinement. Reconstruction of this route to modern standards was started by grading and placing a bituminous stabilized base on 7.2 miles at a cost of $642,000.

Provo River–Haydens Fork forest highway.—This route has the characteristics of most of the forest highways in Utah, traversing rough mountainous territory at high elevations. It provides beautiful scenery and forms a portion of a circular route close to the most densely populated area in the State. Construction on this route has reached the summit of the mountains and has provided access to an area containing numerous scenic lakes, good fishing, and other recreational activities.

Columbia Falls–Glacier Park highway.—This route, coincident with U. S. 2, is located along the south boundary of Glacier National Park in Montana. It was originally constructed in the early 1920's and was narrow, steep, and crooked, following along the Great Northern Railway and the Middle Fork of the Flathead River. A 5.5-mile section to cost in excess of $1 million was being improved to modern standards. This highway is used by cross-country traffic and by tourists to Glacier National Park.

National park highways, park approach roads, and parkways

Funds for the construction and improvement of highways within or approaching National parks and monuments, and for parkways specifically designated by legislation, are appropriated to the Department of the Interior, and are administered in conformity with regulations jointly approved by the Secretary of the Interior and the Secretary of Commerce. The Bureau of Public Roads collaborates with the National Park Service in establishing systems and developing an-

nual programs. Public Roads engineers make surveys, prepare plans, and supervise construction of major projects on these road systems.

During the year improvements on 122 miles of park highways, park approach roads, and parkways were completed at a total cost of $6,908,000. At the end of the year, 269 miles of improvements to cost approximately $20,027,000 were under construction. Tables 18 and 19 of the appendix indicate the general locations of this construction activity during the past fiscal year. Typical improvements are described in the following paragraphs.

Blue Ridge Parkway.—Approximately 17 miles of surfacing and two grade-separation structures were completed during the year on the Blue Ridge Parkway, which traverses Virginia and North Carolina, making a total of 340 miles of surfaced parkway open to traffic. Work continued at a steady pace on the 10-mile section north of the James River and on the work in the vicinity of Blowing Rock, N. C.

Colonial Parkway.—Hydraulic fill along the James River in the vicinity of Jamestown Island and grading work between Williamsburg and the island were completed during the past year on the Colonial Parkway in Virginia. Construction on the new ferry wharf and the bridges on the bypass around Yorktown and those on the Jamestown Island end of the parkway were well along. Contracts were let during the year for 4 bridges, 2 grading and draining projects, and 1 paving project at a total estimated cost of approximately $2.8 million. It is expected that major work on this 23-mile parkway will be completed in time for the 350th anniversary celebration of the founding of Jamestown in 1957.

Everglades National Park.—Work on the main road in Everglades National Park in Florida progressed well during the year. Approximately 17 miles of the 38-mile route were under contract, and several additional grading, draining, and surfacing projects and one major bridge were about ready to be advertised for bids. Work under contract was to cost about $1¼ million.

Natchez Trace Parkway.—Bituminous paving was completed on a 15-mile section of the Natchez Trace Parkway between French Camp, Miss., and Mississippi State Route 12, increasing the total length open to traffic to 113 miles of the proposed 450 miles of parkway between Nashville, Tenn., and Natchez, Miss. Also during the past year, 1 paving contract covering 12 miles, 4 grading and draining projects totaling 25 miles, and 4 bridge projects covering 16 structures were let to contract at a cost of slightly over $2.8 million.

Grand Canyon National Park.—Construction was initiated on the scenic East Rim Drive in Grand Canyon National Park. The 8.5-mile improvement (in Arizona) starts at the junction 3 miles east of Grand Canyon Village and extends easterly covering approximately one-third of the route. Improved alinement and grades and additional rim contact with enlarged parking areas have been provided in the location and design. The estimated cost is $665,000. Traffic during the summer season is 1,200 vehicles per day. Construction of the remainder of the route is planned as funds become available.

Mesa Verde National Park.—Access to the Indian ruins in Mesa Verde National Park in Colorado is afforded by a highway south from a junction with U. S. 160 between Mancos and Cortez. It ascends the mesa along a very steep sidehill through the unstable Mancos shale formation, and one section, known as the "Knife Edge," has been extremely difficult and expensive to maintain because of settlements, slides, and slough. In order to bypass this section, a contract was let in 1955 to construct a 1,400-foot vehicular tunnel. The tunnel was holed through in January 1956 and, at the end of the fiscal year, lining was nearing completion. The cost of the tunnel was expected to be approximately $1,056,000, and the approaches were estimated to cost approximately $534,000.

Forest development roads and access roads for spruce-bark beetle control

When requested by the Forest Service, Public Roads makes surveys, prepares plans, and supervises construction within the National forests of roads of importance in the protection, administration, and integration of the forests. Public Roads has also provided engineers for location and construction of access roads in the spruce-bark beetle control program. During the year, 103 miles of forest development roads and beetle-control roads were completed under contracts totaling $4,059,187. At the end of the year a total of 185 miles were under contract at an estimated cost of approximately $9,613,000.

Bureau of Land Management roads

Public Roads continued its cooperation with the Bureau of Land Management of the Department of Interior in its program of road construction to provide access to areas for subsequent logging operations. Public Roads, in fiscal year 1956, prepared plans and supervised construction for numerous projects in Oregon. During the year construction work was completed on 39 miles at a cost of $1,709,564. At the end of the year 138 miles were under contract for work estimated to cost approximately $5,728,000.

Indian reservation roads

Public Roads continued, under agreement with the Bureau of Indian Affairs, to provide general supervision for the programing, designing, and construction of roads and bridges in each Indian reservation. At the end of the fiscal year 1,008 miles were under construction at an estimated total cost of approximately $10,246,000.

Construction in Alaska

Public Roads, during the fiscal year 1956, had under its direct supervision approximately 68 miles of construction on forest highways in the Chugach and Tongass National Forests in Alaska. Construction work on the last project in the Tongass National Forest, which was financed largely by special Tongass funds, and designed to serve traffic generated by the growth of a large wood-pulp industry, was approximately 82 percent complete at the end of the year.

Access roads to defense establishments

During the fiscal year the Atomic Energy Commission transferred an additional $3,900,000 to Public Roads, increasing the total funds transferred for the construction and improvement of access roads to sources of uranium ore to $6,400,000. The Department of Defense also transferred an additional $2,250,000, increasing the total funds transferred for access roads to military reservations and defense industries to $15,750,000. These funds, with the $42,000,000 previously appropriated under legislative authority of 1950 and 1952 and the $9,991,000 which was transferred by the Atomic Energy Commission under authority of Public Law 149, 83d Congress, increased the total funds appropriated for access roads since the beginning of the Korean emergency to $74,141,000.

In addition to the above funds, military construction funds in the amount of $889,300 were transferred during the fiscal year by five Air Force installations for financing the construction of 7 miles of access roads serving those installations, and Army maintenance and operations funds in the amount of $1,769,611 were transferred to finance repairs on 780 miles of roads in Louisiana which were damaged during "Exercise Sagebrush." The total amount of these special funds, including the $100,000 of Army military construction funds previously transferred, is $2,718,271.

During the fiscal year 30 projects serving uranium producing areas were financed at a total estimated cost of $5,011,194, of which $4,651,931 were transferred by the Atomic Energy Commission. At the end of the fiscal year eight additional projects, estimated to cost $2,938,993 and requiring $2,820,113 of access-road

funds, had been referred to the Atomic Energy Commission for a decision as to improvement.

During the same period 26 projects serving reservations of the Armed Forces and defense installations were completely financed at a total estimated cost of $5,987,118, of which $4,922,277 were financed with funds transferred by the Department of Defense. Preliminary engineering on 30 additional projects had also been financed. Sixty other projects having a total estimated cost of $17,913,910 and requiring $16,813,812 of access-road funds had either been certified as important to the national defense or had been referred to the Department of Defense for certification. At the end of the year there were 46 projects being evaluated by Public Roads.

Bridge Design

Projects involving construction of bridges on freeways, expressways, and similar arterial highways increased in number. Many of the structures were in urban areas with attendant complications in design and layout to fit the geometric highway pattern.

Prestressed concrete design continued in favor, with a notable increase in the number of projects submitted.

The great increase in the construction of welded bridges during recent years gave rise to an urgent demand for a revised edition of the bridge specifications of the American Welding Society. Public Roads has been active in the work of preparation, and completion and publication of the new specifications will undoubtedly encourage use of welding that will produce savings in weight of steel in much of the steel highway bridge construction.

The difficulties arising in repairing surface imperfections in structural silicon steel by welding has caused a demand among bridge engineers for a new high-strength, low-alloy steel for riveted construction, but of improved manufacturing characteristics and weldability. The American Railway Engineering Association, in collaboration with Public Roads and the major steel producers, urged the adoption of a new standard specification by the American Society for Testing Materials. Much progress was made and it was believed that this goal would be reached during the coming year.

Work was done on a revision and enlargement of standard plans for highway bridge superstructures.

Survey of Right-of-Way Practices and Procedures

A State-by-State survey of the practices and procedures of the various highway departments in acquiring right-of-way was initiated and completed. An analysis of the information obtained was of considerable value as a guide in the development of Public Roads policy concerning right-of-way and preparation of rules and regulations governing Federal participation in the cost of right-of-way acquired under the expanded highway program.

Roadside Improvement

There was a marked increase in the incorporation of roadside improvement features in the construction plans for Federal-aid projects. Practically all of the States now include in their highway design some form of erosion control. With a view to increasing the effectiveness of funds expended for roadside improvements, particularly erosion control, a study was made of specifications, methods, materials, and equipment used by each of the State highway departments. It was anticipated that the results of this study, when completed, would provide the States with information on the most effective roadside improvement practices.

Use of Aerial Surveys

To make possible the planning of more highways with limited engineering organizations, the State highway departments continued to expand the use of photogrammetry and aerial surveys.

In order to assist the States in this undertaking, Public Roads increased its photogrammetric equipment, and trained 18 additional engineers assigned to its field offices in the use of this important tool in highway location.

Five regional conferences were conducted by Public Roads staff members for the dissemination of information to its own and State field personnel on practices and procedures used in the application of photogrammetry and aerial surveys to the solution of highway engineering problems. One school of instruction, designed specifically for highway location and design engineers, was conducted at Lincoln, Nebr. The school was attended by 33 engineers representing 7 of the midwestern States, the Soil Conservation Service, and Public Roads. Short intensive courses were given to engineers from India, Iran, the Philippines, and Thailand.

Detailed specifications under which commercial photogrammetric engineering firms may submit comparable bids for the furnishing of aerial surveys and topographic maps were completed and will soon be available from the U. S. Government Printing Office.

Coordinated Planning of Highways and Airports

Public Roads continued to maintain close cooperation with the Civil Aeronautics Administration, the Department of Defense, State highway departments, and local aviation officials to insure careful planning and coordination of highways and airports to avoid unnecessary encroachment of one upon the other. The greatly increased programs both for new and expanded airports and for new and higher-standard highways created many problems.

More extensive airports were being planned for the larger airplanes soon to be in operation. These airports were generally located in the vicinity of the larger cities where the demands for better and more extensive highway facilities were most pressing.

National Civil Defense Program Assistance

Under authority contained in the Federal Civil Defense Act of 1950, certain responsibilities pertaining to streets and highways were delegated to Public Roads. They were as follows:

1. Provide advice and guidance to the State highway departments in the designation of State civil defense emergency highway routes.
2. Coordinate interstate and State designated civil defense highway systems to assure uniformity of designation for civil defense emergency purposes.
3. Plan a national program, develop technical guidance for the States, and direct Federal activities concerning emergency clearance and restoration of highways, streets, and bridges in damaged areas.
4. Provide technical guidance to the States concerning highway traffic control problems which may be created during a civil defense emergency.
5. Determine and evaluate, with the cooperation of the States, counties, and cities, and assist in the planning of the needs for highway improvements to meet civil defense requirements.

Principal activities undertaken consisted of providing technical advice and guidance to civil defense authorities on actions included in the delegated responsibilities, reviewing and beginning revision of a manual on clearance and restoration of streets and highways in civil defense emergencies, and a study of highway needs for civil defense.

The relation of highway conditions to evacuation of civil populations from urban centers, reduction of urban vulnerability, dispersion of industry, and other related programs were under study as important elements of future civil defense planning.

Repair of Flood-Damaged Roads

For many years it has been the policy of the Federal Government to aid the States in the repair or reconstruction of highways and bridges on Federal-aid systems damaged or destroyed by floods and other disasters of extraordinary character and extent. Such aid is available under an authorization permitting the use of available emergency funds without waiting for legislative action following each disaster. Legislation of 1952 provided a continuing authorization of not to exceed $10 million annually for this purpose. The series of devastating hurricanes and associated floods that occurred during the fall of 1955 and spring of 1956 caused damage greatly exceeding that anticipated by the 1952 act and as a result the 1956 Federal-aid Highway Act increased the limitation on annual assistance to $30 million with the provision that this increased amount would apply also to emergency projects approved during the past fiscal year.

Allocations of $26,755,669 of emergency funds were made during the fiscal year to eight States and the Territory of Hawaii for rehabilitation work estimated to cost $54,187,205 in total. Amounts allocated were as follows: California, $7,950,790; Connecticut, $6,247,814; Hawaii, $387,500; Massachusetts, $3,771,500; Mississippi, $733,960; New Jersey, $417,000; New York, $1,914,005; Oregon, $665,100; and Pennsylvania, $4,668,000.

Severe floods occurred in February 1956 in Washington and in May and June 1956 in Idaho. These two States have indicated they will request allocations of emergency funds to aid them in the repair of damaged or destroyed roads and bridges included in the Federal-aid systems.

Foreign Activities

Training of foreign engineers

Public Roads continued to provide and to arrange training programs for highway engineers and officials from other countries. Planned programs were prepared for 110 visitors during the year, and included a total of 388 man-months of training. Assistance was also given to a large number of casual visitors coming to Public Roads for short periods of study and consultation.

Of the participants in the planned programs, 105 were sponsored by the International Cooperation Administration, 3 by the United Nations, and 2 by the Department of State. The 110 participants, representing 33 countries, included 49 from Latin America, 34 from the Far East, 20 from the Near East and Africa, and 7 from Europe.

The officials and engineers of the various State highway departments continued their wholehearted cooperation in providing these visitors with opportunities to study and observe the techniques and methods of highway improvement and utilization in the United States.

The Inter-American Highway

Since 1930 the United States, acting through the Bureau of Public Roads, has assisted the Republics of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama in the construction of the Inter-American Highway, which is that section of the Pan American Highway from Nuevo Laredo, on our Mexican border, to Panama City, at the Pacific terminal of the Panama Canal, a distance of about 3,200 miles. Connecting highways from El Paso and Nogales, Tex., to Mexico City now afford alternate routes from the western United States.

The section of the highway in Mexico has been financed and constructed entirely by Mexico.

At the end of the year 95 percent of the Inter-American Highway was passable in all kinds of weather by motor vehicles, but uninterrupted travel to Panama City was still an impossibility. Throughout its length of about 1,600 miles in Mexico, the highway was open at all times and practically all of it was paved. In Guatemala, starting at the Mexican border, an impassable gap of 25 miles was under construction and scheduled for completion by July 1957. This gap was bypassed by rail pending completion of the road construction. Beyond this gap, the highway was passable under all conditions as far as San Isidro, Costa Rica, a distance of about 1,100 miles. In this distance, there were many sections under construction and additional sections on which considerable construction would have to be done to bring the highway up to modern standards for a 2-lane road, but the route was open and passable without special difficulty.

Beginning at San Isidro, Costa Rica, a formidable impassable section of the route extended for about 150 miles through rough and undeveloped territory to Concepcion, Panama. A contract for the construction of 56 miles was awarded in June and it was planned to contract for the balance by December 1956. From Concepcion to Panama City, a distance of 300 miles, the highway was passable at all times but several substandard sections were being reconstructed.

During the 1956 fiscal year, the following was accomplished:

Congress appropriated $37,730,000 to expedite construction on the Inter-American Highway.

In Guatemala, all of the 25-mile gap at the Mexican border not under construction at the beginning of the year was placed under contract and construction was proceeding rapidly. The contract provided for completion by July 1957, which will make it possible to travel 2,700 miles by motor vehicle from the United States to San Isidro, Costa Rica, over the Inter-American Highway. Between this section and Patzicia, a distance of 150 miles, four contracts in the approximate amount of $14 million were advanced. Work on this section proceeded rapidly. The old road in this location was passable at all times, but it has steep grades, sharp curves, and a rough surface. From Patzicia to Guatemala City, and beyond to Barbarena, the road is paved. Between Barbarena and the El Salvador border, two contracts in the amount of $670,000 were awarded covering 20 miles of the 58 remaining miles to be constructed. These contracts were for grading, drainage, bridges, and selected material subbase only. The crushed stone base and pavement will be placed as soon as possible, but the road now being constructed will be passable at all times.

In El Salvador, construction continued on the surfacing of the only unpaved part of the highway in that country. The entire route in El Salvador was passable at all times. It was estimated that the highway in this country would be completed in 1957.

In Honduras, plans were prepared and a contract awarded for grading, drainage, and selected material base on 21 miles of the 69-mile section between Jicaro Galan and the Nicaragua border. Surveys were made and plans prepared for additional work to be awarded to contract as soon as possible.

In Nicaragua, work continued on the replacement of old temporary bridges with permanent structures between the Honduras border and Sebaco. Three bridges were completed and construction was started on four others. Of the 17 bridges in this section, 13 were completed or under construction and 4 remained to be constructed. Forces of the Government of Nicaragua proceeded steadily in improving the road from the Honduras border south toward Sebaco and surveys and plans were being prepared preparatory to letting a contract on a competitive bidding basis for the grading, drainage, and selected material surface for about

50 miles of this section of the highway. In the southern part of Nicaragua, the highway was completed except for paving and permanent bridges between Rivas and La Virgen, a distance of 7 miles. Plans were completed for 10 permanent bridges to replace temporary structures between Rivas and the Nicaragua border and bids for their construction were opened in June and steps taken toward awarding a contract.

In Costa Rica, all direct employment of labor by the Bureau of Public Roads was brought to a close and the contract method of construction was established. This became possbile with availability of funds in sufficient amounts to attract United States contractors. In December 1955, bids were received for the completion of grading, a crushed stone base, bituminous surface, and bridges on the 146-mile section from San Ramon to the Costa Rica border in northern Costa Rica. Lively interest was shown by United States contractors but the successful bidder was a Costa Rican firm at a price of approximately $4.3 million. In the southern part of Costa Rica, bids were received in June for the grading and selected material surface and one large bridge on a 56-mile section of the 134-mile impassable gap in the highway. As in the northern section, lively interest was shown by United States contractors. The work was awarded to a joint venture of a United States firm and a Cost Rica firm owned by a United States citizen. This contract was in the amount of approximately $9.6 million.

In Panama, five jobs were awarded to contractors by the Government of Panama after public competitive bidding. The total value of the work was approximately $4.43 million for 42 miles of construction and 13 bridges. Panamanian firms were successful bidders on all but one of the jobs.

Other Latin American projects

In Guatemala, Public Roads continued furnishing engineering assistance to the International Cooperation Administration in construction and improvement of the Pacific Highway from Escuintla to the Mexican border, and the Atlantic Highway from Guatemala City to Puerto Barrios.

In Nicaragua, Public Roads continued its technical assistance to the Republic in planning and constructing their national highway system (other than the Inter-American Highway), which was being financed in part by a loan from the International Bank for Reconstruction and Development (World Bank).

The Rama Road, when completed, will form the main transportation link between the settled portion of Nicaragua on the Pacific Coast and the large, undeveloped fertile areas of eastern Nicaragua and the Atlantic Ocean. It begins at San Benito on the Inter-American Highway and extends 158 miles east to Rama, a river port on the Escondida River which can be reached by ocean vessels from the Atlantic. Construction began on this road in 1943 with United States funds and continued until June 1948, when funds were exhausted. An all-weather road had been practically completed from San Benito to Villa Somoza, a distance of 96 miles.

Work was resumed during the fiscal year 1955 and a contract was let to a United States firm for about 12 miles from Villa Somoza toward Rama. During the fiscal year, $2 million of additional funds were appropriated by Congress and another contract for a 15-mile section at the end of the 12-mile section was let to the same contractor on the basis of competitive bids. This will provide an all-weather road for 123 of the 158 miles of this road. The Nicaragua Highway Department continued placing additional base-course material on the San Benito-Villa Somoza section.

In Ecuador, the Manta-Quevado Highway, on which Public Roads has been furnishing technical assistance, neared completion. This project was financed by the Export-Import Bank and the work was being done by a United States contractor.

Other foreign activities

Activities of the Bureau of Public Roads were continued in Ethiopia, Jordan, Liberia, Pakistan, the Philippines, and Turkey, where programs had been initiated in previous years. In addition to these continuing programs, short-time consulting services were supplied by Public Roads in several other countries at the request of the International Cooperation Administration and the Export-Import Bank.

Three Public Roads engineers spent a month in Iran studying the Iranian highway system to determine the feasibility of an Export-Import Bank loan for an expanded highway maintenance program. A report was prepared and submitted to the Export-Import Bank for their final decision.

A Public Roads engineer spent a week in Afghanistan studying the possibilities for a highway program to improve the roads in that country. A program was proposed, including a list of highway technicians and items of highway equipment to be procured, and was submitted to the International Cooperation Administration for their review.

A Public Roads engineer spent 6 weeks in British Guiana to provide consulting services on their highway program, including reorganization of their highway department.

Two Public Roads engineers spent approximately a month in Indonesia studying the entire Indonesian highway system, its operation and organization. Detailed recommendations were formulated and submitted to the International Cooperation Administration for their study and possible action.

Public Roads engineers spent considerable time in Vietnam, Cambodia, and Laos advising on proposed highway programs being implemented under ICA policies.

Public Roads continued to assist Egypt in selecting equipment for highway construction, maintenance of desert roads, and a highway materials laboratory.

A Public Roads engineer made two trips to Haiti to recommend solutions to highway construction and maintenance problems.

Activities in Turkey.—In Turkey, the program of technical and economic assistance which began in 1947 was continued. The Public Roads staff was reduced to 12 men during the year, in keeping with the increased responsibilities assumed by the Turkish engineers in the many phases of highway organization and management. A total of approximately $46.4 million has been made available for the procurement of roadbuilding equipment and to finance the cost of technical assistance. All funds for operation of this equipment and for construction and maintenance were supplied by Turkey and have approximated $60 million annually. This work has resulted in good highway facilities throughout Turkey and has brought into the national economy nearly all of the areas once isolated. Improvement of roads in Turkey has decreased average vehicular freight costs 62.8 percent since 1949. All-weather roads on the highway system have increased from practically zero in 1948 to 14,760 miles.

Activities in Ethiopia.—In Ethiopia, Public Roads completed its fifth year of directing the activities of the Imperial Highway Authority. Activities were confined to maintaining and bettering surfaces of the 3,100-mile system of national primary highways. The condition of the roads was materially improved during the year. As improvements were completed, truck freight rates were materially reduced as well as the elapsed time of travel on the highway system. A study of transportation costs between Addis Ababa and Assab, the principal Red Sea port, indicates that rates on this particular 500-mile haul were reduced $1.20 a ton during the year with a total annual saving to shippers of approximately $175,000. This is in addition to previous savings in costs resulting from improvement of roads on this route over the last few years.

Financial support of the road program in Ethiopia, including the cost of the Public Roads mission, was furnished entirely by the Ethiopian Government from appropriations and balances available for the year of approximately $5 million. A total of $21.3 million has been supplied by Ethiopia to supplement the original $5 million loan from the International Bank for Reconstruction and Development. The Public Roads staff of 20 includes engineers, administrative officers, superintendents, and equipment specialists. No United States funds have been involved in this program. About 125 miles of highways were sealed and surfaced with asphalt during the year. Approximately 125 miles of new roads were constructed and 800 miles reconstructed or resurfaced with stone.

Activities in the Philippines.—In the Philippines, Public Roads has assisted in establishing an effective highway department since 1946 when it was charged with the restoration of war-damaged roads and bridges under the Philippine Rehabilitation Act of 1946. Since completion of this phase in 1952, Public Roads has operated as a consultant for the International Cooperation Administration and its predecessor agencies. Working with the ICA it assisted the Philippine Bureau of Public Highways in advancing its highway program and training engineers.

During the past fiscal year, 290 miles of the Philippine national system of highways were improved, with work continuing on an additional 255 miles. On the undeveloped Island of Mindanao, 60 miles of new development roads were completed—a total of 135 to date—and 185 miles were under construction at the end of the year. Impetus has been gained this past year in improving the village or barrio roads that provide an outlet for the villages to the principal highway network. More than half of the 8,000 villages in the Philippines were without year-round passable access except by trails. At the end of this past fiscal year 3,200 miles of roads had been graded and 1,400 miles were surfaced. The resulting social uplifting of the rural standards is probably the largest effort toward planned advancement that has ever been attempted in the Philippines.

A total of approximately $20 million of United States funds made available to the Philippines through the International Cooperation Administration has been expended for the purchase of highway equipment and materials (principally bridge steel) and for the services of highway technicians. Against this amount of United States funds the Philippine Government from its own revenues has expended approximately $70 million annually for operation of equipment and for additional contract work.

An extensive training program was carried on, with the greater part being given on the job. Both highway engineers and equipment personnel were trained. The training of engineers has reached the point where it was possible for the Philippine Government to grant a 2-year leave of absence to 6 Filipino engineers in order that they could be employed by the Liberian Government to aid in highway development in that country. Such moves provide a wealth of experience for both the individuals and the countries concerned as well as providing stronger bonds in international relations.

Activities in Liberia.—Public Roads, as participant in the program of the International Cooperation Administration in Liberia, assigned a highway group to Liberia in 1951. Construction of all-weather roads has brought about an increase in travel both in passenger and commercial vehicles. Development precedes construction and even as a road survey is completed individuals plan farms of rubber, coffee, cassava, rice, etc. Work continues on the organization of a Liberian highway division patterned after one of our State highway departments, and a group of subprofessional engineers were being developed. The government was dependent upon engineers from several other countries to man their highway division. These engineers will be replaced as quickly as Liberians can be trained to do the work.

Surveys, plans, and estimates were completed for approximately 150 miles of new roads in Liberia, to be constructed with $15 million loaned by the Export-Import Bank. Approximately 300 miles of new work is planned to be built with these funds. This is in addition to the construction contracted for during the previous year under a $5 million loan by the Export-Import Bank. These projects were substantially completed during the year.

Activities in Jordan.—Public Roads has assisted the Hashemite Kingdom of Jordan with its road program since 1952. This assistance has been in the form of aid in the location and design of highways, consultation on construction, and demonstrations of both construction and maintenance methods. The program has had the dual purpose of providing highways serving important agricultural areas and to demonstrate modern methods of road construction and maintenance. A highway system was planned for Jordan that includes a main east-west route, a main north-south route, and numerous village access roads and farm-to-market roads. Two demonstration projects, one 7 miles and one 28 miles in length, were completed during the year. Work was continued on 57 miles of primary system, using a combination of hand labor and heavy equipment. Approximately 4,900 laborers were employed on the several road projects, with a large impact on the unemployment problem.

Development of an effective highway organization within the Jordanian Government department of public works has been one of the principal tasks in the program. Engineers have been trained in modern methods of highway design and others trained to operate equipment.

Activities in Pakistan.—Assistance to Pakistan in highway improvement by Public Roads, under the auspices of the International Cooperation Administration, began the previous year. Twelve technicians were recruited and assigned to the country. Objectives of the program have been to assist in the development of highway organizations in the Central Government and in East and West Pakistan, and to demonstrate the advantages of modern equipment in highway construction and maintenance. Equipment and supplies costing approximately $1,250,000 were shipped to Pakistan to begin this work. Construction of modern shops to maintain and care for this equipment, and of a materials laboratory, was begun by the Pakistan Government. On-the-job training of engineers and equipment operators continued.

The main objective of the West Pakistan project was to provide a road from Karachi to Quetta, a distance of about 450 miles. This road will serve as a demonstration project and open up a vast portion of West Pakistan, including an access road to Afghanistan.

Highway Safety

Improving highway safety is a direct responsibility of the Bureau of Public Roads, to which it responded in a variety of ways. Possibly its most important contribution was in the design and construction of safer highways. However, Public Roads also participated in the promotion of safety in directions other than highway design. This was done very largely in cooperation with the President's Committee for Traffic Safety, which was provided with headquarters office space, staff, printing, and supplies.

As its major activity in fiscal year 1956, the Committee organized and conducted the first regional traffic-safety conferences ever held under Government sponsorship. The purpose of these meetings in Atlantic City, Miami Beach, Chicago, and San Francisco was to stimulate the organization of effective State and local citizen groups in support of official application of the action program for traffic safety. Follow-up activity in the States and communities indicated that the regional sessions were unusually successful in this objective. Attendance

totaled more than 4,000 citizen leaders, carefully selected by the Governors and by cooperating national organizations.

The urgency of citizen public-support organization was emphasized, according to the Committee, by the 10-percent increase in fatalities during the period 1950–55. The growing problem of traffic deaths must be solved by each community and State: The responsibility lies with them. The response to the conferences reveals a growing understanding of this fact.

The success of the regional meetings was in large part a byproduct of committee appointment of an advisory council of chief executive officers of 31 national organizations with substantial programs in the field of traffic safety. The advisory council provided top management staff for planning and holding the conferences.

Organization and Training

In contemplation of enactment of an expanded highway program, one of the more important aspects of Public Roads advance planning consisted of a comprehensive review of its organization structure. The last previous organization study was completed more than 10 years ago, following which a major reorganization was effected including the establishment of district offices in each of the States and in Puerto Rico, Alaska, and Hawaii, and a realinement of division offices. During the intervening years numerous individual changes and deviations were authorized with the result that much of the original organization pattern was lost.

In the recent study, attention was first given to the district offices in recognition of the desirability of completing the reorganization at operating level at the earliest date possible and well in advance of the impact of a greatly expanded program. Following a comprehensive study, a basic organization plan was prescribed for all district offices, effective January 1, 1956. The organization plan was devised to provide sufficient flexibility to permit its application to all districts, regardless of size, but with the retention of basic uniformity.

The study of the organization structure of the division offices was nearing completion at the close of the fiscal year and it was contemplated that a revised basic organization plan would be put in effect not later than September 1, 1956. The organization study was to be continued with a complete review of the organization structure of the Washington headquarters office during fiscal year 1957.

To place greater emphasis on Public Roads' management improvement program and to focus organizational responsibility for a continuing formal program, all management improvement activities were consolidated in a Budget and Management Branch in the Finance and Management Division. The objectives of the program will be to obtain the most effective utilization of manpower, to improve paperwork management, and to reduce to the minimum consistent with program requirements, work generated at the source.

Management improvement actions during the fiscal year resulted in estimated savings of approximately $400,000 in administrative costs. These actions varied from elimination of duplicate forms and reports to discontinuance of program activities of marginal value. In addition, savings in the cost of highway construction effected through technical improvements initiated by Public Roads engineering personnel resulted in an estimated savings of approximately $7 million. These latter savings accrued jointly to the benefit of the Federal Government and the States.

Public Roads continued to increase the efficiency and productivity of its engineering and administrative personnel by conducting in-service training programs which reached 13 percent of the permanent employees. In addition, 41 college graduates entered the 3-year junior engineer training program.

Administrative studies

At the request of State officials, an organization and management study of the Montana State Highway Commission was undertaken during the year. All necessary field work was completed, and a report is being prepared for submittal to the State.

Field work on a study of classification of State highway department engineering personnel in six States was completed, and a report published.

A study of time-saving methods in highway engineering, in cooperation with the Highway Research Board, was completed and published by the Highway Research Board. A study of local rural road organization was initiated.

Tables showing the directing organizations of State highway departments and salary ranges of the principal officials were revised to show the status of this information as of July 1955.

Preparation of a bibliography on highway administration was undertaken during the year, and was completed in rough draft form. It will be published by the Highway Research Board.

Work was done on a study of the specific dedication of highway revenues, but completion of this study was being delayed by lack of information on the State control of such revenues. Steps were taken to obtain the information.

Financial studies

Local road and street finance data again were reported for all States. Also, the States reported receipts, expenditures, and debt information for "allied functions," including parking meters, publicly owned parking lots and garages, storm sewers, street cleaning, street lighting, and curbs and gutters.

A bulletin covering the highway finance activities of local rural governmental units for the years 1942–51 was published. Work was continued on an urban street finance bulletin covering the years 1937–53.

A highway finance report of receipts, expenditures, and debt status of all governmental units for highway purposes for the years 1946–55 was prepared and published. A review of developments in highway finance during 1955 was also prepared and published.

A discussion concerning financial planning for long-range highway programs was supplied to State highway departments. Data gathered and analyses made in a Public Roads study of highway financing were utilized in a study of the methodology of financial planning and potentialities of credit financing. A report describing this work was presented at the January 1956 annual meeting of the Highway Research Board.

Taxation studies

Comprehensive research into the problems of highway taxation was continued. Much of the work was done in cooperation with committees of the Highway Research Board. Particularly noteworthy was the cooperative study given to the allocation of motor-vehicle-user tax responsibility among vehicles of various types and sizes by the incremental method or theory of differential costs.

A study of the so-called "third-structure taxes" on commercial vehicles as they now exist in the United States was begun. Other activities included the preparation of a report comparing State highway finance and tax study findings with respect to the tax responsibility of vehicles of different types and sizes. These findings were applied to a series of selected vehicles and the actual State road-user taxes that would be paid on these vehicles in 1955 were also evaluated. In addition, two earlier studies, one analyzing toll road and bridge payments by selected vehicles of different types and weights, and an analysis and estimate of the average

payments in State road-user taxes made on vehicles in different types and weight groups, were brought up to date; reports on these analyses were in preparation.

During the year technical assistance was given toward finance and tax studies in Kentucky, Montana, North Dakota, Rhode Island, and Washington. All of these were large-scale, State-sponsored projects involving the allocation of tax burdens and the development of adequate revenue structures to support expanded programs.

Highway cost studies

A study of the service life characteristics of road surface types was completed during the year. Twenty-five States and Puerto Rico cooperated by furnishing data on their primary road systems, showing mileages of various types built each year, mileages retired, and methods of retirement. Previous reports on this subject were completed in 1940 and 1948. The report on the latest study covers 50 years of roadbuilding and shows the service lives of various types, their age, and remaining life expectancies.

An analysis was begun of the life of dollars invested in grading, surfacing, and structures. Nine States cooperated by furnishing basic data on construction costs and salvage. From the investment lives which will be developed by this study it will be possible to arrive at depreciation rates of various elements of the highway plant. Such information is essential for numerous kinds of economic studies in the field of highway transportation.

Pilot studies were continued of the relation between the growth trends in traffic and corresponding growth trends in highway investment. The objective was to refine the procedure whereby estimates of current backlogs and future highway needs can be updated periodically at a fraction of the effort required by conventional field appraisal methods. A progress report on this subject was completed.

Assistance was given to Kentucky, Michigan, Missouri, Rhode Island, South Dakota, and Tennessee in furtherance of comprehensive studies of highway needs.

Production cost studies

A program of research on methods and costs of building and maintaining roads was continued. Results of cost studies of secondary road work performed by contract and by State forces on five projects in a southeastern State were reported. Findings on the jobs studied showed that contract work had certain measurable cost advantages over State force work.

Work was started on several short motion pictures, covering significant time losses from small delays by key units of equipment on highway construction jobs. Typical action scenes at various intervals during construction operations will also be included. One film was completed.

Field studies of the cost of surface maintenance of portland cement concrete roads in midwestern States were continued. These studies included unit costs of labor, equipment, and materials. The basic data developed are to be used in interpreting the physical maintenance work on the AASHO test road in Illinois in terms of normal work and cost when performed as a routine maintenance operation.

Analyses of power-shovel performance data relating to the effect of degree of fragmentation, height of face, and swing angle on production rates were completed and a report was made.

Special unit cost studies of bridge construction were started in January 1956. These studies included multiple box bridges, reinforced concrete deck girder bridges, reinforced concrete decks on continuous I–beam bridges, and a flat slab bridge. Field and analysis work on the individual jobs was scheduled for completion in 1957.

Land acquisition, roadside control, highway laws, and terminal facility studies

Problems attendant on the acquisition of land for highway right-of-way, adequate protection of the roadside, highway laws, the provision of controlled-access facilities, and of terminal facilities were the subjects of studies carried on during the year. Some of these studies were requested by or cooperated in by State highway departments and other public or private organizations. Technical assistance in these fields to State highway departments and other individuals and agencies continued during the year.

Preliminary studies, one on land acquisition for future highway use and the other concerning control of highway access, were completed during the year. These studies were prepared in connection with a comprehensive project for the study of highway laws in which Public Roads cooperated with the Highway Research Board. Other reports in process of completion by the laws project included studies of land acquisition, highway system classification, declaration of legislative policy on highways, Federal-aid intergovernmental relations, and constitutional provisions relating to highway matters. Technical assistance was also rendered to some of the States in connection with State law surveys.

A study of the attitudes of the courts toward resolution of parking difficulties by cities was practically completed. This study will summarize most of the judicial decisions on practically every phase of the parking problem that has been litigated in the courts.

Technical assistance was given in the legal, financial, administrative, and economic phases of establishing parking facilities in municipalities.

Highway Transport Research

Road inventory and mapping

Data of fundamental importance in determining needs and deficiencies of the entire road network and in appraisal of the performance and adequacy of the several highway systems were obtained in a continuing inventory process in 42 States, Hawaii, and Puerto Rico. Work of inventorying conditions of highways and business, industrial, and other development along them was done by State highway departments with Federal assistance. General highway maps were prepared for 437 counties in 34 States. Other mapping activities resulting from State planning surveys included the preparation and publication of 16 State general highway maps, 28 State traffic maps, many other special area maps, and city and county traffic maps.

Traffic volume and truck weights

Information concerning the volumes and changes in highway traffic that is needed in planning highway programs was obtained. Over 1,000 continuous-count stations were operated and extensive traffic volume studies covering all or the most important portions of the rural road network were made in a number of the States.

During the year traffic in rural areas increased at a moderate rate, somewhat higher than in 1954 but at a lower rate than in most previous years (exclusive of the war years). Traffic in the urban areas increased at a lesser rate than it did in the rural areas but the rate of increase was identical with that reported for the previous year. All rural travel increased about 4.0 percent, while urban travel increased 3.2 percent.

Information on truck weights was obtained at over 500 locations in 44 States. Estimates of truck travel, ton-mileage of freight transported, and frequency of heavy axle loads and gross loads were made. Preliminary analyses indicate that truck travel on main rural roads increased about 4.3 percent and ton-mileage of carried load increased about 7.1 percent.

The improved techniques developed as a result of research of sampling error as it is related to the scheduled length of traffic counts were tested and applied in four additional States and in one city. Consistent improvement of efficiency of traffic-counting operations has been noted in the States where the new techniques have been introduced during the past 3 years. Basic research designed to provide data for further improvement in traffic counting in urban as well as rural areas was continued.

Traffic studies in cities

The data obtained in a resurvey of traffic movement in the Tulsa, Okla., metropolitan area, by the home-interview method, was analyzed and reported by the State. The original survey was made in 1944 and the resurvey in 1954. The resurvey shows important changes in the distribution of traffic during the 10-year period as well as sizable shifts in the population. Only 24 percent of the people interviewed in 1954 had lived at the same address in 1944. Only 64 percent of those interviewed in 1954 were living in Tulsa in the earlier year. This illustrates the importance of periodic checks on travel habits and resulting traffic movements.

A comprehensive origin and destination traffic survey of the home-interview type was completed in Detroit. The results show a need for a 259-mile freeway system, estimated to cost $1.5 billion, to serve an estimated population of 4.4 million and its traffic by 1980. Very definite relations between trips and land use were found and these relations will aid in the conversion of future land-use forecasts into traffic forecasts.

A similar origin and destination survey, estimated to cost nearly $2 million, was started in the Chicago area. This is the largest and most costly survey of this type ever undertaken. The cost of the survey, however, will not exceed the cost of about two blocks of a Chicago expressway recently built, and is fully justified by the great magnitude of new facilities which will be based upon the results.

Similar surveys were made or were underway in 114 urban areas and resurveys for determining changed conditions were completed or underway in 5 areas.

Urban highway planning

Research was continued, utilizing data from selected metropolitan area traffic studies, to develop factors and indices and improve methods of estimating both present and future urban travel patterns. It is desired to establish the relation between residents' vehicular trips and such variables as population size or density, distance from central area, automobile ownership, family income, and land use.

A comprehensive analysis of data developed from the home-interview type of traffic study in 50 urban areas was completed. This study encompassed information relative to certain household characteristics of the areas, such as dwelling units, persons, and automobiles owned, and the relations between these characteristics and the volume of trips made by the urban residents. In these studies the urban areas were grouped by population size and by economic character. One of the indications is remarkable uniformity in the proportion of trips for each particular trip purpose, i. e., work, shop, and social and recreational, in cities of all sizes. The study indicates the desirability of additional analysis, particularly determination of the dependence to be placed on factors such as car ownership and distance from the central area in estimating traffic demands.

A statistical study to determine the effect of family income, automobile ownership, distance from the central business district, and population density on number of trips per dwelling unit in Washington, D. C., was completed. It was found that automobile ownership was the strongest variable in predicting total vehicular trips. However, initial results indicate that in estimating transit trips best results probably would be attained by using variables other than automobile ownership.

A study of the factors affecting mode of travel, such as land use, transit service, population and population density, number of persons employed, and automobile registration, was underway. Metropolitan area origin-destination traffic surveys in 26 cities for which detailed information on transit service and land use could be obtained were studied in this manner and others will be included as similar data are obtained.

Toll-road studies

Studies of traffic using toll roads were continued in order to establish a sound basis for estimating the volume and kind of traffic likely to be attracted to a high-type highway. Such information is especially needed in planning the National System of Interstate and Defense Highways.

Analyses of the data for the Maine Turnpike and the eastern extension of the Pennsylvania Turnpike were completed and reports published. Analysis of travel data obtained in the area of the western extension of the Pennsylvania Turnpike was continued. Arrangements were made to study traffic on the Ohio Turnpike.

The diversion and the generation of traffic resulting from improved facilities and the long-time growth of traffic must be considered in designing a highway. Traffic information for both average and high-type facilities are required.

Completed studies show that traffic diversion to toll roads is greater for passenger cars than for commercial vehicles except in mountainous areas. It was found that a much greater increase in traffic in the vicinity and general direction of a turnpike resulted after its opening than elsewhere in the State. The increase is generated traffic or traffic diverted from routes not in the immediate vicinity of the turnpike.

Motor-vehicle-use studies

Studies of motor-vehicle use were conducted in cooperation with the State highway departments. They were designed to yield information on the proportion of travel in rural and urban areas and the principal highway systems used, rural and urban ownership of vehicles, and pertinent characteristics of travel including modes of home-to-work travel, purpose of travel, and frequency and length of trips. This information is fundamental in the solution of highway planning and financing problems. At the close of the fiscal year field work of these studies had been completed in 20 States and in Hawaii and work was underway in 2 States; at least 3 other States anticipated starting such studies.

Based on information from 16 States, highway travel was found to be predominantly of short distance. About 59 percent of passenger-car trips were less than 5 miles and 79 percent less than 10 miles, one-way length. Less than 1 percent exceeded 100 miles. On the basis of vehicle-mileage, however, 29 percent of the travel consisted of trips under 10 miles but 20 percent resulted from the small proportion of trips of 100 miles and longer. The average length of all trips was 8.5 miles.

Parking facilities

Data on parking and travel habits, valuable in urban planning, was prepared for a revision of the *Parking Guide for Cities*, soon to be published. As an example, a comparison of prevailing curb time restrictions with parking habits made it evident that in nearly every city there was need for more 15- and 30-minute spaces and proportionately fewer 1-hour spaces.

Although there has been an increase in the number of parking spaces, the increase developed in offstreet areas where turnover was low and hence the volume of parking accommodated was actually less than the increase in space indicates. Increase in parking space has not developed as fast as need.

A procedure developed in 1955, for a simplified parking study for use in small cities, gave good results in a pilot study and was in general use.

Economic cost of motor-vehicle accidents

The first phase of a comprehensive study of the economic cost of motor-vehicle accidents was completed in Massachusetts. For the first time, the direct annual costs of traffic accidents to passenger-car owners and the occupants and pedestrians involved have been determined in detail, for an entire State. These costs were correlated with such items as highway systems, population groups, weather, and other related items. The direct costs consist of costs of hospitalization, medical and dental expenses, ambulance costs, property damage costs, value of time lost from income-producing work, legal and court costs, damages awarded in excess of all other direct costs, and minor miscellaneous costs. These annual direct costs in Massachusetts were found to be $57 million, in a State having a population of approximately 4.9 million with nearly 1¼ million passenger-car registrations.

Preparation of similar costs to truck owners was begun. The indirect costs of all highway traffic accidents in Massachusetts will be determined before the study is complete.

On the basis of the highly significant data being developed in Massachusetts, exploratory conferences were held with seven other States, and it was anticipated that a number of them would inaugurate similar studies.

Studies of paved shoulders

In cooperation with the highway departments of nine western and southwestern States, speeds, transverse positions, and passing practice data were recorded for a total of 115,000 vehicles at 79 locations during the summer of 1955. These data were obtained in an effort to evaluate the merits of 2-lane rural roads with full-width paved shoulders. For comparative purposes, highways with normal shoulders such as grass or gravel and highways with cross sections typical to a particular State were also included in the studies.

The data were summarized separately for each State and efforts directed toward a uniform summarization and analysis of the data for a comprehensive report. It was expected that this information would supply answers to a number of questions relating to the regulation and control of traffic on highways with paved shoulders that are similar in appearance to the surface of traffic lanes. The solution to this problem is particularly important to the western and southwestern States where the greatest mileage of this type of shoulder construction is found.

Driver behavior on a structure with a partial shoulder

Highway shoulders adjacent to traveled lanes provide a place of refuge for disabled vehicles. On long bridges and other structures, particularly in urban areas, the provision of full-width shoulders increases the cost materially. Design engineers have been considering the advantages and disadvantages of a partial shoulder.

In Fort Worth, Tex., a 4-lane divided highway structure was built with a partial shoulder, 6 feet wide with a 4-inch mountable curb, provided adjacent to the right-hand lane. This is believed to be the only structure in the country having this feature. A study of speeds and placements of vehicles was conducted in cooperation with the Texas State Highway Department during March 1956.

Preliminary results indicated that there was a considerable difference between the behavior of traffic on a 4-lane divided highway with a wide median and shoulders and the behavior of traffic on the structure with the partial shoulder, especially when a car was parked on the partial shoulder. It was evident, however, that the two lanes of traffic moving in one direction could continue to move over the bridge at reasonable speeds and with safety, when a disabled vehicle was parked on the partial shoulder. This would not have been possible without a partial shoulder.

Highway capacity research

Further study of highway capacity at intersections at grade and entrances and exits on expressways was in progress. The *Highway Capacity Manual* published by Public Roads has been widely used in the design and operation of freeways and urban streets. Its importance justifies keeping it up to date and refining capacity determination procedures.

Safe, efficient use of freeways cannot be achieved without proper provision for the merging of traffic streams at points of access, and for the interweaving of vehicles between lanes as traffic approaches points of divergence. Practices and principles followed in the design of ramp terminals and weaving sections vary widely. During the year, movement of vehicles was studied at numerous locations for the purpose of determining capacities of ramp terminals and weaving sections having a variety of geometric design features. The knowledge thus gained will result in freeways of the future being so designed as to carry their traffic load with minimum congestion and with the highest degree of safety. Sixty cities in 24 States submitted detailed data for 416 of the most congested intersections in the country.

Reduction in erratic driving by proper signs and markings

High-speed, heavily traveled expressways present new and complex problems in traffic control. To develop the standards for improved signs and markings, which are vital to safe and efficient handling of traffic, studies were initiated on a portion of the Pentagon road network near Washington, D. C.

Pavement markings were effective in reducing erratic driving practices, with an overall reduction of 46 percent. Although the rate of erratic driving by out-of-town drivers was several times as great as by local drivers, the new traffic control measures produced substantially the same percentage reductions for each group.

These studies showed that a relation may exist between erratic driving practices and accidents. If such a relation can be established, it will be easier to evaluate the effectiveness of changes in traffic control measures and highway design practices.

The studies revealed that accidents were reduced 29 percent after placement of pavement markings that were reflectorized. The most pronounced improvement was at night and during inclement weather. Drivers are most in need of guide lines when visibility is reduced. Reflectorized pavement markings appear to fill this need.

Installation of improved highway signs subsequent to improvement of the pavement markings resulted in a further reduction in erratic driving. As more accident data are collected, it may be possible to measure the effect of improved signs on accidents.

It was found that advance warning signs, adequately designed and well located, can guide traffic into proper lane positions in advance of a complex intersection. Out-of-town drivers, who usually are unfamiliar with the route, were particularly benefited by this type of treatment. Because these drivers tend to drive in the right-hand lane, good advance warning signs are especially required for exits on the left.

Access connections to roadside businesses

Studies have shown that expressways with full control of access have fatality rates that are about one-third of those found on conventional highways. Most existing highways do not have control of access. Where access is not fully controlled, the frequency and design of access points to commercial establishments are recognized as two of the most important physical elements affecting the safe and efficient operation of the highway. Studies of the movement of vehicles into and out of roadside business places are being conducted to develop standards for

driveway entrances. Such studies at 11 gasoline stations were completed in cooperation with the New York State Department of Public Works.

It was found that channelization at a station by curbs produced an orderly and concentrated movement of traffic into and out of the station, compared to the disorderly pattern existing when the entire frontage was left open to the highway. The average entrance speed was only 6 miles per hour at the channelized stations with a 90-degree angle of driveway entrance. As the entrance angle was reduced, the entrance speed increased proportionately to 16 miles per hour for a 30-degree angle of driveway entrance.

Another important finding was that the two main driveways handled at least 80 percent of the traffic at stations having more than two driveways. It was also found that nearly all vehicles entered within a 26-foot width of driveway, measured at right angles, even when the available driveway was much wider.

An analysis of motor-vehicle accidents revealed that the number of accidents per mile of service-station frontage on New York State rural highways was about 85 percent higher than the overall rural highway accident frequency in the State.

These studies, together with similar studies that may be conducted in other States, will make it possible to formulate standards for access to roadside businesses based on factual information.

Highway crash barrier research

Public Roads, in cooperation with the University of New Hampshire, undertook in January 1955 a study to determine the effectiveness of hedges of multiflora roses as crash barriers in stopping a passenger car running off the road. It had been suggested that such plantings could be used on the highway to catch an errant vehicle without the usual injury to persons and damage to property.

The immediate objectives were to determine the deceleration rate, stopping distance, and general behavior of the vehicle, the physical effect upon the driver and an observer, and the extent of damage to both the automobile and the plants. Test runs were made at speeds of 20 to 50 miles per hour and from various angles of approach; some in July 1955 when the bushes were in full foliage and some in December 1955 when the bushes were denuded.

It was concluded that multiflora rose hedges are effective barriers for stopping passenger cars provided there is sufficient growth. For the passenger car to be stopped within the hedge at speeds of about 50 miles per hour, the minimum effective length of bushes on the path of travel was 75 feet. The maximum deceleration recorded during the tests was severe enough to indicate that some form of protection within the vehicle should be used. No one was injured, but the driver and passenger wore lap and shoulder seat belts. They reported that shock during the stop seemed no more severe than an extreme emergency stop. The car received only minor scratches.

Only the life-saving possibilities of barrier hedges were investigated. Related problems of snow removal, drainage, accumulation of litter, monotony, and highway user reaction were still to be evaluated from experience with plantings.

Brake research

Public Roads completed a study of the braking performance of over 1,250 motor vehicles selected at random from the general stream of traffic. Passenger cars, single-unit trucks, and truck combinations on the highways in Maryland, Michigan, and California were tested. The study provides current information on levels of brake performance of the various vehicle types found on the highways and brings up to date the results of similar tests performed in 1949. Findings of the study will be particularly useful in examining, for possible revision, present highway standards and regulatory measures in which vehicle stopping ability is an important factor.

Results of the current study indicate the 15 percent of passenger cars with the best performance require about the same distance to stop as the corresponding group of cars in 1949, but at the 85-percentile level the performance was about 10 percent better than in 1949. In general, the performance of the single-unit trucks and smaller combination vehicles showed little change since 1949, but the performance of the larger combination vehicles showed a small improvement.

Economics of motor-vehicle size and weight

Determination of the overall cost of highway freight transportation by various types of vehicles is essential for rational determination of truck size and weight limits. Costs include those of owning, maintaining, and operating trucking equipment, plus such costs of constructing and maintaining highway facilities as may properly be assigned to freight vehicles.

Two major questions must ultimately be answered: What are the optimum size and weight specifications that will result in the lowest overall cost of highway freight transportation? Are such optimum size and weight specifications applicable uniformly in all States or regions of the Nation?

In a program of research being carried on in collaboration with the Highway Research Board committee on economics of motor-vehicle size and weight, vehicular cost and operating data are being collected by interviewing motor carriers throughout the country. By the end of June about 2,400 carriers had been approached in 35 States and the District of Columbia. About 20 percent of these carriers supplied useful data. Field work was to be started in five additional States before the end of 1956 and completed in all States by June 1957.

Hydraulic Research

Research in the field of highway hydraulics, while not large compared to that in other fields, is unique in that about two-thirds of the total money spent is for research done by others under agreement with the Bureau of Public Roads. The policy is to make use of expert knowledge wherever available, rather than to attempt to build up a large staff of technicians and research facilities which would in some measure duplicate those available in other Federal agencies or in universities. Public Roads is interested primarily in the application of research. The staff is able to concentrate most of its effort on development of design techniques rather than in the exacting task of conducting experiments in the hydraulic laboratory.

The hydrologic research conducted by Public Roads has been directed toward development of sound statistical methods of analyzing the vast amount of data on runoff in published records of the U. S. Geological Survey. The highway engineer is concerned with peak rates of flow. Accordingly, the studies have been aimed at getting the most reliable estimates of flood magnitude and frequency obtainable at reasonable cost on a mass production basis.

During the past year several significant advances have been made in statistical analysis of flood data, both stemming from graduate study by a staff engineer. A novel method of separating ordinary floods from major floods has demonstrated that the former can be estimated reliably from a short period of record and that certain fixed relations exist over wide geographic regions between the 10-year flood based on this short period and the 10-year flood based on major flood occurrences. This greatly improves the reliability of flood estimating. A second notable achievement relates to the selection of representative gaging stations in a given hydrologic region. By proper selection a relatively small number of stations have been found to define flood discharge as related to size of watershed with better reliability than was obtained from using additional stations which had the effect of throwing the sample out of balance. This finding can also be applied

by the data-gathering agencies in establishing networks of gaging stations in a region where insufficient records are available to define flood runoff characteristics.

Hydrologic studies have been made for Public Roads by three agencies. The Weather Bureau has nearly completed the development of a method of using long-term rainfall records as a means of extending short-term runoff records and thereby has improved the reliability of flood estimates. Stanford University has completed a study of the relation between intensity of rainfall and various topographic indices (the study is limited to northern California where variations in rainfall are extreme). The University of California is testing the applicability of the new method of analyzing flood frequency to data for watersheds along the westerly slope of the Sierra Nevada Mountains.

Hydraulic research was conducted on culverts, bridges, and storm drains under cooperative agreements with Public Roads, or a State highway department using Federal-aid funds, at three institutions. The Iowa Institute of Hydraulic Research completed two reports to be published by the Iowa State Highway Commission. The first provided, for the first time, design data for estimating the probable depth of scour around a bridge pier as the flood stage increased. This is the culmination of 7 years of painstaking research. The second report gave data for estimating how much sand and silt could be carried in a storm drain or culvert without causing blockage and, if blockage did occur, the extent to which the flow capacity of the pipe line would be reduced; data were also provided for designing traps to retain sediment not transportable beyond a certain point in the system. The Institute also worked on the hydraulics of box culvert inlets.

The Missouri State Highway Commission joined with Public Roads 3 years ago in sponsoring research at the University of Missouri on the efficiency of junctions in storm drain systems. Significant results departing markedly from old concepts have resulted. A progress report was presented to the Highway Research Board.

Of far-reaching importance is the research on the hydraulics of highway bridges begun in 1954 for Public Roads at Colorado Agricultural and Mechanical College. These model studies have resulted in development of a simple method of estimating the increase in water-surface elevation upstream from the bridge (called backwater) caused by the contraction in waterway area due to piers and abutments of various types and arrangements. These data are of great value since the length and cost of a bridge can vary as much as 20 to 30 percent depending on the allowable amount of backwater at a given flood stage.

Research on hydraulics of culverts at the National Bureau of Standards with funds provided by Public Roads continued. This investigation, now going into its third year, has upset many of the old beliefs as to how water flows in a culvert. Ordinary culverts were found to be rather inefficient in that they flowed partly full even when ponded water at the entrance was overflowing the road. The research has shown that new forms of entrances can force culvert barrels to flow full at maximum capacity. Industry will be invited to participate in final development of commercial designs when sufficient data are available.

Physical Research

It has become more apparent that emphasis must be placed on studies of the durability of highways and associated structures, and on means of using local materials to the best advantage. Depletion of good materials in some areas has caused concern, and efforts to improve and make use of the materials remaining are necessary. Many of the investigations mentioned here were made for these two purposes. Much of this work was continued from previous years. In most cases this was due to requests from State highway departments to include additional materials or to add additional services other than those contemplated when the work was started.

Soil studies

Studies of the properties of soil were made in cooperation with State and Federal agencies. The development and production of soil reports and maps for engineering purposes was continued for Illinois, Maine, and Rhode Island. In addition, maps showing construction materials and drainage were prepared for Maine with the assistance of its highway department. A nationwide survey of soils was continued with the cooperation of the Soil Conservation Service of the U. S. Department of Agriculture. Samples of soil from 16 counties in 10 States were received for this work. Reports regarding the engineering application of soil survey information were prepared for inclusion in agricultural soil bulletins for three of these counties. In another study in cooperation with the Soil Conservation Service, a complete series of tests to determine all characteristics of the major types of soil in the United States of interest to engineers was started. Samples from six States were received for this investigation.

Published information in the form of maps and reports can be used with aerial photographs to give a sound knowledge of the materials available for highway construction. To demonstrate this, a study of such sources of information for one county was made and a soil map and a report on the properties of the soil were prepared.

Investigation of the extremely fine particles of soil which cause clays to be plastic was continued. A preliminary report on the influence of type and amount of these soil-clay minerals on the properties of soil materials was prepared. Due to the small size of these particles, special methods of examination including X-ray diffraction, differential thermal analysis, and base exchange were used in this work. Determination of the surface area of some clay minerals was made, using a method in which the retention of glycerin was measured.

A preliminary report was prepared regarding the use of physical test data to evaluate shale, burned shale, chert, and refuse from coal mines for use in base courses and shoulders of highways in Maryland, Pennsylvania, and West Virginia. The study to determine whether the type and nature of the clay minerals in these construction materials are related to their field behavior in roads was continued.

The cooperative research program between several chemical manufacturing companies and Public Roads to develop and evaluate chemicals to stabilize clayey and silty soils sufficiently to permit their use as base-course materials for roads was continued.

Cooperative studies in Indiana and Ohio to determine the effectiveness of subbases of granular material and soil-cement for the control of pumping of concrete pavement were continued. Traffic counts, truck-weight surveys, and observation of the behavior of pavement slabs were made periodically. In the Indiana study, instruments developed by Purdue University were used to determine the strain and deflection in pavement slabs caused by truck wheel loads of known magnitude.

An investigation of the shear strength of soil at various conditions of moisture content and density was begun and tests of one soil were completed. It is anticipated that shear strength data of a variety of soils will be useful in determining the need for specifying the desired moisture content and density in the compaction of specific types of soil in embankment construction.

Cooperation with Oklahoma in the study of the performance of over 350 miles of nonrigid pavements in six significantly different soil areas in that State was continued. The planning for this project was reported at the annual meeting of the Highway Research Board. It is expected that, from these and similar studies, the significance of the deflection characteristics of nonrigid pavements under load can be evaluated.

Bituminous materials and mixtures

The study of rubber in bituminous pavements was continued. Three additional rubbers were tested in combination with asphalt and in asphaltic concrete mixtures. The field and laboratory study of rubber emulsion in sand-asphalt pavement in the District of Columbia was continued. The experimental sections were completed and placed under observation and companion tests made to evaluate the use of rubber for such purpose.

The study of the quality of asphalts has been continued and extended through examination of samples of asphalt from many sources which were used in construction with variable results. Tests to determine a direct correlation between the quality of asphalt and the service behavior of pavements were started.

Laboratory and field studies of bituminous pavements designed to correlate properties of aggregates, asphalts, and bituminous mixtures with service behavior were continued. A study of a section of pavement in Washington, D. C., which had been under test and observation for 20 years, was completed.

The study of additives for bituminous materials with special reference to their heat stability was continued. Informal reports on the merits of a number of commercial additives were made to various governmental agencies.

Studies designed to standardize and improve the precision of tests of bituminous mixtures and pavements were continued. Studies were conducted by Public Roads both independently and in cooperation with State highway departments and Highway Research Board committees.

Cement, aggregates, and concrete

Study of the alkali-aggregate reaction in concrete continued to require considerable testing and research. Aggregates from a number of sources were tested for susceptibility to attack by the alkalies in cement. Tests to determine the effect of two proprietary materials on this reaction were made. A comprehensive series of tests was undertaken to study the feasibility of using concrete specimens for testing coarse aggregates rather than mortar bars prepared with the coarse aggregate crushed to sand size. A chemical test for the susceptibility of aggregates to reaction with alkalies was applied to a large number of materials. The usefulness of this test, which requires only 24 hours to perform, was assessed by reference to mortar bar data. It was found unsuitable for aggregates containing dolomite.

During recent years, considerable dissatisfaction has been expressed by many State highway agencies in regard to the nonuniformity of type I portland cement as produced at some plants. In an effort to overcome this difficulty, some States have specified type II cement where the special properties of this cement were not required. Other highway departments have written their own special provisions regarding chemical restrictions in order to obtain more uniform cement. To obtain first-hand data on the variation in properties of cement from a single plant, samples of cement were taken from 80 different shipments to a construction job. Although the chemical compositions of these cements were quite uniform, the strength-producing properties were variable. An extensive series of tests was undertaken to determine the cause of this nonuniformity.

The service life of some concrete structures can be extended many years if an economical means can be found to prevent water from entering the concrete. Although linseed oil paints have been used for this purpose with some success in the past, a program of tests was initiated to determine the suitability of new materials such as silicones, stabilized rubber latex, and the poly-plastics.

During recent years, there has been considerable interest in the use of fly ash in concrete. Highway agencies in particular are interested in the possibility of using this relatively inexpensive waste product from the burning of pulverized coal as a replacement for part of the cement. Such replacement is feasible because fly ash is a finely divided pozzolanic material which reacts with the lime in con-

crete to form additional cementing material. Fly ash also improves the workability of plastic concrete because of the generally spherical shape of the individual particle. An investigation involving 34 different fly ashes was made to obtain data for use in preparing specifications and methods of test for this material.

In a separate investigation, the effect of four fly ashes on the strength and durability of concrete was studied. Concrete containing fly ash as a replacement for part of the cement had low strength at early ages, but at 1 year the strength of the concrete containing fly ash was equal or superior to that of concrete not containing the admixture. No marked improvement of fly ash concrete over plain concrete was found with respect to resistance to freezing and thawing and the scaling caused by calcium chloride used for melting ice. However, based on the volume of cement present in each concrete, that containing fly ash was usually superior. Papers reporting the results of these tests of mortar and concrete were prepared for publication.

The development or improvement of several methods of test was undertaken during the year. The present mortar strength test for determining the quality of fine aggregate for use in concrete is affected by the grading as well as the quality of the sand grains. This had resulted in a lack of confidence among testing engineers in the results of this test. A program of tests has been started to provide the data necessary for improving this test. Several different freezing and thawing test procedures are presently used by State highway laboratories for determining the soundness of aggregates. Freezing and thawing tests on a number of aggregates were initiated to determine the relative severity of each method. The service record of these materials is known and will be used in selecting the test procedure most indicative of the soundness of an aggregate in service.

Shrinkage of cement is considered to be important but there is no general agreement as to what constitutes an objectionable amount of shrinkage and no standard procedure for measuring this property. To provide this type of information the shrinkage of a number of cements during the early stages of drying was determined both by measuring the time required for a restrained neat cement specimen to crack and by measuring the contraction of a free specimen. The relation of this shrinkage data to the ultimate durability of concrete will be studied.

A procedure has been proposed for determining the cement content of plastic concrete which involves final separation of the cement and fine aggregate by centrifuging. This method was investigated and found to be practical.

Research on the durability of concrete frequently requires determination of the void content of hardened concrete. The linear traverse method which has been used to make this determination is a time-consuming and tedious procedure. An investigation was started in cooperation with the Illinois Division of Highways to study the accuracy of a pressure method for obtaining this information with less difficulty.

An investigation of methods of improving the quality of coarse aggregates which give low flexural strength in concrete was continued. The strength of the concrete to an age of 1 year was increased when a smaller maximum size material was used alone or in combination with crushed material from the larger particles. Use of the smaller top-size material with a higher sand content also increased the strength of the concrete. In view of the successful improvement of this aggregate, additional tests were planned with two other coarse aggregates which also produce concrete of low strength.

Study of methods of treating concrete to resist the action of calcium chloride used for ice removal was extended to include the use of water-soluble and oil-soluble silicones as protective coatings. Observations made during the year indicated that both types were of value for this purpose.

The cooperative investigation conducted under the auspices of the Highway Research Board for appraising the four American Society for Testing Materials

methods of freezing and thawing tests of concrete was completed. The results of the Public Roads tests using the slow method of freezing and thawing concrete were reported.

A report on the use of the Kelly ball for measuring the consistency of concrete was prepared. In comparison with the standard slump cone, the Kelly ball eliminates the need of sampling and manipulation of the concrete, requires less time to make a test, and is easier to clean.

Investigation of a spring-actuated impact hammer, known as the Swiss hammer, for use in a nondestructive test for estimating the compressive strength of concrete was continued. Tests made during the year substantiate results of previous tests that the instrument has value for determining the relative change in the strength of concrete. A report was prepared for publication.

Study of a method for the determination of the indirect tensile strength of concrete cylinders was begun. In this test, load is applied along the side of a cylinder of concrete, and the cylinder fails by splitting. This method has possibilities as an alternate to the usual test of beams for flexural strength.

A study of methods of capping concrete cylinders for the compression test was completed. Hydraulic cements were found to be the most satisfactory capping material although the alternate materials which are permissible under the specifications of the American Association of State Highway Officials are also satisfactory. Plaster of paris was found unsuitable for this purpose. A report was being prepared for publication.

An investigation was made of a "pocket-size" air meter for determination of entrained air in plastic concrete in the field. Air content determination with this device correlated fairly well with the values obtained by the pressure meter on concrete containing 3 to 6 percent of air. In tests of concrete containing less than 2 percent of air, good agreement between the results furnished by the two meters was not obtained. A report on these tests was prepared.

Work on the durability of concrete exposed to natural weathering continued. Specimens made for the long-time study and stored outside the laboratory were examined and the usual volume change and sonic tests were made. Annual inspections of specimens at Treat Island, Maine, and pavement slabs at Wellsville, N. Y., were made.

An investigation of the use of portland blast-furnace slag cements in concrete was approximately half completed. These cements are prepared by grinding together portland cement clinker and granulated blast-furnace slag. Strength tests, volume change tests, and durability tests of the concrete were made. Use of portland blast-furnace slag cements in concrete began in the last 2 years because of a shortage of type I portland cement. In addition to making more hydraulic cement available with the same plant equipment and facilities, it was believed that the addition of the slag to portland cement might furnish a cement with a greater ultimate strength.

Geophysical methods for subsurface exploration

There was increased interest in application of geophysical methods for subsurface exploration to the problems of highway engineering. Publication of the results of Public Roads studies and discussions and demonstrations of the use of the methods has created an expanding interest in their use.

The simpler earth-resistivity method was particularly of interest to the State highway departments. During the year three additional States equipped their highway organizations for the use of the earth-resistivity method. A total of 25 States now have resistivity equipment in the highway department or have an arrangement with some agency within the State, making possible their use of the method. In addition, at least four States have equipment for the refraction

seismic method of exploration. Public Roads has made extensive use of these methods on road work in the National Parks.

Training in the use of the earth-resistivity procedure was given personnel of several highway departments and to foreign engineers.

The AASHO road test in Illinois

The previous annual report described plans for a large-scale cooperative investigation of the performance of both rigid and nonrigid pavements and of highway bridges under controlled traffic. This research project, commonly referred to as the AASHO or Illinois road test, is sponsored by the American Association of State Highway Officials and directed by the Highway Research Board, and has received the active support of Public Roads. This support has included participation in planning, consultation on matters of instrumentation, and the design, development, and construction of special apparatus and test equipment for use on the project.

Structural design of pavements

During the year, Public Roads participated in a number of other cooperative research projects to develop information on the design of pavements.

The cooperative exploratory studies of the load-deflection characteristics of nonrigid pavements in the vicinity of Washington, D. C., mentioned in last year's report, were continued. A complete series of measurements was made on certain selected pavements in Maryland in the fall of 1955 and again in the spring of 1956. A report of the analysis of the data obtained, under the joint authorship of State and Public Roads personnel, is planned for presentation at the next annual meeting of the Highway Research Board. Similar studies at another Maryland location were inaugurated at the request of the State.

At the Missouri School of Mines a cooperative research project was begun which has for its object the development of certain basic information of importance in connection with the prestressing of concrete structures, particularly concrete pavements.

Other research on concrete pavement in which Public Roads is participating involved the construction and observation of a continuously reinforced concrete pavement in Pennsylvania. Observations and instrumental measurements will be made by the staff of Lehigh University.

Studies of the surface characteristics of pavements

There was evidence of increased interest in the equipment developed by Public Roads for indicating the relative roughness of road surfaces. Several additional State highway departments have constructed the equipment from plans furnished by Public Roads. Various modifications and possible improvements suggested by others have been investigated and means for calibrating the unit as a whole has been placed under study. Measurements were made with the equipment on a cooperative experimental pavement in Michigan and assistance was rendered two other States in connection with the use of their road roughness indicators.

The slipperiness of road surfaces is of increasing concern as traffic density increases and the polishing effect of rubber tires becomes more pronounced. After studying the various methods that have been used for measuring the slipperiness of pavements in service, an experimental piece of equipment was designed for studies of this kind. The device embodies a conventional automobile wheel, tire, and springs. Measurements may be made for the conditions of impending skidding, locked wheel skidding, and sidewise skidding.

Bridges

Studies of the structural action of highway bridges under moving vehicular loads, mentioned in the last two annual reports, were continued. The purpose

of the tests is to develop information on the strains and deflections caused by heavy, moving motor vehicles at critical points in typical bridge structures. It is expected that a large volume of such data will make possible refinements in design procedures, particularly in the assumptions regarding the effects of dynamic loads. Two bridges were tested in cooperation with the States of Missouri and South Dakota. After analysis of the data by the respective State highway departments, the results of the tests will be made available in published reports.

Cooperative studies of the aerodynamic behavior of suspension bridges have been carried on at the University of Washington for a number of years with Public Roads as an active participant. Plans were made to supplement this work by a program of tests of section models of suspension bridges in a wind tunnel designed for the purpose and now approaching completion at the Public Roads Langley research station in Fairfax County, Va. It was expected that the wind tunnel would be placed in active operation within a few months.

The possibilities of utilizing some of the newer types of data-reduction equipment as a means for conserving engineers' time in the analysis of test data, particularly bridge test data, were investigated. It was concluded that significant economies were possible through the use of such equipment and arrangements have been completed for its procurement for use on bridge investigations.

Appendix

LIST OF TABLES

Table 1.—Summaries of programs approved and work completed in the fiscal year 1956, by class of highway and by fund

	PROGRAMS APPROVED [1]						WORK COMPLETED					
	Total cost	Federal funds	Miles	Railway-highway grade-crossing improvements			Total cost	Federal funds	Miles	Railway-highway grade-crossing improvements		
				Crossings eliminated	Structures reconstructed	Crossings protected				Crossings eliminated	Structures reconstructed	Crossings protected
	BY CLASS OF HIGHWAY						BY CLASS OF HIGHWAY					
Primary-rural, Interstate	$198,936,220	$120,263,302	898.2	36			$145,281,923	$77,806,080	1,090.7	24	2	1
Primary-rural, all other	576,209,124	301,500,789	6,280.0	65	11	112	346,973,386	182,280,321	5,581.9	45	8	95
Secondary-rural	460,093,108	243,025,053	16,710.3	21	10	221	340,240,555	176,542,227	15,288.9	26	2	164
Urban-Interstate	176,075,665	95,576,059	112.7	30	2	1	158,053,644	76,209,435	249.8	37	1	3
Urban, all other	378,863,633	194,225,323	915.3	79	10	37	276,123,682	140,522,072	707.2	77	14	42
Subtotal	1,790,177,750	954,590,526	24,916.5	231	33	371	1,266,673,190	653,360,135	22,918.5	209	27	305
Not classified [2]	96,125,039	67,139,416	2,066.8			3	39,241,115	33,969,079	909.1	3		
Total	1,886,302,789	1,021,729,942	26,983.3	231	33	374	1,305,914,305	687,329,214	23,827.6	212	27	305
	BY FUND						BY FUND					
Federal-aid:												
Primary	$675,631,586	$353,135,967	6,976.9	89	13	117	$526,582,539	$273,684,002	6,748.5	89	17	126
Secondary	457,806,799	238,296,465	16,420.3	22	9	221	342,715,304	175,362,405	15,137.0	28	3	165
Urban	375,977,773	191,903,943	391.1	71	9	31	317,062,607	156,717,597	306.8	84	6	13
Interstate	269,564,430	161,481,093	735.9	44	1	1	65,204,953	37,324,972	482.9	8	1	
Prewar Federal-aid grade crossing							137,997	68,999				
Access roads, Act of 1950	11,197,162	9,773,058	392.3	5	1	1	13,686,259	9,532,561	243.3			1
Defense Highway Act							1,283,531	669,599				
Subtotal	1,790,177,750	954,590,526	24,916.5	231	33	371	1,266,673,190	653,360,135	22,918.5	209	27	305
National forest highway [3]	22,852,495	20,988,607	625.5				23,028,706	21,376,979	701.0			
National park and parkway [4]	18,569,300	18,569,300	163.6				6,908,457	6,908,457	121.8			
Public lands	1,237,814	1,186,727	20.6				3,879,785	3,080,832	53.6			
Emergency flood relief	53,465,430	26,394,782	1,257.1			3	5,424,167	2,602,811	32.7	3		
Subtotal	96,125,039	67,139,416	2,066.8			3	39,241,115	33,969,079	909.1	3		
Total	1,886,302,789	1,021,729,942	26,983.3	231	33	374	1,305,914,305	687,329,214	23,827.6	212	27	305

[1] Initial commitment of funds.
[2] Forest, park, public lands, and emergency flood-relief projects.
[3] Includes construction projects only.
[4] Construction supervised by Bureau of Public Roads.

Table 2.—Projects under construction or plans approved on June 30, 1956, by class of highway and by fund

	Total cost	Federal funds	Miles	Railway-highway grade-crossing improvements		
				Crossings eliminated	Structures reconstructed	Crossings protected
BY CLASS OF HIGHWAY						
Primary-rural:						
Interstate	$259,659,099	$153,772,825	1,366.9	58	2	
All other	733,917,129	382,146,881	7,611.7	111	19	97
Secondary-rural	470,945,090	249,825,783	14,688.9	49	6	198
Urban:						
Interstate	402,594,852	204,970,038	254.3	82	4	4
All other	677,465,822	339,526,584	1,421.0	153	20	67
Subtotal	2,544,581,992	1,330,242,111	25,342.8	453	51	366
Not classified [1]	74,761,186	61,965,462	1,058.7			
Total	2,619,343,178	1,392,207,573	26,401.5	453	51	366
BY FUND						
Federal-aid:						
Primary	$985,503,427	$510,861,662	8,856.8	159	26	125
Secondary	474,728,160	245,172,682	14,436.6	51	6	193
Urban	757,565,950	374,655,253	586.3	175	17	38
Interstate	306,575,590	182,517,669	1,042.3	57	2	2
Prewar Federal-aid grade crossing	682,282	341,140				
Access Roads, Act of 1950	18,522,714	16,191,774	420.8	11		8
Defense Highway Act	1,003,869	501,931				
Subtotal	2,544,581,992	1,330,242,111	25,342.8	453	51	366
National forest highway [2]	30,666,752	27,266,543	681.7			
Tongass National Forest, Alaska [2]	662,479	662,479	4.5			
National park and parkway [3]	24,026,375	24,026,375	280.6			
Public Lands	1,034,947	956,500	16.4			
Emergency flood relief	18,370,633	9,053,565	75.5			
Subtotal	74,761,186	61,965,462	1,058.7			
Total	2,619,343,178	1,392,207,573	26,401.5	453	51	366

[1] Forest, park, public lands, and emergency flood-relief projects.
[2] Includes construction projects only.
[3] Construction supervised by Bureau of Public Roads.

Table 3.—Projects financed with Federal-aid funds programed [1] during the fiscal year ended June 30, 1956, by State

State or Territory	Primary			Secondary			Urban			Interstate			Total		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$13,114,926	$6,749,833	119.3	$11,684,005	$5,861,028	491.3	$7,217,441	$4,070,979	22.2	$7,952,180	$4,797,308	21.5	$39,968,552	$21,479,148	654.3
Arizona	5,849,145	4,310,391	61.1	4,864,416	3,458,498	87.1	1,676,175	1,170,277	.9	2,889,212	2,224,175	42.3	15,278,948	11,163,341	191.4
Arkansas	15,471,870	7,731,500	193.8	9,467,322	4,753,736	500.5	1,166,720	583,360	2.7	1,620,540	968,324	4.0	27,726,452	14,036,920	701.0
California	26,098,527	13,322,315	39.2	15,384,057	8,368,030	176.4	30,550,327	15,180,465	25.9	18,130,683	10,184,836	13.0	90,163,594	47,055,646	254.5
Colorado	11,121,601	6,101,231	99.7	7,827,737	4,323,241	227.2	915,040	517,668	.7	4,216,056	2,732,130	44.2	24,080,434	13,674,270	371.8
Connecticut	1,436,355	782,794	2.5	2,256,412	1,132,257	9.1	2,561,100	1,295,717	.4	986,199	548,865	5.4	7,240,066	3,759,633	17.4
Delaware	5,802,269	2,900,385	52.2	1,816,840	916,020	43.5	1,120,642	560,321	1.5	15,274	7,637	.....	8,755,025	4,384,363	97.2
Florida	12,731,616	6,799,875	96.5	1,709,044	749,481	25.5	12,811,302	6,319,969	25.3	3,809,520	2,220,796	7.5	31,061,482	16,090,121	154.8
Georgia	22,719,092	11,367,402	326.5	16,741,986	8,486,129	523.8	3,591,538	1,809,681	1.1	5,459,326	3,275,596	8.3	48,511,942	24,938,808	859.7
Idaho	4,757,980	2,970,443	111.0	4,342,630	2,687,751	134.2	322,587	321,988	.3	376,475	262,470	.....	9,799,672	6,242,652	245.5
Illinois	28,219,959	14,077,411	216.5	17,460,991	8,729,241	550.6	22,620,514	12,187,037	22.5	12,836,843	7,697,353	35.0	81,138,307	42,691,042	824.6
Indiana	8,133,737	4,172,229	165.6	9,423,107	4,727,368	94.5	7,748,836	4,341,205	5.1	3,184,377	2,061,301	3.0	28,490,057	15,302,103	268.2
Iowa	18,299,244	9,818,907	321.4	14,381,263	7,219,803	852.1	3,827,211	2,656,596	7.6	5,025,793	3,299,111	24.5	41,533,511	22,994,417	1,205.6
Kansas	17,004,853	8,526,870	381.3	13,274,514	6,642,005	1,002.3	5,227,930	2,613,912	9.8	6,225,582	3,556,894	35.1	41,732,879	21,339,681	1,428.5
Kentucky	3,505,433	1,939,644	13.4	13,536,508	6,790,178	294.6	1,787,248	1,111,451	2.2	5,998,211	3,682,687	2.7	24,827,400	13,523,960	312.9
Louisiana	11,400,244	5,700,122	39.2	8,878,906	4,439,453	140.4	11,874,346	5,937,173	1.3	5,746,477	3,447,886	.....	37,899,973	19,524,634	180.9
Maine	5,633,602	2,824,747	34.6	3,760,240	1,880,120	47.7	1,147,834	568,572	3.2	1,382,046	862,969	2.8	11,923,722	6,136,408	88.3
Maryland	12,050,810	6,092,560	46.9	6,418,238	3,211,903	171.2	9,562,911	4,281,143	4.8	8,107,495	4,057,311	5.3	36,139,454	17,642,917	228.2
Massachusetts	7,345,973	3,642,126	16.7	375,538	187,269	1.8	24,235,762	12,116,558	15.3	9,068,874	5,305,766	2.2	41,026,147	21,251,719	36.0
Michigan	22,860,311	11,419,391	198.8	13,288,531	6,641,874	570.2	11,596,651	5,724,566	23.9	15,099,255	9,023,942	53.9	62,844,748	32,809,773	846.8
Minnesota	18,490,885	9,657,252	377.7	13,661,720	6,863,074	1,317.7	10,578,548	5,566,825	22.6	5,230,239	3,415,275	35.6	47,961,392	25,502,426	1,753.6
Mississippi	7,271,700	3,717,490	256.7	9,010,042	4,342,865	501.0	1,033,900	523,550	5.7	151,000	90,600	.....	17,466,642	8,674,505	763.4
Missouri	17,228,148	8,977,852	82.5	17,697,786	8,893,543	1,464.0	12,287,210	6,264,331	7.4	7,784,999	4,668,803	5.5	54,998,143	28,804,529	1,559.4
Montana	13,804,712	8,176,741	217.8	7,076,654	4,150,823	168.3	1,018,628	576,885	3.9	1,231,444	741,151	20.2	23,131,438	13,645,600	410.2
Nebraska	8,443,220	4,324,196	204.6	9,984,119	5,027,867	343.6	1,109,371	554,686	2.4	280,126	151,125	.....	19,816,836	10,057,874	550.6
Nevada	8,941,687	7,445,590	98.5	5,604,198	4,676,329	168.4	2,366	1,976	.....	1,469,223	1,273,956	5.5	16,017,474	13,397,851	272.4
New Hampshire	2,797,758	1,517,145	15.5	2,538,949	1,355,231	16.2	9,243	7,704	.....	16,160	16,160	.....	5,362,110	2,896,240	31.7
New Jersey	11,034,358	5,402,173	21.0	1,740,728	870,364	10.3	18,690,303	9,003,109	14.1	1,609,136	936,115	1.9	33,074,525	16,211,761	47.3
New Mexico	10,830,364	6,836,514	96.3	6,843,288	4,449,856	217.3	754,187	474,383	1.9	3,341,655	2,350,278	22.6	21,769,494	14,111,031	338.1
New York	40,532,320	20,287,213	164.6	12,395,997	6,283,268	69.0	52,601,276	27,272,150	33.5	34,970,728	19,362,412	13.3	140,500,321	73,205,043	280.4
North Carolina	16,861,750	8,408,985	259.3	13,980,296	6,751,833	337.3	7,749,328	3,455,824	12.7	2,748,290	1,569,740	19.3	41,339,664	20,186,382	628.6
North Dakota	10,309,648	5,244,804	313.0	9,213,851	4,649,902	1,004.3	412,510	206,255	1.4	538,100	322,860	16.8	20,474,109	10,423,821	1,335.5

Ohio	22,704,487	11,421,926	67.6	19,082,343	9,817,371	143.8	11,494,578	6,141,051	4.7	17,142,635	10,268,381	23.7	70,424,043	37,648,729	239.8
Oklahoma	19,485,604	9,684,139	151.3	11,537,494	5,686,981	392.3	4,555,795	2,429,675	12.1	9,416,882	5,543,524	16.3	44,995,775	23,344,319	572.0
Oregon	8,178,446	5,030,161	73.2	8,168,437	4,752,821	131.0	1,357,819	814,860	2.6	1,760,660	1,222,042	22.4	19,465,362	11,819,884	229.2
Pennsylvania	32,837,346	16,315,447	157.2	16,298,456	8,132,276	110.3	23,026,054	10,280,000	9.0	13,633,777	8,180,266	17.6	85,795,633	42,907,989	294.1
Rhode Island	4,484,780	2,242,340	10.8	426,974	213,487	1.4	3,808,860	1,904,430	3.6	3,058,693	1,835,216	.5	11,779,307	6,195,473	16.3
South Carolina	8,270,135	4,138,651	47.4	5,620,715	2,900,061	335.4	3,905,000	2,474,500	5.5	125,000	75,000		17,920,850	9,588,212	388.3
South Dakota	13,636,720	7,638,444	370.6	7,975,541	4,504,178	435.1	549,003	308,100	1.4	3,636,712	2,357,854	25.1	25,797,976	14,808,576	832.2
Tennessee	17,532,062	8,457,481	132.0	15,332,153	7,386,406	642.6	3,019,900	1,359,950	2.4	1,602,226	821,113		37,486,341	18,024,950	777.0
Texas	47,827,604	24,279,410	658.7	34,393,661	17,227,200	1,465.6	27,762,430	14,105,701	28.5	16,856,877	10,147,680	107.6	126,840,572	65,759,991	2,260.4
Utah	4,627,246	3,456,449	42.4	3,918,630	2,813,190	146.8	1,321,740	984,019	5.7	2,281,730	1,823,071	2.4	12,149,346	9,076,729	197.3
Vermont	3,542,795	1,767,273	21.4	2,196,152	1,063,511	33.1	1,449,901	705,166	3.8	32,819	22,046		7,221,667	3,557,996	58.3
Virginia	16,533,547	8,252,805	158.0	13,817,618	7,166,079	344.7	4,417,863	2,211,575	8.4	6,481,726	3,988,339	18.8	41,250,754	21,618,798	529.9
Washington	12,362,581	6,605,650	151.0	7,486,728	3,967,101	208.0	3,595,705	1,923,424	7.2	5,363,249	3,428,075	25.3	28,808,263	15,924,250	391.5
West Virginia	9,156,790	4,741,831	58.1	4,409,840	2,222,586	21.1	580,000	290,000	.4	174,000	94,000		14,320,630	7,348,417	79.6
Wisconsin	14,309,957	7,199,241	125.3	10,030,122	4,770,843	298.9	6,913,583	3,646,743	9.6	4,576,152	2,745,691	5.0	35,829,814	18,362,518	438.8
Wyoming	5,986,921	3,820,633	95.3	3,828,896	2,464,005	122.3	304,394	195,968	1.4	2,355,216	1,680,684	19.3	12,475,427	8,161,290	238.3
District of Columbia	4,643,334	2,593,998	.3	1,772,404	1,280,537		7,637,488	3,812,341	1.1	3,564,558	2,132,279	.5	17,617,784	9,819,155	1.9
Hawaii	3,757,792	1,928,607	6.4	1,343,970	668,784	5.5	1,679,749	757,762	1.0				6,781,511	3,355,153	12.9
Puerto Rico	5,649,342	2,315,350	6.2	3,526,752	1,738,708	21.0	788,926	282,362	.4				9,965,020	4,336,420	27.6
Total	675,631,586	353,135,967	6,976.9	457,806,799	238,296,465	16,420.3	375,977,773	191,903,943	391.1	269,564,430	161,481,093	735.9	1,778,980,588	944,817,468	24,524.2

[1] Initial commitment of funds.

Table 4.—Projects involving Federal funds awarded to contract [1] during the fiscal year ended June 30, 1956, by program and by State

State or Territory	Total cost	Total Federal funds	Federal-aid funds				Other [3]	Miles
			Primary [2]	Secondary	Urban	Interstate		
Alabama	$45,454,520	$24,321,549	$10,298,683	$6,431,806	$2,914,428	$4,659,482	$17,150	860.9
Arizona	17,434,753	13,109,505	5,071,582	3,890,115	261,093	2,602,965	1,283,750	335.0
Arkansas	18,087,127	9,252,686	4,458,130	3,618,775	169,678	1,006,103		484.2
California	94,801,871	50,128,796	12,948,922	6,344,762	18,807,970	11,093,642	933,500	347.5
Colorado	23,432,602	13,518,507	4,574,338	4,010,895	864,649	2,143,457	1,925,168	336.4
Connecticut	4,485,571	2,380,959	539,913	1,004,836	594,778	206,432	35,000	12.2
Delaware	4,864,589	2,463,809	2,028,365	422,486	5,321	7,637		68.8
Florida	41,947,100	21,705,957	9,581,573	2,767,610	8,511,446	731,328	114,000	398.0
Georgia	30,439,487	15,442,555	5,185,516	5,066,579	2,413,629	2,488,257	288,574	461.1
Idaho	13,352,144	8,537,418	5,020,656	2,698,770	555,522	262,470		214.7
Illinois	85,825,606	46,377,369	15,935,634	5,664,646	14,554,050	10,223,039		622.0
Indiana	31,677,664	17,029,819	6,101,587	4,785,257	6,118,115	18,060	6,800	227.7
Iowa	39,295,202	20,698,950	9,723,819	6,274,367	4,074,876	625,888		1,208.0
Kansas	39,607,637	20,471,196	7,307,248	6,492,235	2,403,052	4,261,661	7,000	1,399.5
Kentucky	30,969,591	16,867,540	4,168,711	7,859,529	1,205,098	3,634,202		537.9
Louisiana	24,061,713	12,440,667	5,602,728	3,884,560	533,758	2,400,000	19,621	243.3
Maine	12,228,648	6,571,646	2,131,798	1,941,501	623,895	1,385,690	488,762	84.0
Maryland	21,021,918	9,782,149	2,716,442	1,337,652	3,272,393	2,432,662	23,000	142.4
Massachusetts	28,083,373	14,762,084	4,152,710	1,345,210	4,047,580	5,196,084	20,500	42.9
Michigan	74,191,805	38,835,833	15,145,096	6,974,927	6,784,900	9,930,910		845.9
Minnesota	50,521,486	27,004,570	10,956,795	6,383,710	5,718,142	3,945,923		1,827.5
Mississippi	16,905,009	8,272,788	3,412,548	4,539,515	236,494	8,531	75,700	769.9
Missouri	51,916,528	27,268,670	6,016,214	7,362,913	8,609,922	5,279,621		1,370.0
Montana	24,465,843	15,012,125	8,366,676	5,220,023	475,569	919,357	30,500	519.3
Nebraska	28,809,780	14,704,795	7,947,061	5,935,732	666,877	151,125	4,000	842.7
Nevada	10,973,962	9,189,993	4,490,043	3,424,018	1,976	1,273,956		223.2
New Hampshire	6,220,635	3,105,160	1,970,263	1,033,785	84,952	16,160		39.6
New Jersey	36,112,099	17,737,135	5,866,112	1,620,561	9,372,082	878,380		57.6
New Mexico	19,743,386	12,804,073	6,209,312	4,450,240	34,062	2,110,459		365.7
New York	129,251,197	62,384,274	25,990,613	3,898,186	23,135,627	9,289,143	70,705	313.3
North Carolina	48,469,618	23,996,791	8,820,680	8,247,839	4,245,744	2,518,728	163,800	742.5
North Dakota	17,883,962	8,979,217	3,844,952	4,465,990	345,415	322,860		1,330.3

Ohio	65,808,025	33,804,323	9,819,125	5,282,650	8,285,145	10,170,881	246,522	142.1
Oklahoma	40,009,332	20,669,006	9,919,532	4,217,934	3,027,307	3,484,183	20,050	479.2
Oregon	24,305,188	14,923,155	5,224,161	4,920,692	3,009,860	1,762,042	6,400	267.8
Pennsylvania	96,671,340	48,113,544	13,139,706	5,399,450	21,144,388	8,430,000		253.8
Rhode Island	14,880,558	7,740,331	2,020,113	974,508	2,939,127	1,806,583		23.5
South Carolina	16,931,610	8,866,133	5,119,622	2,449,517	566,918	728,876	1,200	474.0
South Dakota	24,139,318	13,853,428	7,353,727	4,221,610		2,277,341	750	1,016.7
Tennessee	32,768,297	15,904,364	9,938,006	3,885,057	1,299,401	781,900		653.2
Texas	132,302,882	68,681,688	27,052,330	16,253,700	13,134,701	12,213,957	27,000	2,390.3
Utah	13,925,815	10,806,537	3,210,878	2,302,705	933,078	3,101,713	1,258,163	296.4
Vermont	6,765,892	3,413,767	1,547,645	1,126,108	707,735	32,279		48.3
Virginia	33,053,122	17,095,166	6,887,618	5,612,521	1,310,130	2,421,294	863,603	455.3
Washington	28,018,953	15,385,314	5,936,123	3,845,421	3,239,434	2,350,660	13,676	368.7
West Virginia	11,772,600	6,260,855	2,827,059	1,508,296	1,352,500	94.000	479,000	59.1
Wisconsin	42,852,119	21,420,582	10,384,602	5,191,394	3,938,295	1,906,291		513.6
Wyoming	15,082,428	9,842,326	5,011,065	3,513,160	2,199	1,315,902		289.7
Alaska	3,000	3,000					3,000	
District of Columbia	6,882,026	3,396,001	621,590	908,849	1,849,443	16,119		5.5
Hawaii	5,152,577	2,576,149	1,003,287	1,054,009	518,853			6.5
Puerto Rico	7,654,926	3,749,754	1,244,710	1,934,671	556,242		14,131	27.2
Total	1,741,516,434	921,664,008	354,845,619	214,001,282	199,457,849	144,918,233	8,441,025	25,044.9

[1] Includes force-account projects placed under construction during the fiscal year.
[2] Funds available for either rural or urban portions of the Federal-aid primary highway system.
Includes prewar Federal-aid grade crossing and 1950 access funds.

Table 5.—Status of Federal-aid projects [1] as of June 30, 1956, and projects completed during the fiscal year

State or Territory	Programed,[2] plans not approved			Plans approved, not under construction			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$14,909,536	$8,123,266	212.2	$5,789,915	$3,283,107	41.6	$46,641,690	$24,768,534	652.5	$39,756,104	$20,274,337	927.3
Arizona	4,522,678	3,459,678	97.0	2,355,769	1,723,848	34.1	12,604,415	9,676,636	197.6	13,455,146	9,703,452	391.8
Arkansas	15,733,660	7,887,150	505.9	5,121,516	2,631,806	46.5	22,773,452	11,766,438	480.2	15,742,641	7,857,554	536.6
California	18,614,425	10,093,733	199.5	9,746,960	4,902,412	9.7	151,064,911	79,234,159	262.8	66,140,049	31,872,895	422.1
Colorado	9,504,037	5,837,714	188.4	2,348,768	1,881,255	30.1	21,886,569	12,028,295	245.5	22,191,853	11,731,999	296.5
Connecticut	4,443,278	2,135,788	9.7	2,014,918	1,125,184	7.6	12,861,770	6,472,280	20.2	2,355,872	1,134,468	2.3
Delaware	3,490,000	1,749,000	33.4	1,187,788	610,709	14.2	5,685,262	2,846,872	49.4	7,046,545	3,861,197	42.6
Florida	6,859,000	3,628,800	107.3	13,779,313	7,100,900	45.0	37,614,997	19,539,449	341.7	25,069,263	12,593,997	348.6
Georgia	32,987,959	16,943,001	710.7	13,240,234	6,826,490	110.3	48,127,689	23,057,138	779.2	26,854,077	13,128,504	538.6
Idaho	4,680,261	3,009,761	108.3	2,860,444	1,891,660	72.9	13,948,264	9,043,486	204.9	14,226,381	8,741,106	283.0
Illinois	34,817,582	18,233,170	619.1	17,862,297	9,002,641	83.8	101,526,542	54,716,304	625.4	66,454,760	34,890,932	698.7
Indiana	20,916,869	11,383,604	90.4	15,951,186	8,184,567	169.7	47,987,750	26,201,969	206.3	29,695,004	14,975,266	152.5
Iowa	18,859,429	10,864,473	757.9	4,958,613	2,773,320	78.4	31,019,496	16,679,907	896.4	32,685,349	17,523,977	1,192.5
Kansas	11,601,305	5,810,947	924.2	9,370,628	4,841,059	161.1	28,512,275	14,794,378	818.4	31,766,868	16,025,292	1,485.9
Kentucky	6,855,680	3,461,573	155.0	1,727,434	870,155	4.1	42,183,854	22,516,872	614.0	21,939,949	11,281,172	395.3
Louisiana	22,938,396	11,636,784	75.5	6,225,836	4,241,649	11.8	42,397,102	20,772,142	372.1	21,193,724	10,662,756	332.8
Maine	10,521,730	5,417,065	89.6	1,467,514	812,174	8.7	15,978,629	8,469,481	107.2	12,229,145	6,107,576	104.4
Maryland	18,131,137	9,278,448	121.6	16,626,904	7,711,920	23.6	24,403,475	12,741,957	154.5	4,139,653	2,196,027	95.8
Massachusetts	20,459,424	10,302,837	24.9	13,378,019	7,251,557	8.9	42,510,845	20,506,346	64.2	23,687,719	11,094,303	23.8
Michigan	33,178,450	16,704,175	656.2	20,870,214	11,048,657	96.8	65,158,008	33,772,291	544.8	49,230,892	24,431,743	757.9
Minnesota	9,132,246	4,749,348	580.7	7,181,570	3,798,699	63.4	47,656,098	25,551,071	1,529.7	33,310,298	17,166,476	1,900.3
Mississippi	11,904,842	6,029,371	464.9	5,077,500	2,889,482	115.3	25,551,335	12,972,636	770.5	22,821,656	11,582,340	680.6
Missouri	20,361,012	10,509,134	1,103.3	6,553,152	3,489,760	12.9	78,428,230	40,941,166	1,469.5	51,009,562	26,570,513	1,352.4
Montana	11,553,080	6,845,389	203.4	4,300,954	2,611,367	54.1	30,044,575	18,670,709	542.4	19,623,494	12,107,116	542.8
Nebraska	9,046,180	4,891,390	290.6	4,802,658	2,537,571	93.6	34,877,800	18,535,953	1,037.3	25,681,435	13,670,316	590.1
Nevada	6,673,000	5,569,579	86.4	707,733	590,669	25.1	11,093,606	9,363,216	203.1	7,227,891	5,853,393	138.7
New Hampshire	2,633,000	1,498,500	16.1	556,268	304,268	2.4	10,073,009	5,156,724	61.5	4,871,321	2,376,866	28.0
New Jersey	12,629,395	6,324,320	54.8	6,971,600	3,064,065	17.3	35,351,089	17,087,925	45.8	18,997,706	8,860,954	55.4
New Mexico	2,130,126	1,421,151	31.7	4,399,154	2,865,262	62.5	12,534,851	8,087,805	180.6	20,520,861	13,257,250	424.2
New York	26,197,490	13,589,159	90.3	56,129,687	30,505,354	97.1	235,340,837	111,505,779	327.7	93,866,380	43,795,681	226.3
North Carolina	20,031,116	9,829,488	315.8	3,152,875	1,687,520	77.3	58,999,285	29,212,210	794.1	34,037,358	16,753,336	539.1
North Dakota	8,388,468	4,255,650	1,005.3	10,641,246	5,565,820	664.0	13,385,273	6,818,789	719.8	14,175,661	7,052,735	1,162.5

Ohio	53,408,313	27,852,290	206.4	9,642,213	4,849,726	52.0	91,086,412	45,560,912	145.9	42,607,474	20,884,667	132.7
Oklahoma	15,710,900	8,326,181	291.3	13,874,273	7,153,119	183.4	41,028,216	21,213,899	392.3	21,395,771	11,425,164	454.6
Oregon	3,804,998	2,246,999	71.9	848,193	506,801	6.2	29,142,079	17,918,553	278.9	11,791,540	7,144,245	232.0
Pennsylvania	44,176,473	23,418,114	153.0	22,311,053	11,134,806	47.0	127,986,018	64,071,808	381.1	54,601,417	26,633,398	98.7
Rhode Island	1,987,000	993,500	4.7	1,669,302	810,031	1.0	18,963,506	9,794,935	28.2	7,598,830	3,789,499	32.3
South Carolina	17,951,500	9,733,620	299.9	1,976,267	1,239,672	11.0	21,613,985	11,186,411	488.0	15,263,325	8,110,370	286.7
South Dakota	15,814,831	9,202,657	621.4	7,892,494	4,567,412	212.6	18,175,691	10,364,714	675.4	10,307,025	5,865,494	673.5
Tennessee	16,830,384	8,129,992	426.7	7,676,644	3,841,160	19.9	49,861,113	23,089,213	556.5	22,413,661	10,767,586	701.3
Texas	15,576,900	8,067,623	345.2	17,309,984	9,423,348	124.0	123,406,122	64,742,420	1,688.2	81,673,082	42,051,784	1,878.3
Utah	8,781,594	6,360,422	195.8	1,478,815	1,120,107	32.1	15,142,161	11,423,456	265.6	9,347,468	7,034,425	249.8
Vermont	1,263,300	631,650	23.6	1,309,878	654,478	7.3	10,693,423	5,513,883	94.2	4,001,347	1,978,084	35.9
Virginia	19,087,809	10,302,190	310.3	8,298,056	4,346,313	103.0	34,271,143	17,644,856	361.9	21,657,600	10,933,998	387.6
Washington	14,247,431	8,021,660	176.6	9,667,064	5,153,715	107.1	27,541,948	14,957,015	260.4	20,397,731	11,038,819	295.4
West Virginia	12,914,582	6,664,221	57.2	7,048,095	3,628,261	21.3	17,216,395	8,901,412	57.1	9,394,508	4,727,339	76.8
Wisconsin	13,187,824	6,731,117	242.0	7,581,636	3,979,637	35.7	52,750,508	25,956,033	535.5	30,325,369	15,461,126	528.8
Wyoming	4,431,177	2,921,091	70.5	3,151,700	2,081,497	86.2	18,005,968	11,852,679	346.7	9,322,491	5,840,199	231.4
Alaska							9,500	9,500				
District of Columbia	13,975,900	8,018,584	2.5	2,564,035	1,264,716	1.2	7,604,093	3,785,087	.7	11,064,665	5,170,115	7.5
Hawaii	3,616,246	1,897,923	11.1	4,100,936	1,980,625	3.8	3,972,170	2,001,019	4.2	5,449,072	2,431,215	12.8
Puerto Rico	6,604,500	2,658,500	18.7	3,438,182	1,698,332	3.6	18,751,071	8,686,726	60.4	6,056,197	2,937,079	23.0
Total	738,076,453	393,651,780	13,458.9	409,137,487	218,058,663	3,402.3	2,135,444,505	1,112,183,448	21,940.5	1,266,673,190	653,360,135	22,918.5

[1] Includes projects financed from Federal-aid primary, secondary, urban and interstate, prewar Federal-aid primary, secondary, and grade crossing, Defense Highway Act, and 1950 access funds.

[2] Initial commitment of funds.

Table 6.—Mileage of Federal-aid highway projects completed during fiscal year 1956, by class of fund and by number of lanes

State or Territory	Primary program			Secondary program [1]	Urban program			Interstate program		
	2 lanes	4 lanes	6 lanes or more		2 lanes	4 lanes	6 lanes or more	2 lanes	4 lanes	6 lanes or more
Alabama	91.9	82.4		725.2	0.2	12.4			15.2	
Arizona	95.1	27.0		133.9		1.1		30.8	6.0	
Arkansas	126.2			407.6	2.8					
California	21.6	57.6		242.0		8.2	11.0		19.2	
Colorado	51.0	31.4		184.2		2.8		4.6	7.1	
Connecticut	.7			.5		1.1				
Delaware	9.8	9.9	1.2	21.2		.1				0.3
Florida	131.4	22.2		183.4	2.9	8.7				
Georgia	129.4	16.7		370.5		5.0	.1		5.7	
Idaho	69.2	1.5		205.3		1.2		5.0	.8	
Illinois	78.4	44.7		513.9	2.4	2.2	4.0		53.1	
Indiana	61.1	24.7		56.8		.9	.7		4.8	
Iowa	398.5	6.9		763.5	.5	7.2		16.0		
Kansas	375.7	3.0		1,081.0	2.7	9.3		10.4		
Kentucky	58.0	5.8		325.2	1.7	4.6				
Louisiana	134.0	27.2		170.0		.2	1.4			
Maine	59.7			39.3	2.5	.2	.6	2.3		
Maryland		2.6		75.3	1.5			.1		
Massachusetts	4.6	9.0		4.7			3.9		1.6	
Michigan	223.2	40.1	1.7	467.5	.6	4.9	2.2		11.7	
Minnesota	304.2	15.2	27.6	1,507.6	.6	13.6			31.4	
Mississippi	260.9	20.0		395.5	2.8	1.4				
Missouri	125.1	38.9		1,149.9	1.1	4.2	1.0		29.3	
Montana	308.4	.4		231.6		2.4				
Nebraska	310.5	3.7		258.2	1.1	2.8	1.0	12.9		
Nevada	76.7	4.5		54.9				2.5		
New Hampshire	9.8	2.2		9.1	6.2	.8				
New Jersey		10.3		22.9		6.1	16.0			
New Mexico	82.7	19.4		259.6	4.6	3.0		30.3	24.6	
New York	77.5	11.7	.1	106.4	4.7	17.1	5.5			.1
North Carolina	187.2	33.5		291.0	4.8	9.5			13.1	
North Dakota	282.7			868.3		4.1		7.3		

Ohio	7.4	19.7		77.5	.7	7.1	2.3			
Oklahoma	132.0	23.8		288.5	.1	4.8	.3			
Oregon	55.0	14.7		140.7		5.2		14.6	1.8	
Pennsylvania	33.7	26.8		17.1	.4	10.9	5.7		4.2	
Rhode Island		14.6		17.7						
South Carolina	27.9	15.1		240.2	1.4	2.0				
South Dakota	261.2			402.3				9.6	.4	
Tennessee	134.8	62.9	.5	491.7		.7	1.3	8.8		
Texas	413.1	149.0	8.0	1,211.8		6.1	9.0	28.3	40.0	6.9
Utah	57.3	2.2		107.3		.4		12.1		
Vermont	8.8			22.4	2.8			1.9		
Virginia	61.8	40.8		277.6	.7	3.4		1.6		
Washington	86.6	15.2	1.5	175.6	1.0	1.3			6.2	
West Virginia	58.5	3.8		13.7		.4			.3	
Wisconsin	134.6	3.4		380.0	6.1	4.5				
Wyoming	104.3	5.0		121.7		.4				
Hawaii	9.5	.9		1.2		.6	.6			
District of Columbia		.5	1.7	4.9			.4			
Puerto Rico	3.6			19.1						
Total	5,735.3	970.9	42.3	15,137.0	56.9	182.9	67.0	199.1	276.5	7.3

[1] Total mileage completed, principally 2-lane construction.

Table 7.—Lane classification of mileage of Federal-aid highway projects completed during fiscal year 1956, by class of fund

Number of lanes	Mileage					Total lane miles
	Primary	Secondary	Urban	Interstate	Total	
2-lane	5,735.3	[1] 15,137.0	56.9	199.1	21,128.3	42,256.6
4-lane	970.9		182.9	276.5	1,430.3	5,721.2
6 lanes and over	42.3		67.0	7.3	116.6	[2] 699.6
Total	6,748.5	15,137.0	306.8	482.9	22,675.2	[2] 48,677.4

[1] Total mileage completed, principally 2-lane construction.
[2] 6-lane-and-over mileage was all converted to lane miles on the basis of 6 lanes.

Table 8.—Apportionment of Federal-aid highway funds authorized for the fiscal year ending June 30, 1956, under the Federal-aid Highway Acts of 1954 and 1956 (combined) [1]

State or Territory	Primary highway system ($371,250,000)	Secondary or feeder roads ($247,500,000)	Urban highways ($206,250,000)	Subtotal ($825,000,000)	Interstate System			Total ($2,000,000,000)
					1954 Act ($175,000,000)	1956 Act ($1,000,000,000)	Subtotal ($1,175,000,000)	
Alabama	$7,894,354	$6,126,233	$2,684,025	$16,704,612	$3,534,866	$20,314,823	$23,849,689	$40,554,301
Arizona	5,564,756	3,790,056	796,865	10,151,677	1,975,320	11,460,214	13,435,534	23,587,211
Arkansas	6,206,833	4,969,911	1,146,057	12,322,804	2,507,179	14,530,179	17,037,358	29,360,162
California	17,118,341	8,806,491	18,211,275	44,136,107	9,792,836	57,028,146	66,820,982	110,957,089
Colorado	6,713,614	4,484,240	1,702,670	12,900,524	2,307,752	13,668,709	15,976,461	28,876,985
Connecticut	2,417,271	1,221,750	3,967,681	7,606,702	1,659,495	9,628,892	11,288,387	18,895,089
Delaware	1,832,625	1,221,750	420,157	3,474,532	1,077,343	6,250,000	7,327,343	10,801,875
Florida	6,051,746	3,955,585	3,673,574	13,680,905	2,939,167	17,001,961	19,941,128	33,622,033
Georgia	9,176,781	7,015,695	2,985,688	19,178,164	4,045,342	23,303,774	27,349,116	46,527,280
Idaho	4,582,936	3,224,440	394,281	8,201,657	1,738,744	10,122,547	11,861,291	20,062,948
Illinois	14,352,363	7,808,933	14,327,401	36,488,697	8,116,903	47,148,832	55,265,735	91,754,432
Indiana	8,813,752	6,076,360	4,901,244	19,791,356	4,222,758	24,326,684	28,549,442	48,340,798
Iowa	8,963,939	6,563,962	2,432,180	17,960,081	3,548,249	20,426,284	23,974,533	41,934,614
Kansas	8,984,926	6,293,371	1,925,545	17,203,842	3,170,269	18,147,676	21,317,945	38,521,787
Kentucky	6,908,849	5,732,579	2,127,518	14,768,946	3,232,347	18,754,857	21,987,204	36,756,150
Louisiana	5,826,706	4,217,024	3,003,125	13,046,855	2,834,407	16,505,713	19,340,120	32,386,975
Maine	3,122,957	2,235,423	856,222	6,214,602	1,391,238	8,042,145	9,433,383	15,647,985
Maryland	3,308,070	2,022,982	3,476,982	8,808,034	2,049,815	11,993,915	14,043,730	22,851,764
Massachusetts	4,729,627	1,750,407	8,527,097	15,007,131	3,656,939	21,349,905	25,006,844	40,013,975
Michigan	11,617,393	7,089,111	9,535,064	28,241,568	6,205,304	35,952,223	42,157,527	70,399,095
Minnesota	9,765,563	6,890,710	3,336,047	19,992,320	3,941,091	22,530,164	26,471,255	46,463,575
Mississippi	6,636,540	5,535,825	1,134,260	13,306,625	2,757,388	15,858,478	18,615,866	31,922,491
Missouri	10,842,153	7,335,962	5,045,372	23,223,487	4,719,780	27,086,494	31,806,274	55,029,761
Montana	7,469,165	5,138,777	482,414	13,090,356	2,419,567	14,364,040	16,783,607	29,873,963
Nebraska	7,237,111	5,133,621	1,201,564	13,572,296	2,429,657	14,341,470	16,771,127	30,343,423
Nevada	4,774,317	3,190,893	156,027	8,121,237	1,784,039	10,440,057	12,224,096	20,345,333
New Hampshire	1,832,625	1,221,750	606,715	3,661,090	1,077,343	6,250,000	7,327,343	10,988,433
New Jersey	4,827,665	1,622,120	8,968,185	15,417,970	3,759,671	21,903,382	25,663,053	41,081,023
New Mexico	6,033,941	4,146,049	672,350	10,852,340	2,085,683	12,141,101	14,226,784	25,079,121
New York	17,586,078	7,049,352	27,383,501	52,018,931	12,193,741	70,893,783	83,087,521	135,106,455
North Carolina	9,292,540	7,932,154	2,632,578	19,857,272	4,403,745	25,493,157	29,896,902	49,754,174
North Dakota	5,429,916	3,942,233	346,416	9,718,565	1,943,458	11,085,704	13,029,162	22,747,727

Ohio	12,984,286	7,894,718	11,855,397	32,734,401	7,378,381	42,818,835	50,197,216	82,931,617
Oklahoma	7,982,571	5,716,561	2,238,251	15,937,383	3,107,078	17,891,937	20,999,015	36,936,398
Oregon	6,357,968	4,444,383	1,642,739	12,445,090	2,336,162	13,575,755	15,911,917	28,357,007
Pennsylvania	14,689,192	8,741,853	15,509,504	38,940,549	9,151,129	53,608,531	62,759,660	101,700,209
Rhode Island	1,832,625	1,221,750	1,464,537	4,518,912	1,077,343	6,250,000	7,327,343	11,846,255
South Carolina	5,044,045	4,174,597	1,409,274	10,627,916	2,346,686	13,446,488	15,793,174	26,421,090
South Dakota	5,861,129	4,184,845	397,915	10,443,889	2,049,249	11,580,202	13,629,451	24,073,340
Tennessee	8,078,195	6,298,507	2,962,514	17,339,216	3,698,867	21,382,732	25,081,599	42,420,815
Texas	24,196,620	16,201,319	9,814,593	50,212,532	9,926,764	57,472,180	67,398,944	117,611,476
Utah	4,259,076	2,817,305	868,090	7,944,471	1,660,770	9,743,469	11,404,239	19,348,710
Vermont	1,832,625	1,221,750	318,991	3,373,366	1,077,343	6,250,000	7,327,343	10,700,709
Virginia	7,072,789	5,499,927	3,194,704	15,767,420	3,471,022	20,243,520	23,714,542	39,481,962
Washington	6,165,749	4,118,818	3,091,222	13,375,789	2,750,383	16,060,901	18,811,284	32,187,073
West Virginia	4,081,158	3,551,911	1,333,318	8,966,387	2,053,696	11,912,989	13,966,685	22,933,072
Wisconsin	8,788,340	6,132,838	4,011,757	18,932,935	3,946,702	22,776,026	26,722,728	45,655,663
Wyoming	4,631,615	3,139,166	222,755	7,993,536	1,744,646	10,391,126	12,135,772	20,129,308
Hawaii	1,832,625	1,221,750	688,910	3,743,285				3,743,285
District of Columbia	1,832,625	1,221,750	1,769,884	4,824,259	1,077,343	6,250,000	7,327,343	12,151,602
Puerto Rico	1,937,796	2,026,005	1,760,990	5,724,791				5,724,791
Alaska	1,148,518	774,495	9,575	1,932,588				1,932,588

[1] Apportionments under the two acts were actually made separately. Primary, secondary, and urban funds are matched 50–50 by the States; Interstate funds under the 1954 act are matched 60–40, and Interstate funds under the 1956 act are matched 90–10. A full explanation is given in the text of this report.

Table 9.—Federal highway funds paid by Bureau of Public Roads during fiscal year ended June 30, 1956, by program and by State

State or Territory	Federal-aid funds				Defense Highway funds	Total [2]
	Primary [1]	Secondary	Urban	Interstate		
Alabama	$6,884,559	$7,142,157	$1,332,749	$816,936	$247,515	$16,423,916
Arizona	5,507,528	3,621,604	708,038	2,035,804	636,249	12,509,223
Arkansas	4,409,669	4,255,989	494,118	150,011	8,065	9,317,852
California	15,631,623	6,881,362	16,077,255	6,970,446	1,604,838	47,165,524
Colorado	4,824,383	3,407,305	802,466	1,288,759	615,721	10,938,634
Connecticut	315,558	595,913	2,514,074	65,946		3,491,491
Delaware	1,252,571	629,683	598,500	5,518		2,486,272
Florida	7,107,439	3,225,044	2,585,170	1,457,661	75,498	14,450,812
Georgia	5,601,402	5,168,337	882,907	118,919	571,721	12,343,286
Idaho	3,714,724	3,068,924	866,575	219,174	136,004	8,005,401
Illinois	11,710,718	7,964,244	13,063,118	6,239,426		38,977,506
Indiana	7,502,960	3,940,369	6,001,721	59,980	42,180	17,589,202
Iowa	9,882,653	5,465,464	1,684,121	649,167	5,006	17,686,411
Kansas	7,223,420	6,418,277	1,607,928	1,557,287	50,209	16,857,121
Kentucky	5,924,220	6,048,327	1,969,887	480,167	210,207	14,632,808
Louisiana	6,744,896	4,186,217	2,146,588	188,928		13,266,629
Maine	3,124,353	2,201,697	491,036	121,930	402,449	6,341,465
Maryland	1,985,274	1,284,594	2,266,585	211,583	338,493	6,086,529
Massachusetts	1,760,482	1,573,578	5,238,933	255,776		8,831,531
Michigan	10,213,579	6,162,390	6,534,281	1,619,995	87,240	24,617,485
Minnesota	9,357,335	6,247,748	2,354,541	1,491,101	16,330	19,467,055
Mississippi	6,584,735	4,614,838	778,449	257,454	8,000	12,243,476
Missouri	10,598,961	10,073,694	7,853,910	4,761,507	238,588	33,526,660
Montana	5,351,689	3,419,707	292,392	293,440	15,312	9,469,002
Nebraska	9,211,192	5,595,495	1,499,939	392,793		16,699,419
Nevada	4,736,815	2,549,154	285,956	233,487	30,353	7,835,765
New Hampshire	1,639,433	723,775	434,949	241,307	4,815	3,044,279
New Jersey	2,357,152	1,015,945	6,796,672	13,928		10,183,697
New Mexico	4,692,525	4,284,243	625,007	1,804,550		11,406,325
New York	14,493,133	5,313,278	30,740,117	153,909	705,463	51,405,900
North Carolina	7,978,925	6,154,529	2,402,541	2,601,316	451,448	19,588,759
North Dakota	4,104,299	3,474,130	480,832	646,763		8,725,752
Ohio	5,733,499	3,595,074	8,792,088	1,575,655	771,012	20,467,328
Oklahoma	8,149,865	3,655,577	2,185,599	506,737	408,724	14,906,502
Oregon	4,611,064	3,208,458	964,398	2,276,984	1,140	11,062,044
Pennsylvania	9,752,594	6,434,812	10,734,329	1,606,359		28,528,094
Rhode Island	1,830,758	1,661,427	980,625	433,910		4,906,720
South Carolina	4,530,495	2,458,641	446,466	363,011	149,529	7,948,142
South Dakota	3,605,613	3,518,056	899,355	455,613	87,789	8,566,426
Tennessee	7,507,079	3,474,555	2,416,081	77,364	18,974	13,494,053
Texas	17,151,200	13,056,200	5,416,600	5,509,400	389,648	41,523,048
Utah	4,161,750	2,910,401	364,102	1,131,918	1,187,879	9,756,050
Vermont	1,526,101	1,358,675	261,850	1,828		3,148,454
Virginia	4,792,609	4,181,502	2,342,759	269,771	428,406	12,015,047
Washington	4,291,285	3,258,351	2,540,198	800,405	143,991	11,034,230
West Virginia	4,194,972	1,257,223	556,825	252,014	152,035	6,413,069
Wisconsin	8,199,718	5,794,487	3,048,785	235,451		17,283,441
Wyoming	3,943,964	2,851,058	210,289	1,397,721	7,506	8,410,538
Alaska					6,148	6,148
District of Columbia	1,915,782	981,978	1,033,672	10,028		3,941,460
Hawaii	668,998	821,483	499,105			2,011,586
Puerto Rico	1,380,206	1,474,921	1,064,447		9,788	3,929,362
Undistributed					−63,000	−63,000
Total	300,375,757	202,660,890	167,168,928	54,309,137	10,201,273	734,903,929

[1] Funds available for either urban or rural portions of the Federal-aid primary highway system.
[2] Included in the totals are the following payments of prewar Federal-aid grade-crossing funds:

Indiana	$41,992	Wisconsin	$5,000
Massachusetts	2,762	Hawaii	22,000
Montana	96,462		
North Dakota	19,728	Total	187,944

Table 10.—Balances of Federal-aid funds available to States for projects not yet programed, as of June 30, 1956

State or Territory	Primary [1]	Secondary	Urban	Interstate	Total
Alabama	$1, 662, 006	$1, 323, 530	$2, 000, 772	$21, 455, 614	$26, 441, 922
Arizona	1, 345, 735	931, 007	400, 994	11, 650, 155	14, 327, 891
Arkansas	1, 335, 096	1, 773, 879	2, 348, 932	18, 515, 500	23, 973, 407
California	4, 305, 543	2, 777, 757	3, 228, 720	57, 028, 146	67, 340, 166
Colorado	6, 217, 254	3, 822, 867	1, 942, 861	15, 614, 509	27, 597, 491
Connecticut	4, 819, 313	2, 105, 098	11, 045, 307	12, 566, 362	30, 536, 080
Delaware	377, 138	1, 615, 010	247, 518	8, 505, 881	10, 745, 547
Florida	1, 137, 277	3, 539, 080	837, 774	19, 464, 820	24, 978, 951
Georgia	4, 043, 376	1, 174, 443	3, 816, 332	28, 146, 730	37, 180, 881
Idaho	2, 281, 700	1, 501, 384	61, 569	12, 806, 867	16, 651, 520
Illinois	2, 282, 389	5, 272, 197	6, 502, 090	47, 620, 820	61, 677, 496
Indiana	8, 489, 918	7, 041, 147	2, 285, 598	30, 634, 039	48, 450, 702
Iowa	1, 683, 887	1, 232, 182	805, 169	24, 032, 273	27, 753, 511
Kansas	3, 197, 052	2, 779, 457	497, 036	18, 447, 692	24, 921, 237
Kentucky	5, 287, 440	1, 269, 019	3, 419, 116	22, 381, 599	32, 357, 174
Louisiana	1, 166, 985	888, 886	821, 374	18, 716, 959	21, 594, 204
Maine	674, 591	504, 290	1, 617, 085	8, 846, 746	11, 642, 712
Maryland	1, 119, 845	479, 240	3, 408, 583	12, 001, 715	17, 009, 383
Massachusetts	3, 378, 446	2, 050, 050	4, 275, 643	23, 356, 295	33, 060, 434
Michigan	2, 223, 555	2, 110, 209	4, 430, 948	36, 883, 635	45, 648, 347
Minnesota	1, 545, 561	2, 932, 159	653, 922	24, 769, 763	29, 901, 405
Mississippi	4, 179, 861	2, 016, 080	1, 006, 312	18, 813, 198	26, 015, 451
Missouri	4, 105, 977	2, 777, 788	1, 564, 705	27, 232, 121	35, 680, 591
Montana	1, 267, 587	6, 107, 966	382, 786	18, 878, 076	26, 636, 415
Nebraska	3, 537, 389	4, 056, 870	1, 758, 422	19, 576, 953	28, 929, 634
Nevada	1, 109, 160	3, 538, 350	156, 027	12, 408, 840	17, 212, 377
New Hampshire	1, 437, 560	1, 361, 609	801, 507	8, 369, 674	11, 970, 350
New Jersey	3, 977, 157	1, 935, 925	5, 396, 112	28, 627, 341	39, 936, 535
New Mexico	2, 940, 099	1, 053, 791	733, 111	12, 315, 124	17, 042, 125
New York	3, 012, 756	4, 966, 605	19, 419, 801	75, 703, 035	103, 102, 197
North Carolina	3, 206, 787	1, 350, 763	587, 364	29, 923, 872	35, 068, 786
North Dakota	1, 111, 491	622, 959	582, 192	13, 818, 307	16, 134, 949
Ohio	4, 466, 743	5, 929, 604	7, 926, 035	43, 069, 160	61, 391, 542
Oklahoma	2, 345, 522	5, 460, 128	2, 195, 558	19, 112, 708	29, 113, 916
Oregon	1, 350, 261	1, 701, 709	657, 862	13, 586, 077	17, 295, 909
Pennsylvania	2, 567, 851	2, 213, 144	12, 955, 622	53, 980, 043	71, 716, 660
Rhode Island	335, 662	975, 026	340, 833	6, 566, 737	8, 218, 258
South Carolina	1, 248, 383	3, 417, 070	555, 301	16, 791, 014	22, 011, 768
South Dakota	983, 638	730, 073	102, 031	11, 640, 037	13, 455, 779
Tennessee	1, 560, 082	3, 929, 024	3, 072, 959	28, 540, 549	37, 102, 614
Texas	4, 000, 810	9, 492, 106	2, 584, 770	57, 569, 956	73, 647, 642
Utah	1, 020, 851	476, 011	215, 587	9, 833, 725	11, 546, 174
Vermont	1, 655, 060	347, 063	52, 541	8, 482, 153	10, 536, 817
Virginia	2, 454, 236	1, 639, 013	4, 204, 183	22, 729, 253	31, 026, 685
Washington	1, 377, 485	674, 646	1, 673, 644	16, 988, 380	20, 714, 155
West Virginia	1, 526, 233	6, 847, 584	614, 883	15, 939, 559	24, 928, 259
Wisconsin	1, 442, 647	3, 448, 627	1, 185, 668	27, 965, 455	34, 042, 397
Wyoming	887, 544	577, 865	49, 833	10, 716, 478	12, 231, 720
Alaska	1, 148, 518	774, 495	9, 575	----------	1, 932, 588
District of Columbia	915, 204	488, 222	554, 652	6, 269, 674	8, 227, 752
Hawaii	1, 779, 472	1, 033, 859	809, 427	----------	3, 622, 758
Puerto Rico	733, 214	3, 306, 415	3, 385, 601	----------	7, 425, 230
Total	122, 259, 347	130, 373, 281	130, 182, 247	1, 108, 893, 619	1, 491, 708, 494

[1] Funds available for either urban or rural portions of the Federal-aid primary highway system.

Table 11.—Improvements on the Federal-aid primary system in rural areas financed with Federal-aid funds: [1] Status of projects as of June 30, 1956, and projects completed during the fiscal year

State or Territory	Programed,[2] plans not approved			Plans approved, not under construction			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$5,060,512	$2,913,074	35.0	$4,914,804	$2,594,602	39.6	$24,688,361	$13,330,776	176.2	$17,327,629	$8,923,613	164.3
Arizona	1,730,133	1,343,826	18.9	205,423	175,100	1.0	6,770,234	5,120,102	67.6	8,678,742	6,334,365	158.8
Arkansas	9,246,000	4,628,520	106.9	3,465,306	1,803,701	35.5	11,086,493	5,833,291	142.0	6,958,475	3,485,854	119.3
California	1,720,000	790,000	.2	2,107,510	966,235	.6	48,413,866	24,903,852	97.3	16,671,276	7,729,183	76.8
Colorado	4,540,000	2,650,756	61.3	939,227	532,103	4.7	10,604,940	6,100,532	94.5	10,426,911	5,593,224	90.2
Connecticut	41,486	24,892		2,014,918	1,125,184	7.6	1,486,557	736,819	2.9	178,554	88,523	.7
Delaware	1,370,000	685,000	9.9	1,055,908	530,257	8.7	3,805,093	1,906,788	26.7	1,952,906	974,816	18.7
Florida	3,017,000	1,726,300	18.6	4,558,359	2,324,328	31.3	16,241,752	8,446,017	156.8	10,286,694	5,136,522	131.1
Georgia	15,500,873	7,895,206	237.5	10,643,048	5,685,274	105.2	14,148,598	7,144,892	150.2	9,806,203	4,884,055	135.8
Idaho	2,760,661	1,700,139	28.5	1,647,863	1,022,007	49.9	8,478,287	5,415,557	112.9	7,313,308	4,489,952	75.7
Illinois	4,387,020	2,364,289	29.0	8,748,397	3,929,822	75.1	43,481,761	24,688,666	183.5	24,342,468	13,235,393	173.3
Indiana	9,985,414	5,629,497	34.6	8,608,757	4,322,366	105.4	15,851,830	8,136,881	80.0	15,250,375	7,652,161	83.4
Iowa	5,507,795	3,760,631	28.7	4,498,963	2,454,983	72.2	12,354,173	6,723,197	201.2	18,956,726	9,859,563	412.2
Kansas	2,909,084	1,469,137	46.9	5,781,777	2,923,125	135.6	8,713,642	4,645,368	219.9	14,221,551	7,218,121	388.1
Kentucky	2,590,398	1,309,732	10.3	57,990	35,433		9,406,863	4,921,434	79.5	7,271,805	3,729,002	55.4
Louisiana	7,710,628	4,022,900	37.2	3,160,793	1,587,458	9.0	15,835,200	8,255,600	107.7	9,519,683	4,749,188	148.9
Maine	6,409,946	3,359,173	35.5	697,704	392,104	6.5	8,792,251	4,670,301	46.9	2,677,980	1,307,709	41.2
Maryland	6,745,075	3,580,417	15.9	4,979,585	2,553,950	16.7	4,388,786	2,109,144	32.9	908,224	451,195	2.7
Massachusetts	3,813,520	1,896,760	7.8	0 1,109,628	551,569	3.5	9,750,928	4,840,089	18.1	5,053,968	2,254,611	7.8
Michigan	8,809,700	4,505,500	27.5	7,803,274	4,048,157	83.0	29,107,060	15,930,807	194.4	15,775,426	7,845,701	233.1
Minnesota	1,009,712	603,856	2.0	3,540,186	1,900,351	39.3	19,699,911	10,692,921	389.5	15,031,325	7,877,895	336.3
Mississippi	4,451,876	2,306,643	96.0	2,104,900	1,074,200	99.1	10,687,616	5,766,201	227.2	10,108,685	5,191,916	258.9
Missouri	6,472,498	3,520,317	35.3	1,950,458	971,886	7.5	25,003,466	13,772,397	109.3	18,554,759	10,181,852	157.4
Montana	6,605,022	4,027,766	90.9	3,486,503	2,150,143	45.3	17,286,316	11,238,894	305.1	11,769,151	7,550,426	294.4
Nebraska	1,305,150	917,575	12.7	3,812,402	2,038,541	91.4	16,131,924	8,320,346	299.8	14,220,558	7,159,371	314.0
Nevada	4,980,000	4,156,308	38.2	644,715	538,075	25.1	6,002,318	5,040,213	75.2	4,754,207	3,884,039	79.9
New Hampshire	770,000	481,000	4.9	522,164	287,216	2.4	6,202,432	3,065,246	41.5	1,365,267	641,513	9.1
New Jersey	4,060,557	2,039,901	4.9	2,371,200	1,081,395	8.2	4,630,356	2,327,352	4.6	1,101,224	544,162	1.8
New Mexico	710,118	455,000		2,368,902	1,574,939	15.4	7,480,274	4,767,662	65.1	11,442,293	7,560,971	149.3
New York	3,032,050	1,571,401	27.5	16,980,035	8,475,598	72.4	59,663,810	29,699,858	196.0	20,957,443	9,861,651	86.0
North Carolina	12,640,120	6,376,090	177.7	1,998,428	1,034,860	58.0	30,373,518	15,373,980	345.6	16,104,047	7,855,490	212.7
North Dakota	3,573,720	1,803,076	79.7	4,248,687	2,307,773	124.7	8,802,449	4,502,732	297.6	6,709,730	3,419,060	290.1

Ohio	26,298,697	13,639,158	77.4	5,339,211	2,698,215	7.8	34,299,178	18,487,060	62.0	10,689,933	5,277,685	19.2
Oklahoma	8,390,900	4,482,371	52.1	7,044,822	3,530,632	57.2	22,687,577	11,459,757	173.0	10,464,598	5,390,795	149.2
Oregon	1,230,498	738,299	10.9	224,470	130,000	1.2	15,154,378	9,618,203	133.7	5,379,548	3,303,394	84.3
Pennsylvania	34,262,821	18,469,288	99.0	7,074,068	3,765,502	36.2	31,659,803	17,224,768	113.7	17,988,364	8,983,806	56.9
Rhode Island	1,100,000	550,000	2.4	100,338	55,549		282,309	152,760		3,717,652	1,858,826	14.6
South Carolina	10,405,000	5,393,220	99.1	1,497,364	902,323	9.7	12,838,722	6,627,414	94.2	3,987,689	2,077,468	23.4
South Dakota	6,853,338	4,130,878	95.6	7,892,494	4,567,412	212.6	10,559,148	6,034,759	352.0	5,365,827	2,988,898	271.2
Tennessee	1,592,754	796,377	4.9	2,285,422	1,145,549	18.2	20,720,883	10,025,031	149.4	10,754,426	5,218,427	187.6
Texas	2,591,500	1,225,923	43.4	8,991,463	4,794,667	111.4	60,134,819	32,892,020	580.0	34,569,915	18,310,132	545.8
Utah	3,830,500	2,864,200	35.8	1,072,498	820,626	14.6	8,838,105	6,645,969	64.2	5,051,429	3,753,188	86.1
Vermont	449,800	224,900	3.2	1,309,878	654,478	7.3	5,132,069	2,786,633	37.0	1,866,493	927,039	10.7
Virginia	5,126,334	2,919,427	36.6	7,553,282	3,985,515	99.7	14,303,329	7,353,186	100.5	11,457,060	5,732,986	101.0
Washington	8,918,343	5,180,105	61.2	2,876,057	1,523,180	51.4	12,282,109	6,752,343	119.5	7,285,574	3,893,614	102.5
West Virginia	8,557,782	4,439,171	43.5	1,729,740	955,566	10.3	7,152,713	3,599,123	36.7	5,681,000	2,850,076	59.3
Wisconsin	3,441,182	1,891,520	9.5	2,604,502	1,287,900	23.6	23,704,226	11,892,643	172.5	13,917,900	7,019,725	135.2
Wyoming	2,554,787	1,713,072	32.8	2,299,600	1,479,655	38.1	11,685,252	7,765,191	149.8	5,587,650	3,447,337	105.1
District of Columbia	95,000	47,500	.3									
Hawaii	2,231,780	1,108,216	6.4				490,210	251,140	.1	1,515,360	752,296	9.5
Puerto Rico	3,979,500	1,478,500	9.2	551,515	269,373	1.2	4,805,795	2,364,911	12.2	1,277,298	629,609	3.6
Total	285,376,584	155,806,807	2,083.3	181,474,538	95,558,880	2,080.4	812,101,690	440,360,826	6,898.2	492,255,309	260,086,401	6,672.6

[1] Includes projects on rural portions of the Federal-aid primary highway system financed from Federal-aid primary, secondary, and interstate, prewar Federal-aid primary and grade crossing, Defense Highway Act, and 1950 access funds.

[2] Initial commitment of funds.

Table 12.—Improvements on secondary roads in rural areas financed with Federal-aid funds: [1] Status of projects as of June 30, 1956, and projects completed during the fiscal year

State or Territory	Programed,[2] plans not approved			Plans approved, not under construction			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$4,247,058	$2,149,089	156.4				$11,774,897	$5,930,353	422.0	$15,846,741	$7,781,475	725.2
Arizona	2,252,485	1,655,733	77.8	$1,525,944	$1,099,682	32.7	3,726,381	3,038,186	125.4	4,533,904	3,244,023	141.9
Arkansas	5,147,060	2,588,330	392.6	126,228	63,114		7,302,859	3,596,125	312.5	8,224,450	4,091,842	407.6
California	16,894,425	9,303,733	199.2	191,873	112,130		9,391,114	6,549,895	89.4	13,707,696	7,720,186	304.5
Colorado	4,798,549	3,093,374	127.1	1,371,384	1,327,586	25.5	6,023,573	3,191,013	148.5	6,566,939	3,669,213	198.4
Connecticut	1,871,026	845,513	9.3				2,888,994	1,505,823	11.2	197,285	92,722	.5
Delaware	1,010,000	509,000	21.9	131,880	80,452	5.5	492,568	246,284	22.5	1,975,317	990,989	21.2
Florida	3,507,000	1,668,500	88.3	207,066	50,464		3,524,088	1,856,145	123.2	7,263,020	3,556,230	183.4
Georgia	15,369,660	7,970,942	472.4	179,066	89,533		17,687,412	8,831,444	605.0	8,508,306	4,328,637	381.7
Idaho	1,603,000	993,022	79.5	839,485	534,264	22.7	4,087,594	2,601,459	89.2	6,310,184	3,884,724	205.3
Illinois	19,674,688	9,835,944	580.1				14,823,664	7,418,979	405.1	14,177,514	6,963,062	513.9
Indiana	8,138,051	4,082,225	53.2	4,304,023	2,169,336	43.4	12,827,245	6,385,420	89.4	7,863,774	4,008,784	60.3
Iowa	12,507,792	6,307,921	728.9				11,628,558	5,826,614	673.1	9,272,996	4,635,422	763.4
Kansas	8,627,127	4,309,264	877.3	126,044	63,022	4.8	10,032,759	5,066,102	550.5	11,663,404	5,859,495	1,084.8
Kentucky	4,115,250	2,074,425	143.4	267,232	133,616		18,529,320	9,383,620	501.9	8,433,437	4,259,619	325.2
Louisiana	3,811,498	1,905,749	37.0	2,350,187	2,296,763	2.8	10,882,300	5,441,650	233.2	8,979,883	4,566,492	170.0
Maine	3,920,040	1,962,020	53.0				5,396,158	2,729,155	55.1	3,949,844	1,912,647	35.8
Maryland	6,656,558	3,333,279	100.7				3,301,463	2,300,733	105.7	2,404,363	1,340,540	91.6
Massachusetts	935,194	550,722	6.9				4,851,351	2,347,792	28.0	748,856	371,777	3.7
Michigan	13,149,750	6,611,675	611.4	318,259	238,259	1.8	11,863,764	5,931,882	277.8	11,903,872	6,014,845	473.6
Minnesota	6,059,340	3,098,895	573.6				11,910,316	6,052,908	1,024.7	10,948,398	5,495,358	1,507.6
Mississippi	6,728,230	3,353,960	364.7				11,082,846	5,036,897	532.6	8,450,657	4,039,612	395.5
Missouri	13,458,564	6,770,642	1,067.5	145,682	72,841		16,068,949	8,050,860	1,335.3	13,137,027	6,715,441	1,152.7
Montana	4,199,484	2,393,076	109.0	90,106	51,027		9,249,944	5,372,307	222.8	7,110,378	4,136,745	231.6
Nebraska	6,989,430	3,588,215	273.3				16,513,219	9,077,146	721.2	5,806,235	2,924,953	258.2
Nevada	1,693,000	1,413,271	48.2				4,200,322	3,504,818	127.0	1,527,726	1,203,243	54.9
New Hampshire	1,863,000	1,017,500	11.2	31,026	15,513		2,461,758	1,222,524	17.3	752,641	374,865	9.0
New Jersey	3,508,094	1,754,047	46.1	317,550	157,495	1.3	1,057,184	527,117	11.3	1,111,550	553,765	16.4
New Mexico	706,435	517,314	31.6	2,030,252	1,290,323	47.1	3,803,186	2,532,278	107.0	7,038,946	4,377,082	259.6
New York	12,292,738	6,312,293	60.0	456,246	228,123		12,132,084	5,566,820	62.7	13,624,146	6,474,617	103.1
North Carolina	6,272,448	2,909,124	134.5	189,370	189,370	9.0	13,989,308	7,021,905	376.5	8,418,103	4,229,750	251.7
North Dakota	4,587,336	2,338,868	925.1	6,103,729	3,113,632	536.0	4,189,534	2,119,412	405.1	6,367,070	3,152,135	868.3

Ohio	17,463,572	9,040,110	124.5	3,585,406	1,793,088	41.2	12,081,773	6,047,172	61.1	10,628,287	4,639,855	93.8
Oklahoma	4,765,000	2,532,723	227.6	3,689,729	1,810,678	122.3	6,830,217	3,418,408	188.5	7,270,512	3,947,080	293.6
Oregon	2,134,500	1,256,700	58.8	66,475	41,100	.1	8,517,962	5,012,721	139.2	4,803,097	2,845,044	140.7
Pennsylvania	9,913,652	4,948,826	54.0	341,464	170,732	----------	25,815,485	12,888,131	213.4	2,989,015	1,431,484	14.8
Rhode Island	337,000	168,500	1.4	61,974	30,987	----------	835,736	417,868	9.1	2,142,059	1,062,402	13.8
South Carolina	3,822,500	1,967,400	196.0	70,415	52,811	----------	4,946,303	2,508,377	379.7	3,966,064	2,006,229	240.2
South Dakota	8,412,490	4,763,679	524.5	----------	----------	----------	5,829,712	3,346,012	319.1	4,934,912	2,873,069	402.3
Tennessee	14,254,392	6,841,996	421.2	160,010	80,005	----------	7,134,302	3,523,718	375.0	7,596,354	3,624,672	491.7
Texas	8,609,400	4,317,900	297.9	434,700	216,900	----------	23,570,232	11,825,600	930.0	24,132,978	12,129,900	1,215.2
Utah	3,957,094	2,753,108	155.0	62,478	49,127	16.1	4,822,415	3,687,167	199.2	3,432,463	2,504,492	163.0
Vermont	813,500	406,750	20.5	----------	----------	----------	3,837,201	1,885,038	52.5	1,290,736	638,900	22.4
Virginia	9,623,000	4,837,125	264.6	308,948	154,474	1.5	12,374,659	6,868,310	256.2	7,391,387	3,791,417	279.4
Washington	3,777,851	2,010,301	109.7	2,853,739	1,506,291	52.5	7,591,915	4,099,158	123.3	4,178,075	2,398,231	183.7
West Virginia	3,575,464	1,834,382	13.0	2,016,405	1,017,045	6.6	3,510,294	2,017,151	19.8	1,759,860	901,148	13.7
Wisconsin	6,383,756	3,154,154	230.1	----------	----------	----------	13,537,695	6,372,200	347.5	10,156,312	5,026,530	380.2
Wyoming	1,571,996	1,012,051	36.3	235,000	235,000	46.0	5,719,164	3,692,067	194.9	3,097,648	1,982,637	121.7
Alaska	----------	----------	----------	----------	----------	----------	9,500	9,500	----------	----------	----------	----------
District of Columbia	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
Hawaii	1,272,606	733,777	4.5	3,172,075	1,567,148	2.9	1,385,924	663,312	4.1	1,113,588	552,171	1.2
Puerto Rico	1,250,000	617,500	7.4	58,927	25,753	----------	6,479,512	3,152,523	42.3	2,532,546	1,216,676	16.9
Total	308,532,083	160,414,647	11,208.2	38,420,377	22,127,684	1,021.8	432,524,713	227,698,099	13,667.1	340,240,555	176,542,227	15,288.9

[1] Includes projects on secondary roads in rural areas financed from Federal-aid secondary, prewar Federal-aid secondary, and grade crossing, Defense Highway Act, and 1950 access funds.

[2] Initial commitment of funds.

Table 13.—Improvements in urban areas financed with Federal-aid funds: [1] Status of projects as of June 30, 1956, and projects completed during the fiscal year

State or Territory	Programed,[2] plans not approved			Plans approved, not under construction			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$5,601,966	$3,061,103	20.8	$875,111	$688,506	1.9	$10,178,431	$5,507,405	54.3	$6,581,734	$3,569,249	37.8
Arizona	540,060	460,119	.4	624,402	449,065	.5	2,107,801	1,518,348	4.6	242,499	125,065	1.1
Arkansas	1,340,600	670,300	6.3	1,529,982	764,991	11.1	4,384,100	2,337,022	25.7	559,716	279,858	9.7
California				7,447,577	3,824,047	9.0	93,259,931	47,780,412	76.1	35,761,076	16,423,526	40.8
Colorado	165,488	93,583		38,157	21,566		5,258,056	2,736,750	2.5	5,198,003	2,469,562	7.9
Connecticut	2,530,766	1,265,383	.4				8,486,219	4,229,639	6.0	1,980,033	953,223	1.2
Delaware	1,110,000	555,000	1.5				1,387,601	693,801	.1	3,118,322	1,895,392	2.7
Florida	335,000	234,000	.4	9,013,888	4,726,108	13.7	17,849,157	9,237,287	61.7	7,519,548	3,901,245	34.2
Georgia	2,117,426	1,076,853	.9	2,418,120	1,051,683	5.0	16,291,679	7,080,802	23.9	8,539,568	3,915,813	21.1
Idaho	316,600	316,600	.3	373,096	335,388	.2	1,382,384	1,026,471	2.8	602,889	366,430	2.0
Illinois	10,755,874	6,032,937	10.1	9,113,900	5,072,819	8.7	43,221,117	22,608,659	36.7	27,934,778	14,692,477	11.5
Indiana	2,793,404	1,671,882	2.6	3,038,406	1,692,866	20.8	19,308,675	11,679,669	36.9	6,580,855	3,314,319	8.8
Iowa	843,842	795,921	.3	459,650	318,337	6.1	7,036,765	4,130,096	22.1	4,455,627	3,028,991	16.8
Kansas	65,094	32,547		3,462,807	1,854,942	20.7	9,765,875	5,082,908	48.0	5,881,913	2,947,676	13.0
Kentucky	150,032	77,416	1.3	1,402,212	701,106	4.1	14,247,670	8,211,818	32.5	6,234,707	3,292,551	14.6
Louisiana	11,416,270	5,708,135	1.3	714,856	357,428	.1	15,679,602	7,074,892	31.3	2,694,158	1,347,076	13.9
Maine	191,744	95,872	1.1	769,810	420,070	2.1	1,790,220	1,070,025	5.2	5,601,320	2,887,220	27.4
Maryland	4,729,504	2,364,752	4.9	11,647,319	5,157,970	6.9	16,713,226	8,332,080	15.8	827,066	404,292	1.5
Massachusetts	15,710,710	7,855,355	10.2	12,268,391	6,699,988	5.5	28,398,565	13,563,465	18.1	17,884,895	8,467,915	12.3
Michigan	11,219,000	5,587,000	17.3	12,748,681	6,762,241	12.0	24,187,184	11,909,602	72.7	21,551,595	10,571,197	51.3
Minnesota	2,063,194	1,046,597	5.1	3,641,381	1,898,348	24.1	16,045,872	8,805,242	115.6	7,330,575	3,793,223	56.4
Mississippi	724,736	368,768	4.2	2,972,600	1,815,282	16.3	3,780,874	2,169,537	10.7	4,262,315	2,350,813	26.3
Missouri	429,950	218,175	.5	4,457,012	2,445,033	5.4	37,355,815	19,117,910	25.0	19,317,775	9,673,220	42.3
Montana	748,574	424,547	3.5	724,346	410,197	8.8	3,508,314	2,059,508	14.5	743,965	419,915	16.8
Nebraska	751,600	385,600	4.6	990,256	499,027	2.2	2,232,656	1,138,460	16.3	5,654,641	3,585,992	17.9
Nevada				63,018	52,594		890,966	818,185	.9	945,959	766,111	3.9
New Hampshire				3,078	1,539		1,408,818	868,953	2.6	2,753,413	1,360,488	9.8
New Jersey	5,060,744	2,530,372	3.8	4,282,850	1,825,175	7.8	29,663,549	14,233,455	29.9	16,781,932	7,763,026	37.2
New Mexico	713,573	448,837	.1				1,251,391	787,865	8.5	2,039,622	1,319,197	15.3
New York	10,872,703	5,705,466	2.8	38,613,406	21,801,634	24.7	163,544,943	76,239,102	69.0	59,284,791	27,459,413	37.2
North Carolina	1,118,548	544,274	3.6	965,077	463,290	10.3	14,636,459	6,816,325	72.0	9,515,208	4,668,096	74.7
North Dakota	227,412	113,706	.5	288,830	144,415	3.4	393,290	196,645	17.1	1,098,860	481,540	4.1

Ohio	9,646,044	5,173,022	4.6	717,596	358,423	3.0	44,705,461	21,026,680	22.9	21,289,254	10,967,126	19.7
Oklahoma	2,555,000	1,311,087	11.6	3,139,722	1,811,809	3.9	11,510,422	6,335,733	30.8	3,660,661	2,087,289	11.8
Oregon	440,000	252,000	2.1	557,247	335,701	4.9	5,469,740	3,287,629	6.0	1,608,896	995,807	7.0
Pennsylvania				14,895,522	7,198,572	10.8	70,510,730	33,958,909	54.1	33,624,038	16,218,108	27.0
Rhode Island	550,000	275,000	.9	1,446,990	723,495	1.0	17,845,461	9,224,307	19.0	1,739,119	868,271	3.9
South Carolina	3,724,000	2,373,000	4.7	408,488	284,538	1.3	3,828,960	2,050,620	14.1	7,309,573	4,026,673	23.1
South Dakota	549,003	308,100	1.4				1,786,831	983,943	4.4	6,285	3,527	
Tennessee	983,238	491,619	.5	5,231,212	2,615,606	1.6	22,005,928	9,540,464	32.1	4,062,881	1,924,487	22.0
Texas	4,376,000	2,523,800	3.9	7,883,821	4,411,781	12.6	39,701,071	20,024,800	178.2	22,970,190	11,611,752	117.3
Utah	994,000	743,114	4.9	343,838	250,353	1.4	1,481,641	1,090,320	2.2	863,576	776,745	.7
Vermont							1,724,153	842,211	4.7	844,118	412,145	2.8
Virginia	4,338,475	2,545,637	9.1	435,826	206,324	1.8	7,593,155	3,423,360	5.3	2,809,154	1,409,595	7.3
Washington	1,551,236	831,254	5.7	3,937,268	2,124,244	3.2	7,667,924	4,105,514	17.6	8,934,082	4,746,973	9.2
West Virginia	781,336	390,668	.7	3,301,950	1,655,650	4.4	6,553,388	3,285,138	.6	1,953,648	976,115	3.8
Wisconsin	3,362,886	1,685,443	2.4	4,977,135	2,691,737	12.1	15,508,586	7,691,189	15.5	6,251,157	3,414,871	13.3
Wyoming	304,394	195,968	1.4	617,100	366,842	2.1	601,553	395,421	2.0	637,193	410,225	4.5
District of Columbia	13,880,900	7,971,084	2.3	2,564,035	1,264,716	1.2	7,604,093	3,785,087	.7	11,064,665	5,170,115	7.5
Hawaii	111,860	55,930	.2	928,861	413,477	.9	1,606,036	841,568		2,820,124	1,126,748	2.1
Puerto Rico	1,375,000	562,500	2.2	2,827,739	1,403,206	2.5	7,465,764	3,169,292	5.9	2,246,354	1,090,794	2.5
Total	144,167,786	77,430,326	167.4	189,242,572	100,372,099	300.1	890,818,102	444,124,523	1,375.2	434,177,326	216,731,507	957.0

[1] Includes projects in urban areas financed from Federal-aid primary, secondary, urban, and interstate, prewar Federal-aid primary, secondary, and grade crossing, Defense Highway Act, and 1950 access funds.
[2] Initial commitment of funds.

Table 14.—Interstate system improvements financed with Federal-aid funds: [1] Status of projects as of June 30, 1956, and projects completed during the fiscal year

State or Territory	Programed,[2] plans not approved			Plans approved, not under construction			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama	$2,604,580	$1,577,088	16.2	$386,800	$232,080	0.1	$10,678,966	$6,004,073	36.8	$11,902,934	$6,072,272	83.9
Arizona	441,180	339,629	6.1	624,402	449,065	.5	4,035,771	3,006,968	38.5	2,924,879	2,278,042	49.1
Arkansas	246,000	123,000	6.1	808,382	483,786	.8	3,099,790	1,805,208	16.9	362,734	194,273	10.9
California				992,583	396,892		60,243,650	32,400,457	66.3	22,675,900	8,576,324	47.4
Colorado	1,415,488	885,340	26.0	52,987	34,558		11,700,747	6,525,105	60.0	7,873,385	4,012,142	25.3
Connecticut	41,486	24,892		578,564	342,390	5.1	4,213,230	2,084,065	5.8	1,384,969	662,393	.5
Delaware							23,756	16,119		1,213,076	605,038	1.8
Florida				2,663,700	1,533,430	4.8	2,552,084	1,446,710	3.5	3,720,314	1,820,022	26.3
Georgia	1,219,133	733,880	3.2	6,427,680	3,443,883	10.4	15,384,269	6,662,097	32.0	8,142,616	3,702,929	18.8
Idaho				52,514	32,264	17.3	1,113,297	778,729		1,098,877	663,336	10.1
Illinois	7,441,922	4,409,253	3.2	6,220,554	3,253,800	5.7	49,657,179	28,060,339	63.2	32,303,035	16,960,345	98.7
Indiana	4,138,756	2,546,028	3.0	813,000	406,500		9,487,695	4,934,512	12.8	4,847,427	2,422,362	11.1
Iowa	4,077,355	2,726,411	24.5	18,082	9,041		1,037,088	625,888		1,030,125	617,096	16.0
Kansas	105,556	63,333		1,353,801	810,299	9.2	6,079,026	3,470,978	42.8	1,370,993	815,460	10.4
Kentucky	1,076,314	546,738	.5	27,668	13,834		6,648,487	4,096,298	3.1	2,566,307	1,439,279	9.2
Louisiana	1,675,860	1,005,516		70,617	42,370		8,144,460	4,410,230	14.8	3,617,407	1,799,721	39.1
Maine	1,197,736	751,268	2.8				2,339,924	1,363,589	5.4	2,466,613	1,319,366	4.6
Maryland	3,142,445	1,779,102	2.9	8,966,719	3,748,270	.5	3,129,485	1,415,002	14.6	387,569	192,326	.1
Massachusetts	336,364	158,182		6,993,720	4,080,689	2.2	3,094,038	1,490,583	1.0	6,222,471	2,857,547	4.2
Michigan	8,404,100	4,280,200	2.1	8,416,625	4,801,297	2.1	25,188,296	13,630,535	79.6	16,353,669	8,044,314	26.4
Minnesota	921,388	547,694	1.6	1,210,250	726,150	8.3	4,631,214	3,175,827	56.8	4,643,082	2,621,549	70.5
Mississippi	216,850	130,110		2,601,100	1,629,532	6.4	4,407,238	2,424,469	34.6	3,961,026	2,197,813	30.5
Missouri	1,695,684	971,410	8.5	21,960	10,980		40,862,013	21,918,237	72.5	22,797,501	11,868,055	65.4
Montana	1,117,785	589,230	16.0	259,913	212,665	7.1	3,848,858	2,556,133	37.9	1,407,374	837,932	48.4
Nebraska							283,626	152,875		847,565	423,783	12.9
Nevada				18,546	15,478		1,444,223	1,252,266	5.5	798,822	667,067	5.0
New Hampshire							1,739,653	1,023,291	5.1			
New Jersey	96,225	57,735					1,512,911	878,380	1.9	3,263,618	1,599,809	8.8
New Mexico	44,490	31,285		935,996	658,380	6.8	825,897	580,927	5.0	7,473,481	4,990,405	108.5
New York	1,093,054	601,870	.5	16,803,110	9,789,359	2.1	80,149,356	37,727,455	25.6	26,535,124	12,324,027	10.4
North Carolina	653,000	384,330	3.3	356,500	213,900	16.4	13,978,038	7,325,770	88.0	7,100,080	3,508,280	64.5
North Dakota	48,157	28,894		520,900	312,540	16.8	717,040	430,224	12.1	689,175	400,085	13.3

Ohio	9,584,459	5,260,675	8.8	184,235	110,541	----------	41,618,526	21,230,348	37.9	8,454,908	3,990,189	12.0
Oklahoma	3,860,500	2,216,900	13.6	1,226,882	714,073	.4	5,898,800	3,428,126	10.9	1,573,845	821,416	9.7
Oregon	555,000	333,000	2.8	137,745	84,000	----------	8,226,331	5,355,042	51.0	3,797,270	2,338,415	40.2
Pennsylvania	13,578,777	8,147,266	18.5	6,737,512	3,603,593	5.6	32,896,000	17,841,000	22.2	24,095,449	11,695,707	21.0
Rhode Island	----------	----------	----------	53,798	32,279	----------	10,519,315	5,559,947	1.2	3,576,480	1,788,240	14.6
South Carolina	180,000	130,720	.1	46,629	34,972	----------	1,645,100	1,106,000	14.3	105,687	64,615	--------
South Dakota	3,287,528	2,131,709	13.9	1,677,830	1,088,434	51.2	1,489,548	950,584	38.9	445,529	250,030	10.0
Tennessee	110,966	55,483	----------	351,804	175,902	1.3	3,172,594	1,328,797	----------	3,916,567	1,896,242	22.6
Texas	450,000	245,423	8.2	5,131,302	2,978,458	14.8	51,675,935	28,384,700	257.6	26,733,775	14,151,800	171.9
Utah	----------	----------	----------	561,252	441,298	6.7	5,476,333	4,253,710	21.4	2,330,647	1,824,921	22.0
Vermont	164,500	82,250	1.1	----------	----------	----------	98,319	54,796	----------	1,202,450	600,965	6.4
Virginia	1,020,000	760,000	1.2	2,102,155	1,258,972	12.4	3,206,285	1,805,294	16.9	2,772,740	1,534,111	6.4
Washington	4,139,940	2,585,755	25.8	214,021	130,930	.6	5,269,123	3,133,400	21.0	4,296,008	2,311,343	15.5
West Virginia	823,612	411,806	3.0	----------	----------	----------	3,250,783	1,645,096	2.3	2,041,570	1,020,785	3.3
Wisconsin	5,026,000	2,640,579	8.2	252,430	126,200	----------	5,494,865	2,845,791	1.3	1,535,562	917,781	--------
Wyoming	1,313,316	913,813	14.1	440,985	283,789	17.8	5,686,457	3,900,605	46.8	2,835,038	1,688,095	50.5
District of Columbia	13,280,900	7,671,084	1.3	1,188,524	584,710	.5	5,743,506	2,844,500	.7	77,582	38,791	--------
Total	100,826,406	58,878,881	247.1	88,503,777	49,331,583	233.9	573,619,125	309,341,075	1,386.5	301,773,255	153,426,838	1,338.2

[1] Includes projects financed from Federal-aid primary, secondary, urban, and interstate funds.
[2] Initial commitment of funds.

Table 15.—Mileage of designated Federal-aid highway systems, by State, as of June 30, 1956

State or Territory	National system of interstate and defense highways			Federal-aid primary highway system [1]			Federal-aid secondary highway system
	Total	Rural	Urban	Total	Rural	Urban	
	Miles	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*	*Miles*
Alabama	947	822	125	5,260	4,872	388	14,930
Arizona	1,187	1,152	35	2,627	2,556	71	3,697
Arkansas	547	482	65	3,509	3,323	186	13,636
California	2,159	1,794	365	7,081	6,073	1,008	10,253
Colorado	678	645	33	4,040	3,912	128	3,802
Connecticut	278	158	120	1,103	806	297	1,142
Delaware	42	38	4	535	491	44	1,421
Florida	1,173	1,008	165	4,336	3,893	443	10,715
Georgia	1,171	1,051	120	7,604	7,213	391	13,041
Idaho	659	637	22	3,106	3,034	72	4,518
Illinois	1,662	1,351	311	10,531	9,358	1,173	10,784
Indiana	1,112	901	211	4,790	4,264	526	15,822
Iowa	736	670	66	9,721	9,284	437	33,114
Kansas	771	702	69	7,601	7,274	327	22,527
Kentucky	668	590	78	3,866	3,630	236	15,203
Louisiana	657	545	112	2,722	2,467	255	5,815
Maine	313	277	36	1,618	1,519	99	2,271
Maryland	355	234	121	1,998	1,714	284	5,978
Massachusetts	415	217	198	2,072	1,309	763	2,197
Michigan	1,098	895	203	6,621	6,104	517	21,401
Minnesota	935	789	146	7,714	7,140	574	19,622
Mississippi	691	611	80	5,104	4,874	230	9,492
Missouri	1,159	1,062	97	8,249	7,981	268	18,896
Montana	1,239	1,210	29	5,943	5,851	92	4,310
Nebraska	503	475	28	5,230	5,090	140	12,849
Nevada	540	529	11	2,197	2,169	28	2,442
New Hampshire	214	183	31	1,200	1,084	116	1,540
New Jersey	354	186	168	1,738	1,106	632	1,965
New Mexico	1,013	968	45	3,929	3,785	144	5,233
New York	1,232	747	485	10,761	8,758	2,003	19,311
North Carolina	714	627	87	6,964	6,555	409	23,897
North Dakota	517	496	21	3,236	3,183	53	12,730
Ohio	1,353	1,098	255	7,624	6,631	993	16,961
Oklahoma	835	747	88	7,400	7,150	250	11,629
Oregon	757	684	73	3,916	3,737	179	5,382
Pennsylvania	1,478	1,126	352	7,110	5,996	1,114	13,254
Rhode Island	68	21	47	170	250	220	379
South Carolina	769	714	55	4,781	4,496	285	12,531
South Dakota	531	512	19	4,504	4,426	78	12,392
Tennessee	1,093	1,002	91	5,240	4,957	283	9,517
Texas	2,912	2,569	343	16,103	15,041	1,062	27,834
Utah	716	659	57	2,189	2,082	107	3,248
Vermont	344	309	35	1,250	1,185	65	1,782
Virginia	1,008	875	133	4,660	4,273	387	17,914
Washington	632	511	121	3,631	3,361	270	9,530
West Virginia	226	183	43	2,386	2,196	190	11,038
Wisconsin	482	427	55	5,997	5,554	443	18,558
Wyoming	1,019	991	28	3,432	3,389	43	2,117
District of Columbia	28		28	128		128	80
Hawaii				525	490	35	614
Puerto Rico				555	428	127	1,057
Total	39,990	34,480	5,510	234,907	216,314	18,593	520,371

[1] Figures include mileage of Interstate System with exception of projects on new location where exact location and mileage was not determined.

Table 16.—Mileage of the National forest highway system, by forest road class and by State, as of June 30, 1956

Region and State or Territory	Total	Class 1 [1]	Class 2 [2]	Class 3 [3]
Western Region:	*Miles*	*Miles*	*Miles*	*Miles*
Arizona	1,039.3	328.2	494.1	217.0
California	2,460.6	675.3	315.0	1,470.3
Colorado	1,497.0	577.0	515.0	405.0
Idaho	1,117.6	642.2	162.4	313.0
Montana	1,194.1	685.8	171.0	337.3
Nevada	318.8	157.2	130.8	30.8
New Mexico	651.0	131.0	407.0	113.0
Oregon	1,416.2	684.7	461.8	269.7
South Dakota	302.0	189.0	101.0	12.0
Utah	716.0	187.0	201.0	328.0
Washington	732.0	389.0	107.5	235.5
Wyoming	477.0	349.0	109.0	19.0
Alaska	393.4			393.4
Total	12,315.0	4,995.4	3,175.6	4,144.0
Eastern Region:				
Alabama	367.8	84.1	229.0	54.7
Arkansas	633.3	96.7	536.6	
Florida	287.9	32.9	194.4	60.6
Georgia	364.1	153.4	148.2	62.5
Iowa	20.0	11.3	8.3	.4
Illinois	301.8	241.3	41.4	19.1
Indiana	101.2	53.6	47.6	
Kentucky	352.9	131.1	216.8	5.0
Louisiana	398.2	54.1	95.7	248.4
Maine	14.0			14.0
Michigan	1,169.6	582.1	533.4	54.1
Minnesota	718.1	255.3	380.8	82.0
Mississippi	538.0	235.0	267.3	35.7
Missouri	998.9	385.9	541.8	71.2
Nebraska	23.0		23.0	
New Hampshire	166.0	61.9	39.6	64.5
North Carolina	840.3	367.4	411.6	61.3
Ohio	133.6	70.4	43.1	20.1
Oklahoma	48.5	31.5	17.0	
Pennsylvania	353.9	118.4	85.9	149.6
South Carolina	777.4	237.9	404.7	134.8
Tennessee	566.5	165.1	336.5	64.9
Texas	306.3	128.3	170.5	7.5
Vermont	119.1	32.7	61.9	24.5
Virginia	1,347.0	374.2	853.0	119.8
West Virginia	484.1	78.4	364.7	41.0
Wisconsin	469.1	75.7	352.4	41.0
Puerto Rico	44.6		44.6	
Total	11,945.2	4,058.7	6,449.8	1,436.7
Grand total	24,260.2	9,054.1	9,625.4	5,580.7

[1] Forest roads which are on the Federal-aid primary system.
[2] Forest roads which are on the Federal-aid secondary system.
[3] Other Forest highways.

Table 17.—Status of National forest highway projects as of June 30, 1956, and projects completed during the fiscal year [1]

State or Territory	Programed,[2] construction not yet authorized			Construction authorized, not started			Under construction			Completed during fiscal year		
	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles	Total cost	Federal funds	Miles
Alabama				$55,480	$26,000	5.3				$265,175	$135,670	9.5
Arizona	$520,000	$520,000	25.2				$1,746,142	$1,546,142	40.9	1,328,434	1,328,434	71.1
Arkansas	440,000	220,000	12.0				1,027,432	740,762	28.3	408,657	408,657	7.1
California	1,940,000	1,940,000	114.4	987,600	927,600	9.4	3,562,000	3,562,000	14.1	2,185,367	2,185,367	50.7
Colorado	660,000	660,000	7.7	985,000	985,000	10.3	1,095,000	1,095,000	8.5	1,980,590	1,980,590	40.8
Florida							1,517,904	758,349	62.1	385,000	192,500	15.4
Georgia	260,000	130,000	8.1				102,100	51,050	2.2	32,538	16,269	
Idaho	1,422,500	1,422,500	25.6	803,000	803,000	13.1	1,651,000	1,651,000	82.1	2,967,434	2,967,434	91.5
Illinois										367,966	183,983	11.4
Indiana	232,322	124,476	.8									
Iowa	14,030	7,015										
Kentucky	117,865	58,933	2.4							90,215	90,215	5.6
Louisiana	58,000	58,000	3.8				605,780	299,230	7.0			
Maine	10,904	10,904	1.5									
Michigan	154,800	154,800	11.5	65,000	65,000	5.4	714,700	311,950	9.9	58,000	58,000	.2
Minnesota	277,433	277,433	15.3							529,561	529,561	28.5
Mississippi	290,000	290,000	.5									
Missouri	157,553	157,553								476,000	476,000	28.5
Montana	805,000	805,000	20.2	230,000	230,000	8.7	3,107,000	3,107,000	65.4	1,253,062	1,253,062	50.2
Nebraska	23,900	23,834	2.8	46,693	46,363	8.7	3,463	3,463				
Nevada	605,000	605,000	3.0				443,000	443,000	5.7			
New Hampshire							398,121	398,121	3.2			
New Mexico	730,000	730,000	6.9				286,000	286,000	3.9	647,244	647,244	27.8
North Carolina	850,000	462,500	28.8	317,360	107,500	5.3	366,770	183,385	11.7			
Oklahoma				124,500	58,458	1.3						
Oregon	2,069,750	2,069,750	20.5	776,000	776,000	16.0	3,315,500	3,315,500	66.8	2,521,180	2,521,180	78.8
Pennsylvania	104,000	104,000	2.2				210,000	210,000	6.4			
South Carolina	96,000	42,000	7.4				64,600	31,500	5.5	268,462	99,529	14.7
South Dakota	175,000	175,000	3.8				347,000	226,000	6.1	397,419	111,277	3.1
Tennessee				140,840	70,420	11.4	600,404	300,202	11.5	331,617	165,808	7.5
Texas										223,912	111,900	14.1
Utah	535,000	535,000	21.9				632,000	632,000	27.9	858,460	829,060	22.8

Vermont	37,894	37,894	1.7				207,780	111,365	2.5			
Virginia	181,000	150,500	18.4							555,945	356,160	16.6
Washington	1,305,000	1,305,000	31.8	12,000	12,000		1,350,450	1,350,450	24.9	2,025,007	2,025,007	60.8
West Virginia	32,700	16,350					446,800	223,400	11.5			
Wisconsin	419,000	125,000	7.5	137,583	137,583	6.5				326,407	159,018	9.2
Wyoming	820,000	820,000	13.1				465,500	465,500	29.4	1,255,552	1,255,552	23.7
Alaska	615,000	615,000	21.5	726,250	726,250	29.3	993,000	993,000	13.5	1,289,502	1,289,502	11.4
Puerto Rico	60,610	60,610	2.7									
Total	16,020,261	14,714,052	443.0	5,407,306	4,971,174	130.7	25,259,446	22,295,369	551.0	23,028,706	21,376,979	701.0

[1] Includes construction projects only.
[2] Initial commitment of funds.

Table 18.—Mileage of highways in National parks, monuments, and parkways constructed by the Bureau of Public Roads during the fiscal year

Park, monument, or parkway (and State)	Under construction as of June 30, 1956	Completed during fiscal year
	Miles	*Miles*
Acadia (Maine)	16.7	17.8
Badlands (S. Dak.)	12.3	
Blue Ridge (Va.–N. C.)	42.1	15.9
Carlsbad Caverns (N. Mex.)		.8
Colonial Park (Va.)	5.0	
Colonial Parkway (Va.)	22.9	2.3
Crater Lake (Oreg.)	.1	1.0
Everglades (Fla.)	18.2	
George Washington Memorial (Va.)		1.2
Glacier (Mont.)		32.0
Grand Canyon (Ariz.)	8.5	
Grand Teton (Wyo.)	21.0	
Great Smoky Mountains (Tenn.)	5.3	
Hawaii National Park (Hawaii)	2.4	
Mesa Verde (Colo.)	.3	
Mount Rainier (Wash.)	18.7	1.7
Natchez Trace (Ala.–Miss.–Tenn.)	49.1	21.4
Olympic (Wash.)	7.2	.3
Sequoia–Kings Canyon (Calif.)	.1	
Shenandoah (Va.)	29.2	
Shiloh (Tenn.)		5.2
Wind Cave (S. Dak.)	5.5	
Yellowstone (Wyo.)		15.4
Yosemite (Calif.)	.9	
Total	265.5	115.0

Table 19.—Mileage of approach roads to National parks, monuments, and parkways constructed by the Bureau of Public Roads during the fiscal year

Park, monument, or parkway (and State)	Under construction as of June 30, 1956	Completed during fiscal year
	Miles	*Miles*
Walnut Canyon (Ariz.)	3.1	
Yellowstone (Wyo.)		6.7
Total	3.1	6.7

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