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REPORT OF THE CHIEF OF THE BUREAU OF PUBLIC ROADS, 1939

PUBLIC ROADS ADMINISTRATION,
FEDERAL WORKS AGENCY,
Washington, D. C., September 1, 1939.

Honorable HENRY A. WALLACE,
Secretary of Agriculture.

DEAR MR. SECRETARY: Until July 1, 1939, this organization functioned as the Bureau of Public Roads of the Department of Agriculture. I, therefore, submit to you the report on the work of that Bureau for the fiscal year ended June 30, 1939.

Sincerely yours,

THOMAS H. MACDONALD, *Commissioner,*
(Formerly *Chief, Bureau of Public Roads.*)

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INTRODUCTION

More than 17,000 miles of highway of all types were completed during the year, exceeding the work of the previous year by about 1,800 miles and sustaining the high rate of progress initiated in the fiscal year 1934. In the program of grade-crossing elimination and

protection 382 crossings were eliminated, 86 obsolete elimination structures were reconstructed, and 438 crossings were protected by signals and other devices.

Outstanding features of the year's work were the large amount of work done in widening, straightening, and otherwise modernizing important main highways, the excellent progress made in eliminating hazards at railroad grade crossings, and the completion of nearly 3,000 miles of secondary roads in the program begun in the preceding year.

In the work done in cooperation with the States and under the immediate supervision of the State highway departments 9,786 miles were completed on rural portions of the Federal-aid system, 2,971 miles on the secondary or farm-to-market systems, and 725 miles were improved in municipalities. Improvements in federally controlled areas, reconstruction of flood-damaged roads, and construction of roads with funds allotted by other Federal agencies aggregated 3,678 miles.

The Bureau of Public Roads and all of its functions were transferred from the Department of Agriculture to the newly created Federal Works Agency, and its name was changed to the Public Roads Administration by Reorganization Plan No. 1 prepared by the President, pursuant to the provisions of the Reorganization Act of 1939. The plan was transmitted to Congress on April 25, 1939, and was made effective on July 1, 1939, by a Joint Resolution of Congress adopted June 7, 1939.

The reorganization plan transfers all functions of the Secretary of Agriculture relating to highway improvement with Federal aid to the Federal Works Administrator. The title of the Chief of the Bureau of Public Roads is changed to Commissioner of Public Roads.

The Federal Works Agency is headed by the Federal Works Administrator and is composed of the Public Roads Administration, the Public Buildings Administration, the United States Housing Authority, the Public Works Administration, and the Work Projects Administration.

FUTURE HIGHWAY NEEDS BECOMING CLEARLY EVIDENT

During the year the Bureau completed the first comprehensive study ever made of the national highway situation, taking into account conditions on city streets, main rural highways, and on secondary or farm-to-market roads. The study was possible because of the wealth of data that have become available through the highway-planning surveys in cooperation with 46 State highway departments. These data show accurately and in great detail the volume, character, and range of traffic, the condition of existing highways, and the need for new facilities.

As a result of exhaustive studies of these data the Bureau prepared a master plan for future highway improvement which was included in the report entitled, "Toll Roads and Free Roads." This report was submitted to the President, who on April 27, 1939, forwarded it to Congress with the recommendation that it be considered as a basis for needed action to solve our highway problems.

The report recommends:

1. The construction of a special tentatively defined system of direct inter-regional highways, with all necessary connections through and around cities,

designed to meet the requirements of the national defense in time of war and the needs of a growing peacetime traffic of longer range.

2. The modernization of the Federal-aid highway system.
3. The elimination of hazards at railroad grade crossings.
4. An improvement of secondary and feeder roads, properly integrated with land-use programs.
5. The creation of a Federal Land Authority empowered to acquire, hold, sell, and lease lands needed for public purposes and to acquire and sell excess lands for the purpose of recoument.

A system of direct interregional highways, with necessary connections through and around cities, is needed to meet the growing peacetime traffic of longer range and the requirements of national defense in time of war. Studies of the present flow of traffic on main highways indicate that such an interregional system should comprise not more than 30,000 miles. No attempt has been made as yet to fix the exact location of the proposed system. Existing highways could be modernized to form a large part of the system, but some new highways would be needed to provide directness of travel. A system of the scope suggested would represent less than 1 percent of the total mileage of rural roads, but the Bureau estimates that it would serve at least 12.5 percent of the travel outside of cities.

The more complete information on the character of traffic in and near cities that has become available shows that existing facilities are seriously inadequate. The situation is becoming more aggravated by increases in traffic, and only the provision of major improvements at a large cost will provide a solution. Such improvements would be a necessary part of an interregional system.

It is found that as much as 90 percent of the traffic on main highways near the entrances to large cities is bound to or from points in cities themselves and cannot be bypassed around them. The studies reveal also that a large part of the traffic is destined to or bound from points in the very heart of the city or points most conveniently reached by going through the center of the city.

There is need for express highways cut directly into and through the center of the big cities. These are needed not only for service of the through traffic delivered by the main rural highways but also for the daily in-and-out movement of local traffic between the downtown section and suburbs centering about the main highways at the periphery of the city.

By preference such express highways should be constructed as attractively landscaped depressed thoroughfares passing under all cross streets.

Bypasses—the remedy usually proposed for the relief of congestion on through streets in cities—are only a partial and, by themselves, a not very effective remedy. They are recommended around the smaller towns, and a new type of belt-line distribution road around cities is proposed. For maximum effectiveness, both the bypass and distribution highways must be free from cross traffic, parked vehicles, and developments immediately adjacent, to preserve their initial advantage against the encroaching growth of the urban community, which otherwise soon converts them into ordinary local streets.

Outside of city limits on the main highways there is need for modernization of the existing roads to ease curvature, reduce gradients, and extend sight distance in order more safely to serve fast-moving traffic. Near the cities, also, a steadily increasing mileage of four-lane divided highways is believed to be required.

Such improvements are required on most of the mileage of the Federal-aid and State highway systems, especially those parts built before the recent considerable increase in the travel speed of motor vehicles. For the most part they involve only local changes in the existing roads. By such changes the bulk of the highway traffic that moves between adjacent cities will be amply served. Many improvements of this kind were made in the Federal-aid work of the past year.

No Federal undertaking has met with stronger public support than has the program of elimination of hazards at railroad grade crossings. This work should be continued.

The plan proposed for future highway improvement includes improvement of a carefully selected mileage of secondary and feeder roads to give direct service to a larger number of rural dwellers. The selection would be made from among the 2,618,000 miles of roads outside of State and Federal-aid systems. Constituting about 83 percent of the country's total road and street mileage, these lesser roads serve at present only about 13 percent of the total vehicle mileage of traffic. Located on them, however, are the homes and working places of about 75 percent of the rural population. The purpose of the improvement of an additional mileage of these roads, therefore, is that of affording better access to rural property rather than the service of a large increment of traffic. The choice of the roads to be improved should be made in close conformity with a program looking to the promotion of economically and socially beneficial land use.

Creation of a Federal Land Authority, empowered to acquire and lease land for public purposes, and to acquire and sell excess land for the purpose of recoupment is only one of several steps that need to be taken toward a solution of highway right-of-way problems.

Engineers trying to create a system of modern highways are everywhere delayed, and the public is forced to pay high prices for needed land, because of laws and a procedure adopted in the days of horse-drawn vehicles. In some States construction may be delayed for months by numerous legal steps, the width finally acquired is often less than that needed for a modern highway, and practically always the steps necessary to acquire rights-of-way are delayed until conditions are unfavorable to the acquirement except at a high price. A marked improvement can be produced by study and revision of State laws.

This step alone will not solve the most serious part of the problem. Along main highways in need of widening and relocation adjacent land steadily increases in value. Buildings are erected and subdivisions are developed, so that the number of owners who must be dealt with constantly increases. As a result of their planning work highway officials can determine with considerable accuracy the land that will be needed in the next 20 years to provide for an adequate highway system.

It is proposed that the Federal Government supply the means of acquiring lands selected by State officials and hold such land subject to lease by the State over a period of 50 years on terms that would in that period amortize the initial cost.

There is no action more necessary than providing the means of obtaining rights-of-way before they increase further in price. In

and near the cities the cost of land for the needed improvements may often exceed the cost of construction. Continuation of the present policy will result in such high costs for land that funds may not be found to pay both land and construction costs. We are now paying dearly because in the past funds could be found only for immediate right-of-way needs. The mistake should not be repeated.

Experience in England and Canada in the taking of land in excess of that needed for highway improvement and in later reselling at a profit indicates that such a policy, under proper constitutional authority, might well be applied in this country. The fact that a rise in land value accompanies major highway improvement is well known, and it seems reasonable that the public should derive some benefit from the value it creates.

BUREAU RECOMMENDS AGAINST A SYSTEM OF TOLL HIGHWAYS

The report to Congress containing the above recommendations was made in accordance with the act of June 8, 1938, which directed the Chief of the Bureau of Public Roads to investigate and report his findings—

with respect to the feasibility of building and cost of superhighways not exceeding three in number, running in a general direction from the eastern to the western portion of the United States and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads.

The building of such a system was found to be entirely feasible from a physical standpoint, but it was also found that the system would not come within 50 percent of self-liquidation if operated as a toll facility and would not meet the most urgent highway needs of the Nation.

In studying the feasibility of a toll system, the Bureau selected six routes, located in accordance with the terms of the act and aggregating 14,336 miles. Detailed studies show that the cost of constructing this system for fast-moving traffic without crossing other highways or railroads at grade would be about \$2,899,800,000, which is at the average rate of \$202,270 per mile.

The average estimated annual expenditure for the period 1945-60, required for financing the construction, maintaining the property, and operating the facility would be \$184,054,000, which is at the average rate of \$12,840 per mile per year.

Estimates of the potential traffic on the proposed toll system were based on actual traffic counts on the main highways of the country and studies of the character of highway travel. A number of facts led to the conclusion that only a small portion of present traffic could be attracted to the toll system. Long-distance travel constitutes only a small fraction of the total travel. Counts made on east-west highways at stations established on a line extending from Canada to Mexico showed only 300 passenger vehicles crossing the line daily in transcontinental travel. The system could be expected to serve adequately only that portion of the traffic having origin and destination close to one of the six routes. Access to the highways would have to be controlled both for collection of tolls and to prevent interference with flow of traffic by entering vehicles. Vehicles traveling distances less than the spacing of access points would not use the toll roads.

It is estimated that the utilization of the system would average, during the period 1945-60, 12,450,000 vehicle-miles per day. Assuming toll charges of 1 cent per vehicle-mile for passenger vehicles and an average of 3.5 cents for trucks and busses, this travel would produce an average annual revenue of \$72,140,000. This is considerably less than the \$184,054,000 estimated average annual cost and leads the Bureau to conclude that the system studied could not be supported by toll collections.

The portion of the proposed system estimated to be most nearly self-supporting is the 172 miles from a point near Philadelphia, Pa., to a point near New Haven, Conn. With the increase in traffic expected by 1960, this portion of the system would earn slightly more than the estimated cost for that year.

The report states:

If, as an actual test of the feasibility of a limited mileage of toll roads, it is the desire of the Congress to make provision for the construction of a section of highway of substantial length upon which there is a reasonable prospect of the recovery of the costs through tolls, it is recommended that such provision be made applicable to a section of highway, properly located, and extending from an appropriate point near Washington, D. C., to an appropriate point near Boston, Mass.

HIGHWAY SAFETY

The Bureau has consistently sought to reduce the number of deaths and accidents on highways by several courses of action in the belief that only the combined effort of many agencies in several directions can produce the desired results. It is felt that the past year has been one of real accomplishment in this field, but the progress has not been such that the situation can be viewed with complete satisfaction. No one can say how many lives have been saved by highway-railroad grade separations, road straightening and widening, divided highways, and road signs and road marking to direct traffic in proper channels. Such work has had special prominence in the State and Federal programs, and has undoubtedly contributed to the more favorable trend in accident statistics.

There is still a great lack of uniformity in essential features of State motor-vehicle and highway laws despite the availability of the vehicle code recommended by the National Conference on Street and Highway Safety. This code has been available for a number of years, but there are still many States with inadequate inspection of motor vehicles and with only a perfunctory examination before issuing a driver's license. Disciplining and control of delinquent drivers continues to be strikingly deficient in many instances.

It has been definitely determined that a relatively small group of accident-prone drivers experience a relatively large number of accidents. The danger from these drivers can be removed only through an efficient system of accident reporting, the keeping of accident records, and laws making the revocation of licenses mandatory for flagrant violations of traffic regulations.

Steps toward improvement of these conditions have been disappointingly slow. Each year a few States make improvements in their traffic laws, provide motor-vehicle inspection stations, make small additions to highway patrol forces, or make provision for accident reporting and the keeping of records. But throughout the country there is still a serious lack of uniformity in traffic laws and inadequate

enforcement machinery. Since there is no general sentiment against the more important safety proposals that have been made, the situation can be accounted for only by public and legislative inertia. Increased efforts should be made to bring all States to a high and uniform standard in motor-vehicle regulation and in the enforcement of the regulations.

PROGRESS MADE IN PROPORTIONING THE PHYSICAL DIMENSIONS OF HIGHWAYS

The Bureau is cooperating with a committee of the American Association of State Highway Officials in the development of design standards for the promotion of maximum safety of traffic and utility of highways. Research has been conducted and special studies made to aid the committee in establishing design standards. A policy on classifying highways recommended by the committee has been accepted by the association. Policies as to sight distance and the dimensions of modern road cross sections will soon be submitted to the association for consideration. The committee is being assisted in developing standards for the physical lay-out at highway intersections, and the marking of pavements and erection of signs to indicate "no-passing zones" on two-lane and three-lane highways.

For some years the Bureau has recommended that transition curves be inserted at each end of highway curves to avoid an abrupt change from a straight line to a curving path of travel. The recommendation has not always been accepted because of the additional calculations and field work required. To overcome this objection an easier method of making the calculations with the aid of special tables has been developed and made available in the book *Transition Curves for Highways*. The method simplifies both the calculations and the field work.

ROADSIDE IMPROVEMENT

Roadside improvement had its beginning in a small way many years ago but it received only slight impetus until the initiation of the emergency program of highway improvement in 1933. Since that time it has been mandatory that roadside improvement work be included in Federal-aid programs.

Six years of experience with roadside improvement have demonstrated that in building a properly conceived highway the road surface and the roadside cannot be treated separately but must be regarded as a single problem. Consideration of the roadside and the recreational use of highways are responsible for several trends that are becoming increasingly evident. Wider rights-of-way are being obtained; deep ditches have disappeared; wider shoulders are being used; slopes are flatter, more rounded, and planted to grass; footpaths are being built; and picnic areas and parking space at scenic views are now included in highway plans.

Increased attention is being given to roadside regulation and border control. Easements are being obtained to permit improvements beyond the limits of restricted rights-of-way. Rural zoning regulations are being adopted. Many of these specify the distance which buildings and billboards shall be set back from the highway.

NEW LEGISLATION INSURES FUNDS FOR HIGHWAY PLANNING WORK

At the close of the fiscal year Congress was considering a proposal to require the use of not to exceed 1½ percent of the regular Federal-aid funds apportioned to each State for highways and for elimination of hazards at railroad grade crossings in making surveys, plans, engineering investigations, and economic investigations of projects for future construction, either on the Federal-aid highway system and its extensions, or on secondary or feeder roads, or grade-crossing eliminations. The States would not be required to match Federal funds so used. The proposed legislation was enacted July 19, 1939.

This new authority will greatly facilitate the financing of future highway-planning-survey work in all States. Regulations requiring a use of funds in sufficient amount to obtain information required in planning Federal-aid work are being prepared.

DIVERSION OF HIGHWAY FUNDS

During the last decade there has been a very decided tendency on the part of legislative bodies to divert the proceeds of the special taxes on motor-vehicle owners and operators to purposes other than highways, particularly to relief purposes. Congress took cognizance of this fact by declaring in section 12 of the Hayden-Cartwright Act of June 18, 1934, that it is unfair and unjust to tax motor-vehicle transportation unless the proceeds of such taxation are applied to the construction, improvement, or maintenance of highways. The act provides that any State that applies to highway purposes a lesser amount of motor-vehicle fees and gasoline taxes than was provided by law on June 18, 1934, shall be penalized not more than one-third of the Federal-aid apportionments to which it would otherwise be entitled.

A continuous study of the State laws pertaining to disposition of the proceeds of the special taxes on motor-vehicle owners and operators and of their administration has been necessary in order to give reasonable effect to this legislation. Committees and members of State legislative assemblies, State highway officials, and citizens' organizations submit numerous inquiries each time that such assemblies are in session as to whether certain proposed legislation will constitute a diversion of the proceeds of the motor-user taxes. The requirement of this section is believed to have had a wholesome and restraining effect, and undoubtedly has prevented passage of many acts designed to divert highway funds that otherwise would have been enacted.

Since the Federal provision to discourage diversion became effective, a reduction has been made in Federal-aid apportionments to two States. On August 7, 1937, \$250,000 was withheld from the apportionment to New Jersey for the fiscal year 1937, and on June 2, 1938, \$472,862 was withheld from the apportionment to Massachusetts for the fiscal year 1938. Apparent acts of diversion in other States are under consideration at the present time.

USE OF FEDERAL AID IN FREEING TOLL BRIDGES ON THE FEDERAL-AID SYSTEM

An act of August 14, 1937, authorized the use of Federal-aid funds apportioned to any State in freeing toll bridges on the Federal-aid system. It permitted payment to the State of 50 percent of the

construction cost or reasonable value (whichever might be least) of bridges made free from tolls prior to July 1, 1939. The act also required that funds so paid should be used in matching unobligated Federal-aid funds available to the State. In effect this legislation permitted the Federal Government to pay an increased part or all of the cost of certain Federal-aid projects thus making available for the freeing of toll bridges the State funds that would otherwise be required for matching the Federal funds.

Alabama is the only State that has made use of this legislation. In the past two years \$2,025,267 was paid to the State in connection with the freeing of 10 bridges and the payments were applied in lieu of State funds on regular Federal-aid projects.

An act of July 19, 1939, has extended the use of this plan of freeing toll bridges to July 1, 1941.

SOURCES OF FUNDS USED DURING THE YEAR

The work of the year was supported mainly by regular Federal-aid funds. The apportionment for the fiscal year was \$125,000,000 for improvement of the Federal-aid system, \$25,000,000 for secondary or farm-to-market roads, and \$50,000,000 for elimination of hazards at highway-railroad grade crossings. Equal amounts had been provided for the preceding fiscal year, and portions of these funds remained available at the beginning of the past year.

Emergency funds for highway improvement were practically exhausted in the preceding year; and, while a few projects were carried over into the past year and completed, the volume of such work was not important. However, the work of grade-crossing elimination, supported by remaining portions of the \$200,000,000 authorized by the Emergency Relief Appropriation Act of 1935, continued into the past year in considerable amount.

On December 29, 1938, the \$135,000,000 authorized for the fiscal year 1940 was apportioned to the States after first deducting \$3,375,000 for administrative expenses of the Bureau as required by law. The apportionment is shown in table 1.

TABLE 1.—*Apportionments of Federal Aid for the fiscal year 1940 for roads on the Federal-aid highway system, for secondary or feeder roads and for grade-crossing eliminations*

State	Federal-aid system	Secondary or feeder	Grade crossings	Total
Alabama.....	\$2,068,493	\$310,274	\$393,552	\$2,772,319
Arizona.....	1,423,400	213,510	125,461	1,762,371
Arkansas.....	1,702,583	255,387	343,731	2,301,701
California.....	3,793,823	569,073	728,856	5,091,752
Colorado.....	1,807,919	271,188	251,215	2,330,322
Connecticut.....	624,021	93,603	167,075	884,699
Delaware.....	487,500	73,125	97,500	658,125
Florida.....	1,335,020	200,253	277,471	1,812,744
Georgia.....	2,507,151	376,073	477,283	3,360,507
Idaho.....	1,223,119	183,468	151,779	1,558,366
Illinois.....	4,043,313	606,497	1,030,486	5,680,296
Indiana.....	2,425,913	363,887	506,736	3,296,536
Iowa.....	2,542,385	381,358	545,468	3,469,211
Kansas.....	2,585,837	387,876	504,959	3,478,672
Kentucky.....	1,824,345	273,652	356,846	2,454,843
Louisiana.....	1,436,747	215,512	310,856	1,963,115
Maine.....	873,455	131,018	135,191	1,139,664
Maryland.....	821,369	123,205	200,663	1,145,237
Massachusetts.....	1,375,489	206,323	408,286	1,990,098
Michigan.....	3,012,993	451,949	649,147	4,114,089

TABLE 1.—*Apportionments of Federal Aid for the fiscal year 1940 for roads on the Federal-aid highway system, for secondary or feeder roads and for grade-crossing eliminations—Continued*

State	Federal-aid system	Secondary or feeder	Grade crossings	Total
Minnesota	\$2,704,164	\$405,625	\$524,721	\$3,634,510
Mississippi	1,746,261	261,939	310,650	2,318,850
Missouri	2,986,426	447,964	596,184	4,030,574
Montana	2,032,384	304,858	261,252	2,598,494
Nebraska	2,044,283	306,642	347,689	2,698,614
Nevada	1,275,938	191,391	97,500	1,564,829
New Hampshire	487,500	73,125	97,500	658,125
New Jersey	1,321,366	198,205	389,614	1,909,185
New Mexico	1,595,294	239,294	166,957	2,001,545
New York	4,845,924	726,889	1,335,949	6,908,762
North Carolina	2,321,357	348,204	500,977	3,170,538
North Dakota	1,532,167	229,825	309,164	2,071,156
Ohio	3,583,189	537,478	833,853	4,954,520
Oklahoma	2,317,258	347,589	455,041	3,119,888
Oregon	1,638,823	245,823	224,953	2,109,599
Pennsylvania	4,221,088	633,163	1,128,616	5,982,867
Rhode Island	487,500	73,125	97,500	658,125
South Carolina	1,328,214	199,232	293,750	1,821,196
South Dakota	1,610,762	241,614	268,815	2,121,191
Tennessee	2,079,803	311,970	373,187	2,764,960
Texas	6,227,084	934,063	1,088,862	8,250,009
Utah	1,124,731	168,710	129,236	1,422,677
Vermont	487,500	73,125	97,500	658,125
Virginia	1,815,401	272,310	373,906	2,461,617
Washington	1,563,815	234,572	300,063	2,098,450
West Virginia	1,082,034	162,305	260,716	1,505,055
Wisconsin	2,413,315	361,997	486,074	3,261,386
Wyoming	1,249,044	187,357	132,134	1,568,535
District of Columbia	487,500	73,125	97,500	658,125
Hawaii	487,500	73,125	97,500	658,125
Puerto Rico	487,500	73,125	150,076	710,701
Total	97,500,000	14,625,000	19,500,000	131,625,000

EMPLOYMENT ON ROAD WORK

Employment on all highway work with Federal funds administered by the Bureau amounted to 1,121,007 man-months, a decrease of 11 percent as compared with the preceding year. This was expected since appreciable amounts of emergency funds had remained available at the beginning of the preceding fiscal year and had been expended largely in the first half of that year. A comparison of employment by corresponding months of the 2 years shows that there was a decrease of more than 36,000 men in both July and August, and 20,394 fewer men were employed in September. By December there was a difference of only 3,097 men, and the difference was small in the remaining months of the year. Table 2 shows the employment on Federal and State work by months in the fiscal years 1932-39.

TABLE 2.—Comparison of employment during the fiscal years 1932-39 on all Federal and Federal-aid highway construction and on all Federal and State road work, including State maintenance, by months

Month	Men employed on all Federal and Federal-aid highway construction							
	1932	1933	1934	1935	1936	1937	1938	1939
July.....	164,708	81,042	129,205	335,223	191,041	249,271	159,489	123,038
August.....	151,418	89,346	111,211	297,224	178,756	247,841	163,331	126,860
September.....	116,100	122,193	115,047	247,880	143,455	227,916	152,784	132,390
October.....	88,869	124,106	154,016	210,079	135,660	206,113	143,617	129,270
November.....	62,466	129,933	185,860	201,046	118,898	172,295	121,394	110,073
December.....	35,991	98,271	174,358	147,101	103,493	128,314	85,365	82,268
January.....	29,518	75,498	154,154	96,594	82,731	76,829	54,899	57,554
February.....	26,673	78,215	156,814	81,257	70,418	57,844	49,713	46,804
March.....	28,008	95,704	144,053	90,999	86,050	69,946	51,229	47,559
April.....	42,205	122,256	187,657	123,063	132,834	88,361	67,829	65,517
May.....	59,008	139,831	271,972	167,535	193,269	122,655	98,179	89,108
June.....	71,772	152,276	336,414	193,263	237,330	145,375	114,373	110,566
Total (man-months).....	876,736	1,308,671	2,120,761	2,191,264	1,673,935	1,792,760	1,262,202	1,121,007

Month	Total men employed on all Federal and State highway construction and maintenance							
	1932	1933	1934	1935	1936	1937	1938	1939
July.....	385,349	305,372	332,277	549,203	375,412	435,971	334,536	322,508
August.....	389,949	333,403	329,813	531,034	382,846	433,533	351,853	323,650
September.....	356,617	374,405	337,973	498,151	340,073	414,147	346,444	337,638
October.....	330,104	373,246	384,029	450,322	323,374	389,966	330,942	350,090
November.....	289,316	371,667	420,069	426,603	290,523	353,971	314,067	341,832
December.....	244,971	290,465	362,031	323,700	252,229	285,248	255,530	266,629
January.....	229,189	266,443	315,989	240,414	202,884	210,027	196,858	200,999
February.....	218,218	255,256	306,000	221,406	200,451	190,336	177,675	176,079
March.....	211,549	279,213	296,265	217,539	227,586	209,794	179,420	169,155
April.....	245,843	299,882	345,278	282,740	287,478	226,286	213,802	187,523
May.....	259,615	330,138	466,504	331,000	374,191	299,063	272,316	220,923
June.....	280,636	359,605	545,013	362,339	423,466	313,149	294,240	252,316
Total (man-months).....	3,441,356	3,839,095	4,441,331	4,434,451	3,680,543	3,755,491	3,267,683	3,149,342

Table 3 shows the employment on the various classes of work during the past year. Comparison with similar figures for the preceding year shows that employment on roads in national parks and forests, and public lands remained at substantially a constant level, while there was an increase of 11 percent in the regular Federal-aid highway and grade-crossing elimination work. The decrease in employment is due almost entirely to the near exhaustion of emergency funds.

TABLE 3.—Direct job employment during the fiscal year 1939 on the several classes of Federal and Federal-aid road construction administered by the Bureau of Public Roads and State road construction and maintenance

Month	Men employed on road construction										Men employed on road maintenance by State highway departments	Total men employed
	In whole or in part with Federal funds											
	National-forest highways	National-park highways	Public-lands highways	Federal-aid and grade-crossing eliminations	Public Works highways	Works Program highways	Works Program grade-crossing eliminations	Loan-and-grant highways ¹	National work-rehab highways	With State funds only, on State highways		
July.....	1,965	3,141	244	56,960	2,019	4,398	5,391	5,920	2,950	30,564	168,906	322,508
August.....	2,276	3,294	251	102,100	2,170	3,521	3,183	5,004	3,001	26,649	170,141	323,650
September.....	2,901	3,135	245	108,288	1,988	3,466	3,681	4,154	3,282	32,054	173,194	337,638
October.....	2,926	3,175	268	107,276	1,866	2,454	3,738	4,751	2,846	35,426	185,394	350,090
November.....	2,439	2,849	296	89,809	1,302	2,038	3,376	3,562	2,902	28,439	203,320	341,832
December.....	1,835	2,056	163	66,256	809	1,435	2,111	5,171	1,818	21,223	163,138	266,629
January.....	962	1,836	211	44,960	835	1,878	1,576	4,080	1,618	15,254	128,191	200,900
February.....	742	1,312	193	35,987	606	678	1,199	5,051	1,056	12,011	117,264	178,979
March.....	679	1,621	306	35,790	392	678	1,053	6,140	1,063	11,663	110,533	169,155
April.....	766	2,044	341	49,685	376	732	1,311	9,679	583	12,877	108,129	187,523
May.....	1,269	2,828	495	67,623	393	809	1,451	14,248	492	13,606	116,119	220,923
June.....	2,288	3,090	481	84,026	300	779	1,660	17,660	282	20,177	121,573	252,316
Total (man-months).....	21,078	29,881	3,494	883,840	13,314	21,818	33,210	88,300	21,072	261,433	1,766,902	3,149,342

¹ Projects transferred by the Public Works Administration for engineering supervision.

Not so many years ago highway construction almost ceased in the winter months except in the Southern States. A special effort to stimulate winter employment in the emergency program produced a definite increase that has been well sustained up to the present time. In the past year employment on work with Federal funds reached its lowest level in February, but even then it amounted to 38 percent of the figure for July.

The total employment for the year on work supervised by the Bureau—1,121,007 man-months—is the equivalent of an average full-time employment each month of 93,417 men. Industrial employment in the production and transportation of equipment and materials is estimated at 1.6 times the direct employment for work of the character done during the year, indicating an industrial employment of 1,794,000 man-months, and this, added to the direct employment, gives a full-time employment of 2,915,000 man-months, the equivalent of the full-time continuous employment of 243,000 men.

There was a slight increase over the preceding year in men employed on State construction not involving Federal funds and also in State maintenance forces. The total employment on work with State and Federal funds amounted to 3,149,342 man-months, or about 4 percent less than in the fiscal year 1938.

MILEAGE OF FEDERAL-AID SYSTEM

The Federal-aid system was designated as a result of the Federal Highway Act of 1921, and in accordance with the intention of the act there has been close adherence to the original system. Only minor revisions have been made to meet unforeseen conditions. The mileages have been changed slightly from year to year as estimated mileages or mileages along old roads have been replaced by the measured mileage on new construction.

The original system was limited to 7 percent of the rural road mileage within each State. When provision has been made for improvement of 90 percent of the designated system, an additional 1 percent is permitted and further additions are permitted on the same basis. This provision is becoming of increasing importance and has been taken advantage of by 25 States. During the past year the mileage of the system outside of Federal reservations increased by 1,704 miles due almost entirely to extensions beyond the original 7 percent.

The system in any State may exceed what would otherwise be the limiting mileage by an amount equal to the mileage of the system within Federal reservations. Additions to the system in reservations amounted to 628 miles bringing the total additions for the year to 2,332. System mileages by States are shown in table 4.

TABLE 4.—Designated Federal-aid highway system mileage as of June 30, 1939

State	Mileage of approved routes outside Federal reservations	Mileage of approved routes within Federal reservations	Total mileage of system	State	Mileage of approved routes outside Federal reservations	Mileage of approved routes within Federal reservations	Total mileage of system
Alabama	3,954	—	3,954	New Jersey ¹	1,595	—	1,595
Arizona ¹	1,617	597	2,214	New Mexico	3,271	377	3,648
Arkansas	4,826	249	5,075	New York ¹	9,241	16	9,257
California ¹	5,590	555	6,145	North Carolina ¹	7,300	506	7,806
Colorado	3,214	536	3,750	North Dakota	7,139	85	7,224
Connecticut ¹	1,046	—	1,046	Ohio ¹	7,125	—	7,125
Delaware ¹	817	—	817	Oklahoma	6,671	50	6,721
Florida ¹	2,747	12	2,759	Oregon ¹	3,270	482	3,752
Georgia ¹	5,845	128	5,973	Pennsylvania ¹	7,698	108	7,806
Idaho	2,608	778	3,386	Rhode Island ¹	—	521	521
Illinois ¹	9,059	8	9,067	South Carolina ¹	4,167	252	4,419
Indiana ¹	5,334	—	5,334	South Dakota	5,796	477	6,273
Iowa ¹	7,891	2	7,893	Tennessee	4,369	66	4,435
Kansas	8,099	15	8,114	Texas ¹	14,196	148	14,344
Kentucky	3,700	6	3,706	Utah ¹	2,085	146	2,231
Louisiana	2,740	—	2,740	Vermont	1,036	—	1,036
Maine	1,617	4	1,621	Virginia ¹	4,566	128	4,694
Maryland ¹	2,164	—	2,164	Washington	2,953	404	3,357
Massachusetts ¹	1,674	—	1,674	West Virginia	2,163	132	2,295
Michigan ¹	5,771	233	6,004	Wisconsin	5,508	133	5,641
Minnesota	7,102	291	7,393	Wyoming	3,222	337	3,559
Mississippi	3,406	193	3,599	Hawaii	623	—	623
Missouri ¹	8,001	—	8,001	Puerto Rico	1,152	—	1,152
Montana	4,569	1,074	5,643	District of Columbia	81	—	81
Nebraska	5,591	21	5,612				
Nevada ¹	1,979	87	2,066	Total	218,278	8,669	226,947
New Hampshire	968	33	1,001				

¹ Increased beyond 7 percent.

STATUS OF MAJOR FUNDS AND PROGRESS IN CONSTRUCTION

During the year construction work on 13,482 miles of highway was brought to completion, exclusive of work done in Federal areas and with special funds. The completed work included 9,786 miles on the Federal-aid system outside of municipalities, 586 miles on extensions of the system into and through municipalities, 139 miles of secondary or feeder roads in municipalities, and 2,971 miles of secondary or feeder roads outside of municipalities. Payments to the States for construction completed amounted to \$186,718,071, as shown in table 5.

TABLE 5.—Funds paid to the States during the fiscal year 1939

State	Federal aid, 1917-33	Public Works, 1934-35	Works Program		Federal-aid system, 1936-40	Federal aid, secondary, or feeder	Federal aid, grade crossings	Total
			Highways	Grade crossings				
Alabama	\$12,272	\$319,249	\$107,003	\$261,899	\$3,921,434	\$337,738	\$784,017	\$5,743,612
Arizona	—	4,211	813	56,876	1,666,602	291,566	137,718	2,157,786
Arkansas	—	22,009	83,353	380,998	3,008,985	233,033	547,207	4,275,585
California	—	10,319	208,141	820,926	4,470,224	1,012,791	1,059,257	7,581,684
Colorado	—	12,571	912,482	642,251	1,921,010	529,955	241,803	4,260,072
Connecticut	—	37,446	94,830	61,452	584,431	36,168	—	814,327
Delaware	—	3,069	185,558	207,575	506,913	—	27,619	930,734
Florida	—	41,930	39,172	264,998	1,395,743	177,573	230,692	2,150,108
Georgia	—	701,750	934,368	960,097	2,191,030	339,193	136,234	5,232,672
Idaho	—	96,395	26,732	149,997	1,468,409	258,915	213,678	2,214,126
Illinois	—	198,712	241,121	570,463	4,881,292	1,035,883	1,540,434	8,467,905
Indiana	—	138,561	19,840	215,564	3,366,270	436,122	986,425	5,162,782
Iowa	—	—	18,005	122,825	3,828,741	—	795,940	4,766,111
Kansas	—	19,191	79,609	298,013	2,875,608	117,938	794,161	4,184,520

TABLE 5.—Funds paid to the States during the fiscal year 1939—Continued

State	Federal aid, 1917-33	Public Works, 1934-35	Works Program		Federal-aid system, 1936-40	Federal aid, secondary, or feeder	Federal aid, grade crossings	Total
			Highways	Grade crossings				
Kentucky		\$67, 131	\$139, 370	\$390, 033	\$2, 535, 624	\$226, 196	\$253, 933	\$3, 612, 287
Louisiana		166, 762	147, 748	694, 037	1, 480, 810	195, 262	172, 846	2, 857, 465
Maine		13, 022	55, 613	77, 167	1, 258, 684	117, 923	278, 552	1, 800, 961
Maryland		342, 376	228, 199	600, 640	887, 699	41, 370	44, 403	2, 144, 687
Massachusetts		171, 265	129, 475	417, 964	1, 322, 404	51, 549	200, 801	2, 293, 458
Michigan			148, 691	501, 457	2, 492, 078	308, 075	572, 183	4, 082, 484
Minnesota		121, 772	17, 755	101, 239	2, 772, 442	303, 819	504, 427	3, 821, 454
Mississippi	\$6, 084	134, 916	113, 531	427, 802	2, 778, 925	98, 442	363, 170	3, 922, 870
Missouri		51, 996	87, 962	249, 733	2, 143, 332	281, 070	367, 983	3, 182, 076
Montana		40, 504	48, 719	61, 011	567, 677	31, 549	565, 427	1, 614, 887
Nebraska		63, 627	188, 039	178, 837	2, 511, 908	484, 742	559, 217	3, 986, 370
Nevada		15, 305	68, 353	68, 652	1, 758, 959	315, 717	218, 903	2, 445, 889
New Hampshire		20, 244	77, 663	58, 523	426, 956	69, 519	89, 093	741, 998
New Jersey		129, 829	92, 408	335, 421	1, 208, 924	78, 362	178, 215	2, 023, 159
New Mexico		8, 860	53, 530	15, 822	1, 840, 918	543, 455	188, 678	2, 651, 263
Nevada		400, 583	394, 247	967, 600	6, 984, 667	993, 950	1, 376, 133	11, 117, 180
North Carolina		69, 293	310, 683	1, 115, 989	3, 219, 110	493, 767	669, 064	5, 877, 906
North Dakota	12, 956	241, 699	294, 899	251, 816	2, 251, 182	97, 719	531, 186	3, 681, 457
Ohio		31, 553	486, 669	1, 494, 480	3, 338, 584	93, 956	17, 758	5, 463, 000
Oklahoma		81, 839	128, 766	440, 061	2, 992, 373	219, 958	135, 872	3, 998, 869
Oregon		156, 081	78, 830	247, 307	1, 669, 215	274, 581	82, 906	2, 508, 920
Pennsylvania	64, 137	185, 784	898, 323	1, 259, 075	4, 697, 248	1, 039, 404	256, 911	8, 400, 882
Rhode Island		2, 478		9, 433	311, 142	85, 841	311, 190	720, 084
South Carolina		139, 622	129, 142	521, 786	1, 869, 323	365, 070	288, 592	3, 233, 535
South Dakota		80, 953	109, 014	399, 411	1, 985, 427	229	280, 153	2, 855, 187
Tennessee		5, 295	155, 529	357, 202	3, 032, 664	274, 770	99, 568	3, 925, 028
Texas		180, 524	185, 151	1, 192, 457	8, 582, 395	1, 897, 032	1, 331, 920	13, 369, 479
Utah			103, 012	69, 549	1, 688, 103	350, 396	108, 145	2, 319, 205
Vermont			32, 811	45, 908	573, 517	93, 936	77, 283	823, 455
Virginia		116, 978	387, 944	270, 938	3, 133, 542	483, 971	505, 576	4, 898, 949
Washington		18, 982	52, 847	176, 641	2, 145, 571	313, 323	703, 273	3, 410, 637
West Virginia	968	279, 819	174, 202	351, 891	1, 329, 829	138, 677	339, 564	2, 614, 950
Wisconsin		30, 040	17, 215	545, 748	3, 192, 865	479, 701	738, 558	5, 004, 227
Wyoming		42, 972	20, 859	78, 610	1, 393, 083	347, 277	80, 967	1, 963, 768
District of Columbia					546, 200	39, 474	157, 383	845, 562
Hawaii		21, 248	47, 700	34, 557	314, 260	45, 681	76, 066	436, 007
Puerto Rico								
Total	96, 417	5, 038, 761	8, 556, 526	18, 992, 731	117, 623, 332	16, 142, 638	20, 267, 666	186, 718, 071

Details concerning the status of the various funds by States and by classes of highways are shown in tables 6 to 9. The mileages of highway according to status, by States, and by class of highways are shown in tables 10, 11, and 12. Similar information for grade-crossing work is shown in table 13. Tables 14, 15, and 16 show the mileage by types in the different stages leading up to completion. The tables are so arranged that each shows all funds or all mileage in a given status.

PUBLIC WORKS AND WORKS PROGRAM HIGHWAY CONSTRUCTION

These emergency programs to provide employment have been financed with authorizations totaling \$800,000,000 made in the calendar years 1933-35. The highway work with these funds was very nearly completed in preceding fiscal years. The accomplishment of the past year is, therefore, small.

In the combined emergency programs, and including the length of road surfaces improved in the emergency program of grade-crossing elimination, 564 miles were improved. This mileage included 117 miles in the Public Works program, 358 miles in the Works Program, and 89 miles of surface in connection with Works Program grade-crossing eliminations. Details concerning this work will be found in tables 6 to 12.

PROGRESS IN FEDERAL-AID ROAD CONSTRUCTION

Improvement of the Federal-aid system was carried on with funds remaining from the previous fiscal year and under an authorization of \$125,000,000 for 1939 provided by the act of June 16, 1936. The apportionment of this fund was shown in the last annual report.

During the year 10,057 miles of highway financed with \$128,220,989 of Federal-aid funds were brought to completion. These projects involved \$121,629,657 of State funds. Payments to the States for completed work, including work done on projects still under construction, amounted to \$117,719,749.

At the close of the year projects under contract and in large part under construction included 7,295 miles of highway at an estimated cost of \$227,324,289 to be provided as follows: \$113,121,919 Federal-aid and \$114,202,370 from State funds. At the same time projects had been approved, but not yet contracted for, covering 2,110 miles, and involving \$23,819,863 of Federal-aid funds and \$24,615,523 of State funds.

On June 30, 1939, there remained available for new projects \$133,629,011 of Federal-aid funds. In greater part they were funds provided for 1940. Tables 6 to 12 show the status of the work by States.

PROGRESS IN CONSTRUCTION OF SECONDARY ROADS WITH FEDERAL AID

Improvement of secondary roads as a part of the regular Federal-aid was begun in the preceding fiscal year with an authorization of \$25,000,000 and an equal amount was made available for the past fiscal year. It is required that these funds be matched with State funds according to the usual Federal-aid plan.

In a number of States this work has not been prosecuted at the rate permitted by Federal funds. Where State funds have been insufficient to permit expenditures on secondary roads or where authority for such expenditures has been lacking, local authorities have been asked to raise required amounts and place them under State control.

Lack of State funds with which to match Federal-aid for secondary roads is still retarding this work, but there was a considerable gain in momentum during the past year when 2,717 miles were completed. At the end of the year 2,315 miles were under contract and 555 miles were approved but not under contract. The mileage completed cost \$28,755,838, the Federal Government contributing \$14,268,844 of this amount. The mileage under contract is to cost \$31,693,820 of which \$15,721,517 is to be Federal-aid. The projects approved but not under contract are estimated to cost \$6,607,416 and \$3,110,405 has been assigned as Federal-aid. Tables 6 to 12 show the status of the work.

The cost of secondary roads in this program has varied greatly, being particularly influenced by local conditions and by availability of suitable materials.

PROGRAM OF GRADE-CROSSING ELIMINATION AND PROTECTION

The accomplishment of the year in eliminating 382 railroad-highway crossings, reconstructing 86 obsolete separation structures, and in protecting 438 crossings by signals or other safety devices is an

important contribution to highway safety and will save much delay and inconvenience to public travel. A portion of the work done was in the emergency program of grade-crossing elimination financed by \$200,000,000 authorized by the Emergency Relief Appropriation Act of 1935. In this program 173 crossings were eliminated, 38 elimination structures were reconstructed, and 154 crossings were protected. Costs were met almost entirely with Federal funds which amounted to \$23,557,056. The fact that more than half of the expenditure was in municipalities reflects the relatively greater dangers and delays at city and suburban crossings.

In the regular Federal-aid program of grade-crossing elimination initiated in the preceding year, and for which \$50,000,000 was authorized for each of the fiscal years 1938 and 1939, 191 crossings were eliminated, 48 existing structures were reconstructed, and 258 crossings were protected. Federal funds involved in this work amounted to \$15,630,604.

Since the Public Works program started in 1933, 2,938 crossings have been eliminated and 434 obsolete elimination structures have been reconstructed. The most dangerous and, therefore, the most important grade crossings are rapidly being done away with in every State. The substantial program of railroad-highway grade-crossing elimination is considered one of the most advanced and productive undertakings of the present period of highway development.

At the end of the year work under contract consisted of 453 crossing eliminations, 75 elimination structures being reconstructed, and 947 crossings being protected. Table 13 shows details of the work by States and also the number of projects approved but not under contract at the end of the year.

SUMMARY

The year's work with the funds apportioned to all States resulted in the completion of 13,482 miles of highway and the elimination of 382 railroad-highway grade crossings, the reconstruction of 86 grade-separation structures, and the protection of 438 crossings at a cost of \$196,566,311 in Federal funds and \$139,524,945 in State funds. The types of highway completed are shown in table 14.

The completed work was divided as follows: 9,786 miles on the Federal-aid system outside of municipalities, 586 miles of extensions of the system into and through municipalities, 139 miles of secondary roads in municipalities, and 2,971 miles of secondary roads outside of municipalities. Federal funds involved in the respective classes of work were \$135,452,188, \$27,187,758, \$10,470,759, and \$23,455,606.

The roads under contract at the end of the year totaled 10,012 miles and involved \$183,723,534 of Federal funds, and there were 2,718 miles approved but not yet contracted for, involving \$34,465,125 of Federal funds. Unobligated balances available for new work totaled \$228,180,129, in large part newly apportioned funds for the fiscal year 1940. Tables 15 and 16, respectively, show the types of road under contract and the types approved but not yet under contract.

TABLE 6.—Funds allotted to projects completed during the fiscal year 1939
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Alabama		\$40,663		\$3,058,669	\$1,980	\$3,101,312	\$6,734,706
Arizona				1,793,274	30,741	1,824,015	2,537,073
Arkansas	\$14,970	87,538	\$258,602	1,726,501	326,925	2,614,536	2,635,258
California	22,501			5,159,590	945,053	6,127,144	10,539,193
Colorado		638,349	39,474	1,837,715	25,787	2,541,325	4,140,597
Connecticut	1,970		103,770	490,316		586,056	1,080,039
Delaware		9,640	279,052	353,975	4,129	646,796	1,010,709
Florida	39,920	38,957	49,918	1,697,762	10,616	1,837,173	3,623,915
Georgia	158,952	215,251	531,768	2,432,310	28,650	3,366,931	6,060,099
Idaho		1,401		1,230,138	222,100	1,453,639	2,493,450
Illinois		5,000	235,000	5,232,520	241,780	5,714,300	11,036,393
Indiana	80,035	49,000	122,950	2,953,345	494,759	3,700,089	7,411,917
Iowa		6,468		3,719,722	370,804	4,096,944	8,223,646
Kansas		74,925	78,694	2,885,123	471,985	3,510,727	6,458,830
Kentucky	10,597	6,388	97,078	2,678,600	11,790	2,804,453	5,555,538
Louisiana	44,459	43,356	199,500	712,915	91,980	1,092,210	1,827,364
Maine		25,152	87,529	1,479,791	5,287	1,597,759	3,142,302
Maryland	81,446	135,182	29,553	609,522		855,763	1,472,725
Massachusetts		436,840	7,250	969,267		1,413,357	2,821,595
Michigan		94,521	169,432	2,919,388	479,602	3,662,943	7,008,201
Minnesota				2,057,036	4,562	2,061,598	4,243,772
Mississippi	44,210		296,500	2,510,414	210,500	3,061,624	6,370,430
Missouri	30,000	121,709	92,132	2,916,184	163,111	3,323,136	6,483,152
Montana	7,599	34,485	108,864	1,280,832	253,298	1,685,078	2,694,027
Nebraska			33,080	2,218,126	172,676	2,423,882	4,948,012
Nevada				1,914,681	234,082	2,148,763	2,490,725
New Hampshire		14,178	13,542	623,256	65,175	716,151	1,360,425
New Jersey			146,511	1,113,177	75,000	1,334,688	2,513,082
New Mexico				1,777,097	99,112	1,876,209	2,857,913
New York	184,899	25,863	39,974	7,010,853	855,000	7,946,589	15,648,866
North Carolina		6,240	123,129	3,433,127	124,340	3,686,836	7,496,558
North Dakota	82,735	43,009	48,112	3,246,402	23,687	3,443,945	3,731,666
Ohio			1,570,560	4,027,118		5,597,678	9,774,124
Oklahoma		86,066	165,922	3,488,618	34,223	3,774,829	7,054,594
Oregon				1,828,245	31,372	1,859,617	3,186,627
Pennsylvania		32,458	930,415	3,977,963	122,537	5,063,673	9,223,967
Rhode Island				488,260		488,260	994,913
South Carolina	99,550		147,691	2,187,400	43,715	2,478,386	5,238,888
South Dakota	86,850	66,749	106,924	1,298,389	91,069	1,649,981	2,682,968
Tennessee		41,923	58,560	3,144,246	14,381	3,259,110	6,462,605
Texas	1,910			8,459,084	609,529	9,100,523	17,851,228
Utah		31,007	18,461	1,008,555	105,463	1,163,486	1,642,378
Vermont				581,795	149,106	730,901	1,430,170
Virginia		36,032	1,256	3,959,632	212,106	3,909,026	7,593,412
Washington		20,432	66,900	2,453,940	103,983	2,645,255	4,919,827
West Virginia	23,168		237,707	1,318,324	93,060	1,672,259	2,377,402
Wisconsin	17,037		81,210	2,060,460	200,987	2,505,694	4,769,893
Wyoming	26,356	20,859		1,790,240	145,205	1,982,660	3,141,521
Hawaii		50,888	169,698	637,043	45,630	906,259	1,560,504
Puerto Rico				347,080	61,550	408,630	765,266
Total	1,059,194	2,540,529	6,746,718	116,964,020	8,141,727	135,452,188	247,232,469

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama			\$124,293	\$154,001	\$25,400	\$303,694	\$470,652
Arizona			6,645	6,645		6,645	10,558
Arkansas	\$500		14,023	66,182	47,685	128,390	131,037
California				836,607	203,970	1,040,577	1,752,543
Colorado		\$7,015		99,005		106,020	189,050
Connecticut			295,180	101,905		397,085	512,440
Delaware				12,855		12,855	25,837
Florida			19,820	50,000		69,820	119,820
Georgia	196,781	529,445	49,310	268,650		1,044,186	1,349,776
Idaho			1,053	20,552	27,044	48,649	63,305
Illinois	449,485		1,020,300	1,253,188	266,800	2,989,773	4,387,196
Indiana	55,526			123,344		178,870	311,027
Iowa		27,513	78,500	296,409	632,993	1,035,415	1,392,710
Kansas	20,885	155,944	1,160,375	132,204	117,580	1,586,988	1,736,366
Kentucky	74,808	172,661	417,814	188,671	153,898	1,007,852	1,203,377
Louisiana			120,820	38,073		158,893	199,886
Maine	8,645			39,000		47,645	90,083
Maryland	98,801		2,120			100,921	121,143

TABLE 6.—Funds allotted to projects completed during the fiscal year 1939—Contd.

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal Funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Massachusetts		\$4,000		\$338,298	\$19,795	\$362,093	\$700,514
Michigan		43,400	\$35,000	1,029,852	184,488	1,292,740	2,537,841
Minnesota	\$170,471	407,520	407,520	423,157	6,250	1,007,398	1,504,377
Mississippi	54,350	73,950	104,847	368,610	146,100	747,857	1,132,027
Missouri		347,910	8,380	109,943	155,240	621,473	737,857
Montana	40,949	60,900		14,258	107,474	223,581	234,677
Nebraska		199,607	72,668	56,771		329,046	392,765
Nevada			3,525			3,525	3,661
New Hampshire				24,682		24,682	49,957
New Jersey	83,092			367,995		451,087	\$28,568
New Mexico	4,897	11,237	2,790	42,248		61,172	\$8,240
New York	70,500	22,147	263,750	713,776		1,070,173	1,930,552
North Carolina	7,036	15,352		280,247	84,840	387,475	680,219
North Dakota	234,103	294,991		87,739	337,300	954,133	963,152
Ohio		395,780	1,151,422	622,881		2,170,083	2,504,734
Oklahoma	21,970		6,173	74,037	29,450	131,630	213,811
Oregon	22,750			181,900	563,493	768,143	884,536
Pennsylvania	20,802	587,301	1,076,115	381,482		2,065,700	2,644,886
Rhode Island				193,590		193,590	387,180
South Carolina	10,450	141,878	68,649	216,678	25,780	463,435	775,466
South Dakota	12,067	104,326	62,038	21,397	13,723	273,551	290,862
Tennessee				298,667	32,270	330,937	635,172
Texas	39,431	46,000	2,571	660,305	442	748,749	1,452,416
Utah				249,863	1,685	251,548	369,078
Vermont				28,618		28,618	61,850
Virginia	13,179	9,800	568,954	105,067	147,790	\$44,790	951,751
Washington				85,023		85,023	164,681
West Virginia	680		212,500	141,690	94,021	448,891	510,246
Wisconsin		4,000	37,363	433,799		475,162	922,400
Wyoming	14,101		75,989	17,105		107,195	122,790
Total	1,726,259	3,315,157	7,463,862	11,256,969	3,425,511	27,187,758	39,063,081

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama				\$3,550	\$35,254	\$38,804	\$42,354
Arkansas			\$4,656	9,255	41,207	55,118	55,200
California		\$21,938			212,760	234,698	234,698
Colorado			332,090	29,466	5,775	367,331	391,144
Connecticut				5,780		5,780	11,560
Delaware					2,000	2,000	2,000
Florida			42,097		6,800	48,897	49,212
Georgia		264,445	451,556	15,359		731,360	776,871
Idaho				3,310		3,310	7,778
Illinois		5,600	48,189	73,945	25,060	153,294	229,355
Indiana				2,492		2,492	5,500
Iowa					3,000	3,000	3,023
Kansas				22,040	2,898	24,938	46,987
Kentucky		33,386	153,396	413	57,800	244,995	249,721
Louisiana			367,720			367,720	367,736
Maine				17,200		17,200	37,085
Maryland			77,238			77,238	77,238
Massachusetts				3,830	54,710	58,540	62,370
Michigan					226,082	226,082	237,677
Minnesota				18,093	33,770	51,863	70,588
Mississippi		34,100	22,200			56,300	56,300
Missouri			552,038	2,573		554,611	557,486
Montana			131,000			131,000	140,389
Nebraska		7,919	89,007	20,234		117,160	143,674
Nevada				181	5,876	6,057	6,116
New Hampshire					4,590	4,590	4,590
New Jersey			214,981		108,715	323,696	323,696
New Mexico					106,222	106,222	106,222
New York		37,988	1,095,900	8,980	111,663	1,254,531	1,264,493
North Carolina		38,982	134,600	44,358	55,720	273,660	318,840

TABLE 6.—Funds allotted to projects completed during the fiscal year 1939—Contd.

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
North Dakota		\$12,314	\$364,000	\$3,147	\$184,700	\$564,161	\$567,209
Ohio		134,509	744,043			878,552	1,035,638
Oklahoma		55,767	144,700	6,794		207,261	221,376
Oregon				1,071		1,071	2,059
Pennsylvania		210,875	285,377	9,030		505,282	566,850
South Carolina		79,922	145,628	4,900	40,826	271,276	286,238
South Dakota			790			790	790
Tennessee		171,578	485,386			656,964	696,492
Texas		60,474	2,638	65,903	381,936	510,951	600,095
Utah				42,736		42,736	80,259
Vermont				14,650	3,470	18,120	36,650
Virginia			4,348	10,518	77,882	92,748	148,160
Washington				24,153	248,099	272,252	294,850
West Virginia			406,400		58,900	465,300	465,300
Wisconsin			336,552	65,336		401,888	480,933
Wyoming				3,675	5,030	8,705	11,071
District of Columbia					30,215	30,215	30,215
Total		1,169,797	6,636,530	532,872	2,131,560	10,470,759	11,404,138

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

Alabama		\$141,414	\$106,600	\$136,162	\$215,657	\$599,833	\$741,526
Arizona				329,737		329,737	506,576
Arkansas				92,562		92,562	99,232
California				1,065,263		1,065,263	1,918,647
Colorado		36,275		577,081	58,186	671,542	1,202,142
Connecticut			254,140	47,435		301,575	349,450
Delaware				11,365	59,760	71,125	82,069
Florida			59,610	10,061		69,671	79,732
Georgia	\$313,843	687,693	151,242	237,161		1,389,939	1,719,634
Idaho			59,956	218,831		278,787	552,249
Illinois	96,629	188,117	135,900	904,085	29,040	1,353,671	2,328,756
Indiana			16,300	315,575	131,459	468,334	909,916
Iowa					4,288	4,288	4,294
Kansas		16,956		103,582	4,070	124,608	228,279
Kentucky		44,323	17,858	243,458	26,200	331,839	893,592
Louisiana	153,236			107,635		260,871	397,702
Maine		12,132		188,794	48,960	249,886	447,952
Maryland	167,634	130,577	277,863			576,254	581,995
Massachusetts		521,293	521,380	59,225		1,101,598	1,683,294
Michigan		185,000		251,635	25,625	462,260	722,958
Minnesota	63,801			108,607	5,749	178,157	306,075
Missouri				248,397		248,397	513,359
Montana	35,985	44,144		7,865		87,964	96,497
Nebraska		50,994		272,092		323,086	629,976
Nevada			4,350	345,209	5,220	354,779	436,766
New Hampshire	20,244	97,965		102,285		220,494	327,953
New Jersey			246,680	79,020		325,700	418,500
New Mexico				521,681	59,315	580,996	916,764
New York	16,000	75,868	52,700	1,152,501	345,880	1,642,939	2,875,269
North Carolina		81,900	96,589	539,259	154,960	672,708	1,013,410
North Dakota	23,112	72,544		53,468		149,124	198,090
Ohio		48,731	378,930	73,767		501,428	611,016
Oklahoma	200,092	16,500		198,265		414,857	624,713
Oregon	35,000			272,929		307,929	512,823
Pennsylvania	12,000	320,245	218,128	891,307	75,086	1,516,766	2,053,534
Rhode Island				81,173		81,173	166,074
South Carolina	43,620	218,845		287,952		550,417	940,113
South Dakota	4,032	11,370	27,780	6,250	33,524	82,956	88,711
Tennessee	5,295	163,476	6,982	185,123	7,770	368,646	617,486
Texas	184,531	53,104	15,390	1,666,733	46,706	1,966,464	3,913,109
Utah	31,990			344,282	1,760	378,032	733,936
Vermont				91,551	78,038	169,589	283,710
Virginia	54,049	180,679		478,344	73,074	786,146	1,356,399
Washington			43,356	272,973	436,722	753,051	1,013,009
West Virginia	189,571			119,483		309,054	435,670
Wisconsin	13,003		18,212	260,953		292,168	572,312
Wyoming				250,890	4,757	265,647	415,474
Hawaii	14,000					14,000	14,000
Puerto Rico				123,966		123,966	250,901
Total	1,677,567	3,400,315	2,709,946	13,735,972	1,931,806	23,465,606	38,391,568

TABLE 6.—Funds allotted to projects completed during the fiscal year 1939—Contd.

TOTAL

State	Public Works, 1934-35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings		
Alabama		\$182,077	\$230,893	\$3,212,670	\$139,712	\$278,291	\$4,043,643	\$7,989,238
Arizona				1,799,919	329,737	30,741	2,160,397	3,054,207
Arkansas	\$15,470	87,538	277,281	1,792,683	101,817	615,817	2,890,606	2,920,727
California	22,500	21,938		5,996,198	1,065,263	1,361,783	8,467,682	14,445,081
Colorado		681,639	371,561	1,936,720	606,547	89,748	3,686,218	5,922,942
Connecticut	1,970		653,090	582,221	53,215		1,290,496	1,953,459
Delaware		9,640	279,052	366,830	11,365	65,889	732,776	1,121,515
Florida	39,920	38,957	171,445	1,747,762	10,061	17,416	2,025,561	3,872,682
Georgia	669,575	1,696,834	1,183,876	2,700,961	252,520	28,650	6,532,416	9,906,380
Idaho		1,401	61,009	1,250,690	222,141	249,144	1,784,385	3,026,782
Illinois	546,014	198,717	1,439,389	6,485,708	977,930	563,280	10,211,038	17,981,730
Indiana	135,561	49,000	139,250	3,076,689	318,067	626,218	4,344,785	6,638,360
Iowa		33,981	78,500	4,016,131		1,011,085	5,139,697	9,623,673
Kansas	20,885	247,825	1,239,069	3,017,327	125,622	596,533	5,247,261	8,707,462
Kentucky	85,405	256,758	686,146	2,867,271	243,871	249,688	5,389,139	7,902,228
Louisiana	197,695	43,356	688,040	750,988	107,635	91,980	1,879,694	2,762,688
Maine	8,645	37,284	87,528	1,518,792	205,994	54,247	1,912,490	3,717,422
Maryland	347,881	265,939	386,774	609,522			1,610,116	2,255,101
Massachusetts		962,133	528,630	1,307,565	63,055	74,505	2,935,888	5,267,773
Michigan		322,920	204,432	3,949,240	251,636	915,797	5,444,025	10,566,677
Minnesota	234,272		407,520	2,480,193	126,700	30,331	3,299,016	6,144,812
Mississippi	98,590	108,050	423,548	2,879,023		356,600	3,865,781	7,558,757
Missouri	30,000	469,619	652,550	3,026,127	250,970	318,351	4,127,617	7,996,554
Montana	84,533	139,529	239,864	1,295,060	7,865	366,772	2,127,653	3,165,590
Nebraska		258,521	194,755	2,274,896	292,326	172,676	3,193,174	6,114,427
Nevada			7,875	1,914,681	345,390	245,178	2,513,124	2,937,268
New Hampshire	20,244	112,142	13,542	1,647,939	102,285	69,765	2,965,917	1,742,925
New Jersey	83,092		608,172	1,481,172	79,020	183,715	2,435,171	4,083,846
New Mexico	4,897	11,237	2,790	1,819,345	521,681	264,649	2,624,599	3,969,139
New York	271,400	161,855	1,452,324	7,724,629	1,161,481	1,142,543	11,914,232	21,719,180
North Carolina	7,037	142,474	354,318	3,713,373	383,616	419,861	5,020,679	9,509,027
North Dakota	339,950	422,858	412,112	3,334,141	56,615	545,687	5,101,363	5,460,117
Ohio		579,021	3,844,955	4,649,998	73,767		9,147,741	14,226,312
Oklahoma	222,062	158,333	316,795	3,562,656	205,059	63,672	4,528,577	8,114,494
Oregon	57,750			2,010,145	274,000	594,865	2,936,760	4,586,046
Pennsylvania	32,803	1,150,879	2,510,035	4,359,440	900,337	197,923	9,151,421	15,089,237
Rhode Island			681,850	881,850	81,173		763,023	1,548,167
South Carolina	153,650	440,615	361,968	2,404,078	292,852	110,321	3,763,514	7,240,755
South Dakota	102,949	242,445	197,532	1,319,786	6,250	138,316	2,007,278	3,063,331
Tennessee	5,295	376,977	550,928	3,442,913	185,123	54,421	4,615,657	8,411,755
Texas	225,871	159,579	20,598	9,149,390	1,732,636	1,038,613	12,326,687	23,816,848
Utah	31,996	31,007	18,461	1,258,418	387,018	108,908	1,835,862	2,825,645
Vermont			610,413	610,413	106,201	230,614	947,228	1,812,380
Virginia	67,228	226,511	574,558	3,764,699	488,862	510,852	5,632,710	10,049,722
Washington		20,432	110,256	2,538,963	297,126	788,804	3,755,581	6,392,367
West Virginia	213,419		856,008	1,460,013	119,483	245,981	2,895,604	3,788,618
Wisconsin	30,040	4,000	473,337	2,640,259	326,289	200,987	3,674,912	6,745,538
Wyoming	40,457	20,859	75,989	1,807,345	254,565	154,992	2,354,207	3,690,856
Hawaii	14,000	50,888	169,698	637,043		48,630	920,259	1,574,504
District of Columbia								
Puerto Rico				347,080	123,966	61,550	532,596	1,016,167
Total	4,463,020	10,425,798	23,557,056	128,220,989	14,268,844	15,630,604	196,566,311	336,091,256

TABLE 7.—Funds allotted to projects under contract on June 30, 1939
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Alabama	\$17,000	\$62,200	\$60,519	\$3,991,589	\$129,324	\$4,260,632	\$8,260,658
Arizona	-----	38,548	18,841	1,075,692	198,841	1,331,922	1,769,619
Arkansas	9,200	-----	-----	3,159,209	254,401	3,422,910	3,426,338
California	-----	116,218	120,706	2,871,216	576,244	3,684,384	6,075,928
Colorado	-----	-----	7,316	2,058,442	86,904	2,152,662	3,793,340
Connecticut	20,709	21,280	25,684	691,803	12,665	772,141	1,477,819
Delaware	-----	-----	-----	313,152	-----	313,152	631,561
Florida	-----	-----	-----	882,400	10,394	892,854	1,775,314
Georgia	88,747	79,834	422,459	2,968,156	322,630	3,881,826	6,849,984
Idaho	31,162	51,038	25,117	856,729	265,461	1,232,507	1,825,939
Illinois	-----	135,310	206,666	4,412,366	1,243,535	5,997,677	10,492,166
Indiana	-----	2,000	-----	2,995,344	446,250	3,443,594	6,542,276
Iowa	-----	77,425	168,000	2,129,534	143,300	2,518,259	5,217,219
Kansas	-----	-----	-----	1,827,785	378,006	2,205,791	4,033,577
Kentucky	-----	55,894	55,086	2,094,468	478,389	2,683,837	4,781,115
Louisiana	-----	-----	72,000	2,871,641	579,903	3,523,544	12,218,715
Maine	6,550	-----	-----	748,521	209,136	964,207	1,712,730
Maryland	50,000	175,161	409,299	1,403,536	78,188	2,116,184	3,526,748
Massachusetts	-----	63,160	63,160	1,152,723	415,147	1,631,039	2,790,286
Michigan	-----	32,649	94,491	2,111,637	608,526	2,847,303	4,987,544
Minnesota	19,289	79,000	199,417	3,188,364	230,594	3,706,664	6,959,262
Mississippi	37,880	24,650	50,222	2,786,688	260,261	3,159,701	8,081,705
Missouri	-----	-----	-----	2,623,432	238,440	2,861,872	5,532,557
Montana	-----	-----	-----	2,067,599	470,466	2,538,065	4,125,037
Nebraska	-----	89,811	122,478	2,672,206	244,253	3,128,748	5,762,967
Nevada	6,682	33,646	30,169	825,234	174,634	1,070,365	1,199,728
New Hampshire	-----	-----	-----	365,967	36,553	600,520	1,180,317
New Jersey	-----	46,947	40,000	1,178,181	29,554	1,294,682	2,474,763
New Mexico	-----	43,071	25,879	1,293,269	18,137	1,380,356	2,196,271
New York	98,100	512,925	45,016	5,361,905	973,289	6,991,226	12,680,606
North Carolina	8,895	63,733	130,699	3,134,247	351,600	3,689,174	6,826,041
North Dakota	2,640	-----	63,600	1,344,581	371,180	572,001	688,520
Ohio	117,975	115,063	126,598	4,752,372	410,400	5,522,408	10,386,826
Oklahoma	11,146	-----	107,500	969,127	112,825	1,200,898	2,100,551
Oregon	15,000	15,580	55,829	1,667,819	39,002	1,823,230	2,920,237
Pennsylvania	126,988	173,842	172,254	4,801,031	276,656	5,550,771	10,632,840
Rhode Island	-----	6,781	-----	459,516	274,191	740,488	1,200,981
South Carolina	-----	40,530	226,341	1,262,486	97,502	1,626,859	3,215,343
South Dakota	-----	-----	16,140	2,000,050	170,160	2,686,350	4,663,869
Tennessee	-----	-----	-----	1,787,808	17,489	1,805,297	3,593,103
Texas	171,264	179,840	163,700	6,203,663	965,732	7,684,199	14,115,905
Utah	-----	-----	-----	1,239,077	61,898	1,300,975	1,790,166
Vermont	-----	13,865	10,900	418,693	12,476	455,934	910,498
Virginia	-----	54,790	55,358	1,509,037	427,301	2,046,486	3,559,652
Washington	25,000	46,591	46,426	1,491,358	276,016	1,888,391	3,375,503
West Virginia	-----	33,471	40,169	828,854	154,824	1,057,318	1,893,123
Wisconsin	40,860	72,000	83,266	3,358,926	426,217	3,981,269	7,501,154
Wyoming	-----	33,287	20,412	959,855	112,830	1,117,384	1,780,754
Hawaii	30,788	-----	-----	284,670	181,790	497,208	797,900
Puerto Rico	-----	-----	-----	871,930	392,150	1,264,080	2,149,531
Total	939,175	2,550,199	3,588,498	401,805,548	14,235,655	123,119,375	226,484,886

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama	\$343,800	-----	-----	\$370,035	\$81,800	\$795,635	\$1,209,375
Arkansas	300	-----	-----	129,590	4,641	134,531	134,998
California	-----	-----	\$141,721	248,050	109,797	499,568	700,889
Colorado	-----	-----	-----	163,250	218,211	381,461	515,250
Delaware	-----	-----	-----	34,738	2,320	37,058	76,700
Florida	-----	-----	-----	372,500	197,900	570,400	942,900
Georgia	-----	-----	-----	434,047	21,500	905,942	1,439,988
Idaho	167,085	\$87,900	195,350	371,045	15,074	386,119	631,138
Illinois	31,335	-----	63,000	540,565	1,182,450	1,817,350	2,432,580
Indiana	17,500	79,491	-----	229,830	24,708	351,529	582,978
Iowa	-----	-----	927,675	220,400	321,200	1,478,275	1,836,238
Kansas	-----	-----	-----	38,567	239,332	302,184	365,164
Kentucky	-----	24,288	-----	188,053	43,445	226,498	457,501
Louisiana	-----	-----	225,000	275,420	162,145	662,565	987,653
Maine	-----	-----	-----	7,960	197,520	205,480	213,440
Maryland	-----	-----	-----	215,255	-----	400,018	634,024
Massachusetts	30,570	154,193	-----	518,970	104,220	627,570	1,146,650
Michigan	4,380	-----	-----	535,235	211,050	746,285	1,281,520
Minnesota	25,950	-----	61,545	592,440	282,973	962,908	1,596,596

TABLE 7.—Funds allotted to projects under contract on June 30, 1939—Continued
ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Mississippi		\$9,100	\$122,746	\$89,710	\$343,354	\$564,910	\$782,120
Missouri		274,561		145,236	898,000	1,317,797	1,514,303
Montana				59,236	150,614	209,850	255,614
Nebraska		4,088	6,760	84,978	323,791	419,617	504,595
Nevada				47,501	5,267	52,768	60,415
New Hampshire				29,328		29,328	51,429
New Jersey				584,302	121,112	705,414	1,290,916
New Mexico				1,524		1,524	2,444
New York	\$77,500			327,932	328,674	734,106	1,066,389
North Carolina	33,335		77,330	176,649	853,605	1,140,911	1,361,231
North Dakota	35,130			7,025	242,340	284,455	338,952
Ohio			442,784	346,354	245,200	1,034,338	1,433,720
Oklahoma	512			77,347	82,230	160,089	225,642
Oregon				161,984	125,632	287,616	400,669
Pennsylvania	78,673			709,051	662,254	1,449,978	2,254,961
Rhode Island				108,933	164,600	273,535	382,844
South Carolina	14,021		40,900	15,000	343,170	413,181	431,581
South Dakota	4,180			32,240	30,230	79,500	105,730
Tennessee				247,887	268,220	522,077	769,944
Texas			279,990	2,879,950	947,350	1,526,135	2,213,815
Utah				396,730	22,630	419,360	737,970
Vermont					6,850	6,850	6,850
Virginia	11,600			54,305	6,500	72,414	144,019
Washington	11,596			131,500	2,424	144,520	265,379
West Virginia	160,141			133,827		299,968	401,595
Wisconsin				1,420,554	367,968	1,788,522	3,304,455
Wyoming				22,140	2,500	24,640	38,340
Hawaii				111,070		111,060	224,740
Total	1,047,609	633,681	2,603,691	11,316,071	9,964,770	25,568,822	37,771,274

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

Alabama		\$15,000	\$28,250	\$948,700	\$991,950	\$1,052,613	
Arizona		3,427		245,000	248,427	271,898	
Arkansas			17,720		17,720	18,152	
California		1,430		576,712	578,142	578,192	
Colorado			1,790	250,805	252,595	254,025	
Delaware			450	5,600	6,050	6,500	
Florida		39,310	14,000	219,800	273,110	287,110	
Georgia	\$15,670	330,400	18,020	43,240	407,330	425,350	
Illinois	25,878	87,000	18,850	206,390	338,118	398,090	
Indiana			75	95,777	95,852	95,927	
Iowa			180	130,300	130,480	139,973	
Kansas			374	335,848	336,222	336,596	
Kentucky			27,000		27,000	157,960	
Maryland		180,000		375	180,375	180,750	
Michigan			38,630	43,900	82,530	126,160	
Minnesota		69,755	95,988	565,417	731,160	830,962	
Mississippi		3,100			3,100	3,100	
Missouri			6,051		6,051	12,102	
Montana				276,614	276,614	276,614	
Nebraska			14,793	444,667	459,460	474,253	
Nevada				16,950	16,950	16,950	
New Jersey	39,615			7,140	46,755	47,009	
New York				210,458	210,458	211,258	
North Carolina		651,430	20,355	40,640	712,425	732,780	
North Dakota				75,960	75,960	75,960	
Ohio		1,274,991	11,659	190,310	1,476,960	1,747,450	
Oklahoma				36,855	36,855	36,855	
Oregon			9,656	135,740	145,396	151,830	
Pennsylvania			11,088	822,685	833,773	1,051,853	
South Carolina	4,594	64,455	13,000	173,816	255,865	279,915	
South Dakota		44,840		64,070	108,910	108,910	
Tennessee			5,131	373,010	378,141	383,272	
Texas	5,900		34,972	290,790	331,662	374,150	
Utah	36,250		8,923	195,840	241,013	293,095	
Vermont				6,440	6,440	6,440	
Virginia	123,987			100,000	223,987	312,987	
Washington			8,640	4,749	13,389	21,689	
Wisconsin			26,248	365,405	391,653	418,234	
Wyoming			7,590	17,790	25,380	29,750	
Total		431,894	2,585,138	439,808	7,517,418	10,974,258	12,226,714

TABLE 7.—Funds allotted to projects under contract on June 30, 1939—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Secondary or feeder	Grade crossings		
Alabama				\$412,500	\$83,300	\$495,800	\$1,089,925
Arizona	\$19,573	\$185	\$2,156	173,408		195,322	285,881
Arkansas				536,310	2,542	538,852	541,937
California	71,027		4,316	542,288	507,797	1,125,428	1,639,546
Colorado		640,020		326,076		966,096	1,298,120
Connecticut				72,417		72,417	172,794
Delaware				39,970	3,550	43,520	83,490
Florida				476,300	3,800	480,100	965,833
Georgia	117,640	541,591	229,750	214,412	75,970	1,179,363	1,393,776
Idaho				140,187		140,187	246,595
Illinois	48,000			766,466	210,620	1,025,086	1,956,552
Indiana				470,510	296,623	767,133	1,237,643
Iowa				21,835	100,406	122,241	175,385
Kansas				27,323	2,060	29,383	56,706
Kentucky		6,652		376,945	93,524	477,121	1,379,562
Louisiana		97,070		319,970		417,040	832,332
Maine		6,691		122,395	67,020	196,106	327,670
Maryland	127,881	170,000	211,700	110,612	42,200	662,393	799,470
Massachusetts				195,689		195,689	394,184
Michigan				612,422		612,422	1,224,844
Minnesota	157,460			309,330	100,851	567,641	901,125
Mississippi	120,000		5,600	348,881		474,841	823,462
Missouri				460,127	73,200	533,327	1,043,554
Montana				426,663		426,663	752,356
Nebraska				347,984	35,065	383,049	748,945
Nevada	15,297			104,184	2,035	121,516	137,501
New Hampshire				29,708	63,906	93,614	124,712
New Jersey	163,331			183,135	335,735	682,201	870,526
New Mexico				271,508	59,805	331,313	509,829
New York		54,000		949,450	488,700	1,492,150	2,442,700
North Carolina	30,383		143,330	622,200	130,940	926,853	1,558,397
North Dakota				61,606	14,170	75,776	129,200
Ohio		141,049		351,052	56,210	548,311	998,763
Oklahoma				44,156	70,770	114,926	153,756
Oregon	31,467		20,000	414,091		465,558	772,755
Pennsylvania	20,701	2,500		1,031,893	9,000	1,064,094	2,131,550
Rhode Island				49,644		49,644	99,335
South Carolina	36,400	63,114		226,069	83,078	408,661	763,779
South Dakota	5,391	30,037	218,790		75,600	329,818	388,430
Tennessee			207,490	299,358	6,050	512,898	922,716
Texas		102,649	2,950	1,013,305	621,860	1,740,794	2,848,637
Utah				97,941	95,610	193,551	276,990
Vermont				65,653	4,450	70,133	138,086
Virginia		31,800	40,100	257,071	89,320	418,291	690,354
Washington	10,000			356,356	19,261	385,617	706,911
West Virginia		65,400	100,923	76,648	202,657	445,628	538,036
Wisconsin			97,584	468,877	436,177	1,002,638	1,488,112
Wyoming				257,779	6,480	264,259	422,602
Hawaii				85,040		85,040	170,080
Puerto Rico				113,965		113,965	233,693
Total	974,551	1,952,758	1,284,689	15,281,709	4,570,372	24,064,079	39,895,137

TOTAL

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost	
		Highways	Grade crossings	Highways	Secondary or feeder			Grade crossings
Alabama	\$360,800	\$62,200	\$75,519	\$4,361,624	\$440,750	\$1,243,124	\$6,544,017	\$11,612,571
Arizona	19,573	38,733	24,424	1,075,692	173,408	443,841	1,775,671	2,327,398
Arkansas	9,500			3,288,899	554,030	261,584	4,114,013	4,121,425
California	71,027	116,218	268,173	3,119,267	542,287	1,770,550	5,887,622	8,994,555
Colorado		640,020	7,316	2,221,693	327,866	555,919	3,752,814	5,860,735
Connecticut		21,280	25,684	691,803	72,417	12,065	844,558	1,650,613
Delaware	20,709			347,890	40,420	11,470	399,780	798,251
Florida			39,310	1,254,960	490,300	431,894	2,216,464	3,971,157
Georgia	373,472	725,054	1,177,959	3,402,203	232,433	463,340	6,374,461	10,109,098
Idaho	34,162	51,038	25,117	1,227,774	140,187	280,535	1,758,813	2,703,672
Illinois	79,335	161,189	356,666	4,952,730	785,316	2,842,995	9,178,231	15,279,388

TABLE 7.—Funds allotted to projects under contract on June 30, 1939—Continued

TOTAL—Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings		
Indiana	\$17,500	\$81,491		\$3,225,174	\$470,585	\$863,358	\$4,658,108	\$8,458,824
Iowa		77,425	\$1,095,675	2,358,933	22,015	695,207	4,249,255	7,368,815
Kansas		24,288		1,866,352	27,697	955,246	2,873,583	4,783,043
Kentucky		62,546	55,086	2,277,521	403,945	615,358	3,414,456	6,776,438
Louisiana		97,070	297,000	3,147,061	319,970	742,043	4,603,149	14,038,700
Maine	6,550	6,691		756,481	122,395	473,676	1,355,793	2,253,840
Maryland	208,451	679,354	620,999	1,618,791	110,987	120,388	3,358,970	5,140,992
Massachusetts	4,380		63,160	1,671,693	195,689	519,367	2,454,289	4,331,120
Michigan		32,649	94,491	2,646,872	651,052	863,476	4,288,540	7,620,368
Minnesota	202,698	79,000	330,717	3,780,804	405,319	1,169,835	5,968,373	10,287,945
Mississippi	157,881	33,750	181,668	2,876,398	348,881	603,614	4,202,192	9,690,387
Missouri		274,561		2,768,668	466,178	1,209,640	4,719,047	8,107,516
Montana				2,126,835	426,663	897,694	3,451,192	5,409,621
Nebraska		93,899	129,238	2,757,183	362,777	1,047,777	4,390,874	7,490,760
Nevada	21,979	33,646	30,169	872,735	104,184	198,886	1,261,599	1,414,594
New Hampshire				593,295	29,708	100,459	723,462	1,364,458
New Jersey	163,331	86,562	40,000	1,762,483	183,135	493,541	2,729,052	4,683,214
New Mexico		43,071	25,879	1,294,793	271,508	77,942	1,713,193	2,708,544
New York	175,600	566,925	45,016	5,689,837	949,450	2,001,112	9,427,940	16,400,933
North Carolina	72,614	63,733	1,002,789	3,310,887	642,555	1,376,785	6,469,363	10,478,449
North Dakota	37,770		63,600	141,606	61,606	703,610	1,008,192	1,232,932
Ohio	117,975	256,112	1,844,373	5,098,727	362,710	902,120	8,582,017	14,567,459
Oklahoma	11,958		107,500	1,046,474	44,156	302,680	1,512,768	2,516,804
Oregon	46,467	45,580	75,829	1,829,803	423,747	300,374	2,721,800	4,245,491
Pennsylvania	226,362	176,342	172,254	5,510,082	1,042,981	1,770,585	8,988,616	16,071,204
Rhode Island		6,781		568,451	49,644	438,791	1,063,667	1,683,160
South Carolina	50,421	108,238	331,786	1,277,486	239,069	697,566	2,704,566	4,690,618
South Dakota	9,571	30,037	292,620	2,532,290		340,060	3,204,578	5,266,939
Tennessee			213,440	2,035,695	304,489	664,769	3,218,393	5,669,037
Texas	171,264	288,389	446,640	6,502,458	1,048,277	2,825,732	11,282,700	19,532,505
Utah		36,250		1,635,807	106,864	375,978	2,154,899	3,098,523
Vermont		13,865	10,900	418,693	65,653	30,246	539,357	1,061,872
Virginia	11,600	210,577	95,458	1,563,342	257,071	623,130	2,761,178	4,707,012
Washington	46,596	46,591	46,426	1,624,858	364,996	302,450	2,431,917	4,369,482
West Virginia	160,141	98,871	141,092	968,681	76,648	357,481	1,802,914	2,832,754
Wisconsin	40,860	72,000	180,850	4,779,480	495,125	1,595,767	7,164,082	12,727,985
Wyoming		33,287	20,412	972,995	265,369	139,600	1,431,663	2,271,446
Hawaii	30,788			395,730	85,040	181,790	663,348	1,192,120
Puerto Rico				871,930	113,965	392,150	1,378,045	2,383,224
Total	2,961,335	5,568,532	10,062,016	113,121,919	15,721,517	36,288,215	183,723,534	316,378,011

TABLE 8.—Funds allotted to projects approved but not under contract on June 30, 1939

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Alabama			\$6,000	\$144,500	\$14,400	\$164,900	\$331,400
Arizona				24,768		24,768	39,861
Arkansas				110,653		110,653	110,703
California				32,471		32,471	59,808
Colorado				178,756		178,756	319,865
Connecticut				238,235	166,540	404,775	654,910
Delaware				591,871		591,871	1,209,658
Florida				768,573		768,573	1,537,146
Georgia				933,207	27,090	960,297	1,893,504
Illinois				500,545	475,000	975,545	1,496,280
Indiana				828,665	326,000	1,154,665	2,088,186
Iowa				238,900		238,900	517,186
Kansas				1,738,260	220,124	1,958,384	3,698,404
Kentucky			25,157	350,744	101,976	477,877	831,118
Louisiana		\$22,800		400,575		423,375	853,544
Maine				535,950	90,800	626,750	1,162,700
Maryland				444,000		444,000	902,060
Massachusetts				321,457		321,457	645,579

TABLE 8.—Funds allotted to projects approved but not under contract on June 30, 1939—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Con.

State	Public Works, 1934-35	Works Program		Federal aid		Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Grade crossings		
Michigan				\$384,750	\$70,000	\$454,750	\$542,500
Minnesota				417,328		417,328	837,511
Mississippi				298,264		298,264	835,860
Missouri				876,020	136,320	1,012,340	1,963,424
Montana				8,349		8,349	14,721
Nebraska				1,268,480	150,805	1,419,285	2,684,765
New Hampshire				188,792		188,792	382,101
New Jersey				312,010		312,010	724,020
New York				806,770	150,000	956,770	2,208,020
North Carolina				563,300		563,300	1,249,940
North Dakota	\$99,106			1,732,338		1,831,444	3,340,164
Ohio				539,261	168,800	708,061	1,236,751
Oklahoma				1,334,963		1,334,963	2,518,299
Pennsylvania		\$7,375		253,500		260,875	514,375
South Carolina				50,900		50,900	112,400
South Dakota				747,105		747,105	1,327,810
Tennessee				146,550		146,550	293,100
Texas				240,480	83,440	323,920	586,157
Utah				57,490		57,490	79,965
Vermont				12,765		12,765	25,530
Virginia	2,260			591,466	68,750	660,216	1,368,478
Washington				542,000		542,000	1,137,005
West Virginia				624,986		624,986	1,255,015
Wisconsin				130,000		130,000	314,779
Wyoming		314		187,684		187,998	297,631
Hawaii		3,443		372,578		376,021	753,190
District of Columbia				148,750		148,750	297,500
Puerto Rico				20,325		20,325	49,095
Total	101,366	33,932	\$31,157	21,242,334	2,250,045	23,658,834	45,635,018

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama				\$4,340		\$4,340	\$8,690
Arkansas				62,111		62,111	64,146
California			\$10,000	188,600		198,600	391,870
Connecticut				104,369		104,369	209,694
Delaware				30,440		30,440	60,879
Florida				40,886	\$75,900	116,786	158,122
Georgia	\$55,544			252,733		308,277	567,447
Illinois	7,500			438,205		445,705	891,410
Indiana				48,595	143,300	191,895	240,490
Iowa				24,000	14,300	38,300	66,595
Kansas				52,780	232,272	285,052	337,832
Kentucky				32,278	96,254	128,532	160,810
Louisiana				110,000		110,000	220,835
Maine				48,808		48,808	97,616
Maryland				5,005		5,005	11,000
Massachusetts				444,540		444,540	891,459
Michigan				99,050		99,050	387,900
Minnesota				18,142	213,540	231,682	249,824
Mississippi				15,520		15,520	33,460
Missouri				45,578	277,800	323,378	405,478
Nebraska				58,147		58,147	116,295
New York				21,390	120,000	141,390	204,880
North Carolina				68,095		68,095	136,190
North Dakota		\$5,106		22,689		27,795	47,446
Ohio				34,934	218,200	253,134	288,719
Oklahoma				93,222	73,000	166,222	248,492
South Carolina				2,100	15,100	17,200	19,900
South Dakota				9,845		14,106	25,040
Texas	4,261			3,580	190,680	194,260	206,368
Utah				500		500	850
Virginia				64,650	36,000	100,650	175,050
Washington				14,500		14,500	34,418
West Virginia				62,513		62,513	125,025
Wyoming				524		524	831
Hawaii				54,860		54,860	136,550
District of Columbia					250,000	250,000	283,544
Total	67,305	5,106	10,000	2,577,529	1,956,346	4,616,286	7,505,155

TABLE 8.—Funds allotted to projects approved but not under contract on June 30, 1939—Continued

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works 1934-35	Works Program grade crossings	Federal aid		Total Federal funds	Estimated total cost
			Secondary or feeder	Grade crossings		
Delaware.....			\$2, 115		\$2, 115	\$4, 230
Georgia.....			4, 920	\$68, 970	73, 890	78, 810
Illinois.....			4, 000		4, 000	8, 000
Indiana.....			180		180	360
Louisiana.....			29, 700		29, 700	60, 959
Maryland.....				113, 207	113, 207	210, 000
Minnesota.....			4, 080		4, 080	8, 160
Missouri.....			7, 190		7, 190	14, 598
Montana.....			3, 835		3, 835	6, 762
Nebraska.....		\$32, 888	1, 260	190, 134	224, 282	225, 541
New York.....				403, 500	403, 500	535, 361
North Carolina.....			6, 855	158, 230	165, 085	171, 940
North Dakota.....				269, 900	269, 900	269, 900
Ohio.....				262, 980	262, 980	262, 980
Oklahoma.....			3, 010		3, 010	5, 900
Pennsylvania.....			400		400	800
Tennessee.....				81, 920	81, 920	81, 920
Texas.....				85, 000	85, 000	105, 140
Utah.....				279	279	279
Virginia.....				26, 729	26, 729	26, 729
Washington.....			22, 300	91, 617	113, 917	133, 986
Wisconsin.....			1, 650		1, 650	3, 355
Total.....		32, 888	91, 495	1, 752, 466	1, 876, 849	2, 215, 680

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

Arizona.....	\$6, 150		\$11, 475		\$17, 625	\$22, 062
Arkansas.....			22, 703		22, 703	22, 703
California.....			50, 895		50, 895	86, 988
Colorado.....			22, 990		22, 990	40, 800
Delaware.....		\$17, 000	34, 850		51, 850	96, 110
Georgia.....	10, 820		61, 840		72, 660	134, 500
Illinois.....			97, 500		97, 500	195, 000
Indiana.....			173, 118		173, 118	385, 817
Iowa.....				\$23, 200	23, 200	25, 072
Kansas.....			200, 354		200, 354	400, 708
Kentucky.....			126, 728		126, 728	369, 959
Louisiana.....			83, 630	27, 200	110, 830	214, 030
Maine.....			98, 265		98, 265	198, 590
Maryland.....			35, 855		35, 855	107, 000
Massachusetts.....			95, 610		95, 610	194, 581
Michigan.....			117, 450		117, 450	262, 300
Minnesota.....			46, 485		46, 485	92, 970
Mississippi.....			3, 400		3, 400	6, 900
Missouri.....			87, 960		87, 960	219, 766
Montana.....			88, 196		88, 196	155, 494
Nebraska.....			201, 230		201, 230	424, 447
Nevada.....			44, 685		44, 685	51, 737
New Hampshire.....				104, 987	104, 987	105, 035
New Jersey.....			66, 225	255, 740	321, 965	388, 870
New York.....			127, 000		127, 000	372, 200
North Carolina.....			47, 755		47, 755	107, 860
North Dakota.....			22, 907		22, 907	42, 770
Ohio.....			81, 800	256, 530	365, 898	496, 888
Oklahoma.....			306, 588	105, 800	412, 388	725, 340
Oregon.....			35, 620		35, 620	59, 356
Pennsylvania.....			92, 550	347, 000	439, 550	740, 552
South Carolina.....			66, 200		66, 200	169, 800
South Dakota.....			7, 640		7, 640	13, 880
Tennessee.....				90, 860	90, 860	90, 860
Texas.....			109, 570		109, 570	227, 479
Utah.....			16, 000		16, 000	46, 320
Vermont.....			32, 900		32, 900	65, 800
Virginia.....	4, 891		52, 012		56, 903	141, 187
Washington.....			14, 700		14, 700	28, 401
West Virginia.....				16, 500	16, 500	16, 500
Wisconsin.....			58, 350		58, 350	158, 164
Wyoming.....			164, 424		164, 424	261, 424
Hawaii.....			11, 450		11, 450	22, 900
Total.....	49, 429	17, 000	3, 018, 910	1, 227, 817	4, 313, 156	7, 989, 120

TABLE 8.—Funds allotted to projects approved but not under contract on June 30, 1938—Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total Federal funds	Estimated total cost
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings		
Alabama			\$6,000	\$148,840		\$14,400	\$169,240	\$340,090
Arizona	\$6,150			24,768	\$11,475		42,393	61,923
Arkansas				172,764	22,703		195,467	197,552
California			10,000	221,071	50,895		281,966	538,666
Colorado				178,756	22,990		201,746	360,665
Connecticut				342,604		166,540	509,144	864,604
Delaware		\$17,000		622,311	36,965		676,276	1,370,877
Florida				809,459		75,900	885,359	1,695,268
Georgia	66,364			1,185,940	66,760	96,090	1,415,124	2,674,261
Illinois	7,500			938,750	101,500	475,000	1,522,750	2,590,690
Indiana				877,260	173,298	469,300	1,519,858	2,714,853
Iowa				262,900		37,500	300,400	608,853
Kansas				1,791,040	200,354	452,396	2,443,790	4,436,944
Kentucky			25,157	383,022	126,728	198,230	733,137	1,361,887
Louisiana		22,800		510,575	113,330	27,200	673,905	1,449,368
Maine				584,758	98,265	90,800	773,823	1,358,960
Maryland				419,005	35,855	113,207	598,067	1,230,000
Massachusetts				765,997	95,610		861,607	1,731,619
Michigan				483,800	117,450	70,000	671,250	1,492,700
Minnesota				435,470	50,565	213,540	699,575	1,188,465
Mississippi				313,784	3,400		317,184	874,220
Missouri				921,698	95,150	414,120	1,430,868	2,633,236
Montana				8,349	92,031		100,380	176,977
Nebraska			32,888	1,326,628	202,459	340,939	1,902,944	3,451,048
Nevada					44,685		44,685	51,737
New Hampshire				188,792		104,987	293,779	487,196
New Jersey				312,010	66,225	255,740	633,975	1,112,890
New York				828,160	127,000	673,500	1,628,660	3,320,461
North Carolina				631,395	54,610	158,230	844,235	1,665,930
North Dakota		5,106		1,755,027	22,907	269,900	2,152,046	3,700,280
Ohio	99,106			574,195	81,800	906,510	1,590,073	2,285,338
Oklahoma	27,568			1,428,184	309,599	178,800	1,916,583	3,498,031
Oregon					35,620		35,620	59,356
Pennsylvania		7,375		253,500	92,950	347,000	700,825	1,255,727
South Carolina				53,000	66,200	15,100	134,300	302,100
South Dakota		4,261		756,950	7,640		768,851	1,366,730
Tennessee				146,550		172,780	319,330	465,880
Texas				244,060	109,570	359,120	712,750	1,125,144
Utah				57,990	16,000	279	74,269	127,414
Vermont				12,765	32,900		45,665	91,330
Virginia	7,151			659,116	52,012	131,479	849,758	1,711,444
Washington				556,500	37,000	91,617	685,117	1,323,810
West Virginia				687,499		16,500	703,999	1,396,540
Wisconsin				130,000	60,000		190,000	475,298
Wyoming		314		188,208	164,424		352,946	559,896
Hawaii		3,443		427,438	11,450		442,331	917,640
District of Columbia				148,750		250,000	398,750	587,044
Puerto Rico				20,325			20,325	49,095
Total	218,100	56,038	74,045	23,819,863	3,110,405	7,186,674	34,465,125	63,344,973

TABLE 9.—Balances of funds available for programmed projects on June 30, 1939

State	Public Works 1931-35	Works Program		Federal-aid system	Federal aid, secondary or feeder	Federal aid, grade crossings	Total
		Highways	Grade crossings				
Alabama	\$13,969	\$18,343	\$25,078	\$3,101,328	\$782,784	\$842,733	\$4,784,235
Arizona			18,357	1,825,489	355,372	281,092	2,480,310
Arkansas		18,137	61,953	1,738,388	440,945	1,225,099	3,484,522
California	1,604	1,041	109,634	4,293,753	758,464	1,296,732	6,461,228
Colorado		283,622	54,000	2,202,372	235,353	593,860	3,669,207
Connecticut	3,920	22,376	93,056	1,331,528	286,249	832,360	2,569,489
Delaware		61,467	11,212	1,008,728	231,250	513,891	1,826,562
Florida	8,243	46,358	143,122	2,904,467	374,744	1,158,058	4,634,992
Georgia	169,268	219,375	1,165,561	5,652,962	1,083,865	2,306,620	10,597,651
Idaho	13,781	6,494	28,893	1,662,248	295,511	454,970	2,461,897
Illinois	5,171			3,545,138	770,576	2,354,151	6,675,036
Indiana	8,121		40,588	2,268,286	644,375	969,772	3,931,142

TABLE 9.—Balances of funds available for programmed projects on June 30, 1939—Continued

State	Public Works 1934-35	Works Program		Federal-aid system	Federal aid, secondary or feeder	Federal aid, grade crossings	Total
		Highways	Grade crossings				
Iowa			\$5,344	\$1,533,270	\$1,657,792	\$1,369,238	\$4,565,644
Kansas		\$48,583	35,366	4,195,785	1,353,173	1,075,292	6,708,199
Kentucky		6,645	101,779	3,017,531	317,903	1,107,615	4,551,473
Louisiana	\$12,504	5,451	189,917	2,703,740	398,713	1,026,689	4,337,024
Maine	58	4,784	18,043	2,406,151	37,761	207,671	3,478,493
Maryland	7,979	45,811	117,424	1,824,539	388,839	993,901	6,744,468
Massachusetts	201,184	78,722	320,951	2,574,887	498,369	1,727,702	5,401,815
Michigan			2,968	3,145,182	967,350	2,085,059	6,200,559
Minnesota	7,668		4,818	3,815,595	1,202,621	1,537,428	6,568,130
Mississippi	10,364	15,533	25,138	2,824,715	798,585	934,587	4,608,922
Missouri	179,993	59,399	194,486	4,663,254	701,338	1,679,326	7,477,796
Montana	11,265	9,439	24,621	4,445,648	813,334	327,257	5,631,564
Nebraska	7,325	21,177	180,135	2,890,294	446,867	550,707	4,096,505
Nevada				1,603,560	192,987	112,509	1,909,056
New Hampshire		7,350	8,691	932,785	188,007	316,039	1,452,872
New Jersey	2,500	7,991	18,510	2,246,292	542,598	1,426,875	4,244,766
New Mexico	8,342	2,356	339	1,524,043	252,877	675,857	2,463,814
New York	6,020	210,887	591,843	4,110,959	851,452	4,288,723	10,059,884
North Carolina		3,680	20,283	2,112,429	349,602	990,495	3,476,489
North Dakota	2,306	1,215	59,108	3,430,254	875,948	369,188	4,738,020
Ohio		29,257	313,270	7,319,148	1,850,842	3,254,391	12,766,908
Oklahoma	926	13,953	91,268	3,841,245	973,691	2,191,397	7,112,480
Oregon	10,006	7,470	20,128	2,249,713	209,990	314,891	2,872,098
Pennsylvania	191,121	194,499	366,117	5,231,412	719,676	4,645,633	11,243,458
Rhode Island				1,073,748	134,171	152,469	1,360,378
South Carolina	10,591	8,337	128,957	2,408,179	279,791	959,865	3,795,720
South Dakota			16,304	3,427,465	1,050,410	1,110,539	5,604,718
Tennessee		24,877	215,024	4,604,324	881,848	1,373,250	7,099,323
Texas			432,602	7,136,819	1,160,749	2,208,513	10,938,683
Utah				1,076,602	209,198	217,372	1,503,172
Vermont			1,640	637,953	77,967	317,471	1,035,031
Virginia	15,892	11,789	100,026	1,066,943	367,303	912,147	2,474,100
Washington		621	35,150	1,080,604	266,006	502,865	1,866,067
West Virginia	21,652	38,386	47,138	2,263,331	515,848	964,552	3,851,207
Wisconsin			22,705	1,769,276	693,622	1,162,829	3,648,882
Wyoming	3,799		58,983	1,026,385	88,192	614,272	1,691,631
District of Columbia				338,750	73,125	128,186	540,061
Hawaii		313		1,058,510	223,510	360,830	1,643,163
Puerto Rico				482,540	82,069	426,676	991,285
Total	936,393	1,535,738	5,520,430	133,629,011	29,008,613	57,549,944	228,180,129

TABLE 10.—Mileage of projects completed during the fiscal year 1939

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
Alabama			1.3	234.3		235.6
Arizona				125.3		125.3
Arkansas	1.0	3.0	8.6	103.4	23.1	139.1
California				228.1	1.8	229.9
Colorado		2.9		134.3		137.2
Connecticut			.4	9.9		10.3
Delaware		.2	.3	17.1		17.6
Florida				82.4		82.4
Georgia	1.9	14.9	7.1	255.8	.6	280.3
Idaho				197.0	3.3	200.3
Illinois			.7	308.8	.6	310.1
Indiana	1.2			158.1	2.0	161.3
Iowa				271.1	2.5	273.6
Kansas				734.1	5.7	739.8
Kentucky			1.0	216.9		217.9
Louisiana			1.0	37.3		38.3
Maine			.4	69.9		70.3
Maryland	1.0	4.4		19.9		25.3
Massachusetts		.6		11.1		11.8
Michigan			.1	157.3	.1	157.7
Minnesota				284.5		284.5

TABLE 10.—*Mileage of projects completed during the fiscal year 1939—Continued*
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Mississippi	2.6		0.9	251.3	0.2	255.0
Missouri				160.2	1.2	161.4
Montana			.4	102.8	10.2	113.4
Nebraska			1.6	404.2	8.9	414.7
Nevada				202.5	.9	203.4
New Hampshire				23.7	.6	24.3
New Jersey			.4	16.3		16.7
New Mexico				284.4	14.9	299.3
New York		0.2		253.5	2.1	255.8
North Carolina		.2	1.1	315.1	1.1	317.5
North Dakota	4.3			287.0		291.3
Ohio			2.2	100.5		102.7
Oklahoma		.4	.3	267.0		267.7
Oregon				152.9	.2	153.1
Pennsylvania			5.4	132.0	.7	138.1
Rhode Island				14.6		14.6
South Carolina	1.0		1.1	246.3	.1	248.5
South Dakota	13.0	4.4	.5	295.7	.6	314.2
Tennessee				199.9		199.9
Texas				1,115.9	15.4	1,131.3
Utah				123.2	1.1	124.3
Vermont				33.4	2.1	35.5
Virginia				249.1	1.4	250.5
Washington		.7	.5	112.4	1.5	115.1
West Virginia	.1		1.1	67.3	.7	69.2
Wisconsin	.1		.3	167.1	3.3	170.8
Wyoming	3.0	2.6		303.0	1.1	309.7
Hawaii		.6	.6	23.3		24.5
Puerto Rico				14.2	.4	14.6
Total	29.2	36.4	36.3	9,575.4	108.4	9,785.7

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alabama			1.0	12.3		13.3
Arizona				.3		.3
Arkansas			.4	3.7	1.4	5.5
California				28.3	.6	28.9
Colorado				4.8		4.8
Connecticut			.5	1.6		2.1
Delaware				.7		.7
Florida				1.0		1.0
Georgia	3.9	8.2	.1	25.4		37.6
Idaho				1.2	.3	1.5
Illinois	.4		.8	21.3	.3	22.8
Indiana	.6			5.2		5.8
Iowa		.3	.5	18.8	.7	20.3
Kansas		.8	1.2	23.5	.6	26.1
Kentucky	1.1	1.2	.6	5.9	.4	9.2
Louisiana			.4	.9		1.3
Maine				1.3		1.3
Maryland	1.2					1.2
Massachusetts				5.1	.1	5.2
Michigan		.3	.1	16.8		17.2
Minnesota	.2		.3	33.4		33.9
Mississippi	.6	2.6	.4	32.8	.2	36.6
Missouri		.2	.1	5.2	.9	6.4
Montana		.1		.9		1.5
Nebraska		2.8	.3	9.7		12.8
New Hampshire				1.9		1.9
New Jersey	.7			3.7		4.4
New Mexico				10.5		10.5
New York	1.0	.2	.2	19.6		21.0
North Carolina				21.6	.2	21.8
North Dakota	.8	28.5		5.5	.1	34.9
Ohio		.6	1.0	11.8		13.4
Oklahoma			.1	5.8		5.9
Oregon	.2			6.1	1.0	7.3
Pennsylvania	.2	3.3	2.0	12.2		17.7
Rhode Island				3.3		3.3
South Carolina	.4	2.2	.7	20.8	.4	24.5
South Dakota	.8	12.9	1.5	4.8		20.0
Tennessee				7.5		7.5

TABLE 10.—*Mileage of projects completed during the fiscal year 1939*—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Texas.....	0.5	2.9		40.6		44.0
Utah.....				9.9		9.9
Vermont.....				.5		.5
Virginia.....	.3	.2	1.2	6.7	1.0	9.4
Washington.....				1.9		1.9
West Virginia.....			.2	4.0	.9	5.1
Wisconsin.....				21.8		21.8
Wyoming.....	.6		.5	1.3		2.4
Total.....	13.5	67.3	14.1	481.9	9.6	586.4

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama.....				0.7	0.2	0.9
Arkansas.....				.9	.1	1.0
California.....					.3	.3
Colorado.....			0.3	1.9		2.2
Connecticut.....				.3		.3
Georgia.....		10.5	1.4	2.7		14.6
Idaho.....		.8	.3	.4		1.4
Illinois.....				17.8		18.9
Indiana.....				.3		.3
Kansas.....				.9		.9
Kentucky.....		.5	.1	.4		1.0
Louisiana.....			.7			.7
Maine.....				2.4		2.4
Maryland.....			.4			.4
Massachusetts.....				.1	.1	.2
Minnesota.....					.1	.1
Mississippi.....		1.5	.1			1.6
Missouri.....			.3	1.5		1.8
Montana.....			.1			.1
Nebraska.....		1.4	.6	2.3		4.3
New Jersey.....			.3		.2	.5
New Mexico.....					.2	.2
New York.....		.1	.7	1.1	.1	2.0
North Carolina.....		.5	.4	13.1	.6	14.6
North Dakota.....			.1	1.5	.1	1.7
Ohio.....		1.0	.4			1.4
Oklahoma.....		4.0	.4	1.3		5.7
Oregon.....				.6		.6
Pennsylvania.....		5.8	.4	1.6		7.8
South Carolina.....		8.9	.9	1.7	.5	12.0
South Dakota.....			.4			.4
Tennessee.....		2.0	.8			2.8
Texas.....		6.1		13.5	1.8	21.4
Utah.....				6.6		6.6
Vermont.....				1.4		1.4
Virginia.....				.4	.1	.5
Washington.....				2.3	.6	2.9
West Virginia.....			.6		.3	.9
Wisconsin.....			.3	2.1		2.4
Wyoming.....				.6		.6
District of Columbia.....					.2	.2
Total.....		43.1	10.0	80.4	5.5	139.0

TABLE 10.—*Mileage of projects completed during the fiscal year 1939*—Continued
ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
		<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	
Alabama.....		6.5	0.1	23.6	1.9	32.1
Arizona.....				42.3		42.3
Arkansas.....				9.1		9.1
California.....				117.8		117.8
Colorado.....		6.0		62.9	.3	69.2
Connecticut.....			.6	1.3		1.9
Delaware.....				5.3		5.3
Florida.....			.5			.5
Georgia.....	7.0	63.1	2.8	67.4		140.3
Idaho.....			.6	56.8		57.4
Illinois.....	7.1	28.4	.2	149.7		185.4
Indiana.....			.4	80.2	1.0	81.6
Kansas.....		10.3		29.0		39.3
Kentucky.....		2.3		105.8		108.1
Louisiana.....	6.9			20.0		26.9
Maine.....		.8		23.3	1.6	25.7
Maryland.....	4.3	6.1	.9			11.3
Massachusetts.....		.4	.5	1.8		2.7
Michigan.....		3.3		37.5		40.8
Minnesota.....				42.2		42.2
Missouri.....				71.3		71.3
Montana.....	3.4	4.4				7.8
Nebraska.....		5.9		99.0		104.9
Nevada.....				68.8		68.8
New Hampshire.....		5.6		6.1		11.7
New Jersey.....			.9	2.5		3.4
New Mexico.....			.1	57.5	.5	58.0
New York.....	.2	1.0		166.7	.9	168.9
North Carolina.....		4.9	.9	76.1		82.1
North Dakota.....	4.0	16.2		25.3	.2	45.5
Ohio.....		2.2	1.5	3.7		7.4
Oklahoma.....	.2	1.6		40.9		42.7
Oregon.....	.2			62.6		62.8
Pennsylvania.....	1.0	6.6	.3	131.9	.4	140.2
Rhode Island.....		7.7		7.2		7.2
South Carolina.....		8.8		77.3		86.1
South Dakota.....	6.2	.4	17.4		2.8	26.8
Tennessee.....	.4	9.1		17.6		27.1
Texas.....	.2	8.6		501.6	2.9	513.3
Utah.....				59.3		59.3
Vermont.....				12.4	.8	13.2
Virginia.....	15.5	8.9		90.5	5.1	120.0
Washington.....			.5	61.9	2.0	64.4
West Virginia.....	10.5			21.4		31.9
Wisconsin.....				28.7		28.7
Wyoming.....				58.4		58.4
Puerto Rico.....				13.7		13.7
Total.....	74.8	211.4	28.2	2,636.4	20.4	2,971.2

TOTAL

State	Public Works, 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings	
		<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	
Alabama.....		7.8	1.1	246.6	24.3	2.1	281.9
Arizona.....				125.6	42.3		167.9
Arkansas.....	1.0	3.0	8.9	107.2	9.9	24.7	154.7
California.....				256.3	117.9	2.7	376.9
Colorado.....		9.0	.3	139.0	64.8	.3	213.4
Connecticut.....			1.5	11.5	1.6		14.6
Delaware.....		.2	.3	17.8	5.3		23.6
Florida.....		.5	.5	83.4			83.9
Georgia.....	12.8	96.7	11.4	281.2	70.1	.6	472.8
Idaho.....			.6	198.2	57.2	3.6	259.6
Illinois.....	7.5	29.2	2.0	330.2	167.4	.9	537.2
Indiana.....	1.9		.4	163.3	80.5	2.9	249.0

TABLE 10.—*Mileage of projects completed during the fiscal year 1939*—Continued

TOTAL—Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Iowa.....		0.3	0.5	290.0		3.1	293.9
Kansas.....		11.0	1.2	757.6	29.9	6.4	806.1
Kentucky.....	1.1	4.0	1.8	222.8	106.1	.4	336.2
Louisiana.....	6.9		2.0	38.3	20.0		67.2
Maine.....		.8	.4	71.2	25.7	1.6	99.7
Maryland.....	6.5	10.5	1.3	19.9			38.2
Massachusetts.....		1.0	.6	16.3	1.8	.2	19.9
Michigan.....		3.7	.4	174.1	37.4	.1	215.7
Minnesota.....	.2		.3	317.9	42.2	.1	360.7
Mississippi.....	3.2	4.1	1.4	284.1		4	293.2
Missouri.....		.2	.4	165.5	72.8	2.0	240.9
Montana.....	3.4	4.4	.5	103.7		10.8	122.8
Nebraska.....		10.2	2.5	413.9	101.3	8.8	536.7
Nevada.....				202.5	68.8	.9	272.2
New Hampshire.....		5.6		25.7	6.0	.6	37.0
New Jersey.....	.7		1.6	20.0	2.5	.2	25.0
New Mexico.....				294.9	57.5	15.6	368.0
New York.....	1.1	1.5	1.0	273.1	167.9	3.1	447.7
North Carolina.....		5.6	2.3	336.7	89.3	2.1	436.0
North Dakota.....	9.2	44.8	.1	292.3	26.8	.2	373.4
Ohio.....		3.7	5.1	112.3	3.8		124.9
Oklahoma.....	.2	6.1	.9	272.7	42.1		322.0
Oregon.....	.4			159.0	63.2	1.2	223.8
Pennsylvania.....	1.2	15.6	8.1	144.2	133.5	1.2	303.8
Rhode Island.....				17.9	7.2		25.1
South Carolina.....	8.9	19.9	2.7	267.1	79.1	1.1	378.8
South Dakota.....	20.0	17.7	19.7	390.6		3.4	361.4
Tennessee.....	.4	11.1	.8	207.4	17.6		237.3
Texas.....	.7	17.5		1,156.4	515.2	20.2	1,710.0
Utah.....				133.1	65.9	1.1	200.1
Vermont.....				33.9	13.8	2.9	50.6
Virginia.....	15.8	9.1	1.3	255.8	90.8	7.6	380.4
Washington.....		.7	1.1	114.2	64.3	4.0	184.3
West Virginia.....	10.7		1.9	71.3	21.4	1.8	107.1
Wisconsin.....	.1		.6	188.8	28.9	3.3	221.7
Wyoming.....	3.6	2.6	.5	304.3	59.0	1.1	371.1
Hawaii.....		.6	.6	23.3			24.5
District of Columbia.....							.2
Puerto Rico.....				14.2	13.7	.4	28.3
Total.....	117.5	358.2	88.6	10,057.3	2,716.8	143.9	13,482.3

TABLE 11.—*Mileage of projects under contract on June 30, 1939*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alabama.....				301.9	0.2	302.1
Arizona.....				60.1	3.1	63.2
Arkansas.....				211.2	5.2	216.4
California.....				66.0	.9	66.9
Colorado.....				89.2	.4	89.6
Connecticut.....				15.7		15.7
Delaware.....				11.8		11.8
Florida.....				39.3		39.3
Georgia.....	0.8	0.1	1.6	316.5	6.3	325.3
Idaho.....				53.0	4.0	57.0
Illinois.....				213.7	4.0	218.1
Indiana.....		.1	.4	131.6	1.2	132.9
Iowa.....		.1	1.1	182.6	.4	184.2
Kansas.....				172.1	5.3	177.4
Kentucky.....				98.6	3.5	102.1
Louisiana.....			.5	57.4	13.8	71.7

TABLE 11.—*Mileage of projects under contract on June 30, 1939—Continued*
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Maine.....	0.1			29.2	4.9	34.2
Maryland.....	1.1	1.8	0.5	53.7		57.1
Massachusetts.....				20.8	1.6	22.4
Michigan.....			.6	139.1	6.2	145.9
Minnesota.....			.4	341.7	.6	342.7
Mississippi.....				320.4	1.2	321.6
Missouri.....				214.0	1.1	215.1
Montana.....				188.7	4.8	193.5
Nebraska.....		.8	.6	450.2	12.7	464.3
Nevada.....				44.5	1.4	45.9
New Hampshire.....				31.2	.5	31.7
New Jersey.....				22.1		22.1
New Mexico.....				121.9		121.9
New York.....	1.1	1.4		204.2	5.6	212.3
North Carolina.....				383.2	2.2	385.4
North Dakota.....	.1		9.7	27.8	3.2	40.8
Ohio.....				112.4	2.5	114.9
Oklahoma.....			.3	28.7	2.4	31.4
Oregon.....			.1	125.1	.5	125.7
Pennsylvania.....	1.0			103.0	.6	104.6
Rhode Island.....				11.0	.3	11.3
South Carolina.....			1.3	84.5	.8	86.6
South Dakota.....				413.4	6.8	420.2
Tennessee.....				102.5		102.5
Texas.....				617.6	21.0	638.6
Utah.....				89.2		89.2
Vermont.....				22.4		22.4
Virginia.....				73.6	2.7	76.3
Washington.....				34.4	1.6	36.0
West Virginia.....				47.7	.7	48.4
Wisconsin.....				262.7	1.9	264.6
Wyoming.....				147.5	.5	148.0
Hawaii.....	1.8			10.3	2.2	14.3
Puerto Rico.....				35.2	1.3	36.5
Total.....	6.0	4.3	17.1	6,934.6	140.1	7,102.1

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alabama.....	1.5			23.8	0.6	25.9
Arkansas.....				10.0		10.0
California.....			0.1	1.2	.4	1.7
Colorado.....				5.0	.3	5.3
Delaware.....				1.0		1.0
Florida.....				2.8	.2	3.0
Georgia.....	1.3	4.6	.7	34.8	.7	42.1
Idaho.....				2.3	.4	2.7
Illinois.....	1.5		.4	17.4	1.7	21.0
Indiana.....		1.1		4.7		5.8
Iowa.....			2.3	12.3	1.1	15.7
Kansas.....		.2		1.8	1.2	3.2
Kentucky.....				3.2	1.1	4.3
Louisiana.....			5.6	1.5	2.1	9.2
Maine.....				.1	.4	.5
Maryland.....		1.7		.2		1.9
Massachusetts.....				4.2	.2	4.4
Michigan.....				15.7	1.4	17.1
Minnesota.....				29.4	.7	30.1
Mississippi.....		.3		8.4	1.3	10.0
Missouri.....		.4		7.1	1.0	8.5
Montana.....				6.5	.7	7.2
Nebraska.....				10.1	1.4	11.5
Nevada.....				.8		.8
New Hampshire.....				.2		.2
New Jersey.....				7.9	.1	8.0
New Mexico.....				.3		.3
New York.....				5.4	.5	5.9
North Carolina.....				12.6	4.9	17.5
North Dakota.....	.5			.7	.9	2.1
Ohio.....			.4	3.7	.4	4.5

TABLE 11.—Mileage of projects under contract on June 30, 1939—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Oklahoma.....				1.0		1.0
Oregon.....				2.9	0.4	3.3
Pennsylvania.....				13.7	1.0	14.7
Rhode Island.....				3.1	.5	3.6
South Carolina.....			0.2	2.0	.7	2.9
South Dakota.....				5.3		5.3
Tennessee.....				10.3	.4	10.7
Texas.....			.6	14.5	5.4	20.5
Utah.....				16.2		16.2
Virginia.....	0.2			2.3		2.5
Washington.....				1.5		1.5
West Virginia.....	2.3			3.7		6.0
Wisconsin.....				45.0	.2	45.2
Wyoming.....				1.0		1.0
Hawaii.....				2.5		2.5
Total.....	7.3	8.3	10.3	360.1	32.3	418.3

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama.....				2.6	1.5	4.1
Arizona.....					.2	.2
Arkansas.....				1.7		1.7
California.....				.1	.7	.7
Colorado.....				.3	1.0	1.1
Delaware.....				.4	.3	.6
Florida.....				.4	.4	.8
Georgia.....	0.7	1.4		5.0	.4	7.5
Illinois.....	1.0	.2		3.1	.2	4.5
Indiana.....				.1		.1
Iowa.....				.4		.4
Kansas.....				.1	.2	.3
Kentucky.....				.2		.2
Maryland.....		.2		.1		.3
Michigan.....				3.0		3.0
Minnesota.....				2.2	1.9	4.1
Missouri.....				1.8		1.8
Montana.....					.2	.2
Nebraska.....				3.5	.8	4.3
New Jersey.....		.2				.2
New York.....					.1	.1
North Carolina.....			1.8	3.2		5.0
North Dakota.....					.6	.6
Ohio.....			.8	.6	.5	1.9
Oregon.....				2.9	1.1	3.0
Pennsylvania.....				.8	.6	1.4
South Carolina.....	.7	.3		3.0	.9	4.9
South Dakota.....		1.0			.2	1.2
Tennessee.....				.3	.3	.6
Texas.....	.4			11.3	.9	12.6
Utah.....	1.8			2.3		4.1
Virginia.....	1.4				.1	1.5
Washington.....				1.8		1.8
Wisconsin.....				1.1	1.1	2.2
Wyoming.....				1.1		1.1
Total.....		6.4	5.5	53.0	13.2	78.1

TABLE 11.—Mileage of projects under contract on June 30, 1939—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Secondary or feeder	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alabama				30.5	1.9	32.4
Arizona				29.4		29.4
Arkansas				71.8		71.8
California				44.7	1.9	46.6
Colorado		6.4		24.2		30.6
Connecticut				2.9		2.9
Delaware				17.3	.3	17.6
Florida				37.2		37.2
Georgia	4.6	23.9	6.0	51.5	.5	86.5
Idaho				11.2		11.2
Illinois	6.9			90.8	.3	98.0
Indiana				80.5	3.5	84.0
Iowa				31.9	.9	35.8
Kansas				17.6		17.6
Kentucky				87.5	2.6	90.1
Louisiana		10.4		59.9		70.3
Maine		1.1		13.3	.2	14.6
Maryland	1.9	3.5	1.4	17.6		24.4
Massachusetts				9.2		9.2
Michigan				78.6		78.6
Minnesota	1.5			60.2	.5	62.2
Mississippi	5.2			61.3		66.5
Missouri				119.4	.2	119.6
Montana				58.2		58.2
Nebraska				140.3	.6	140.9
Nevada				15.5		15.5
New Hampshire				2.4	.9	3.3
New Jersey	1.9			12.4	.6	14.9
New Mexico				28.1	1.0	29.1
New York		4.1		106.4	.8	111.3
North Carolina				115.8	.4	116.2
North Dakota				8.3	.3	8.6
Ohio		8.9		36.5	.7	46.1
Oklahoma				.8	.5	1.3
Oregon			.1	69.4		69.5
Pennsylvania				115.5		115.5
Rhode Island				2.2		2.2
South Carolina	1.4	4.4		53.9	5.9	65.6
South Dakota	4.8	4.7			1.0	10.5
Tennessee			.6	31.7		32.3
Texas		8.0		207.8	3.7	219.5
Utah				24.9		24.9
Vermont				4.5		4.5
Virginia			.3	57.8	.1	58.2
Washington				38.4		38.4
West Virginia		4.3	.5	8.4	.9	14.1
Wisconsin			.6	31.6	3.7	35.9
Wyoming				22.9		22.9
Hawaii				4.6		4.6
Puerto Rico				12.5		12.5
Total	28.2	79.7	9.5	2,262.3	33.9	2,413.6

TOTAL

State	Public Works 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings	
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alabama	1.5			325.8	33.1	4.1	364.5
Arizona				60.3	29.3	3.2	92.8
Arkansas				221.2	73.5	5.2	299.9
California			0.1	67.2	44.7	3.9	115.9
Colorado		6.4		94.2	24.3	1.7	126.6
Connecticut				15.7	2.9		18.6
Delaware				12.8	17.5	.7	31.0
Florida				42.1	37.6	.6	80.3

TABLE 11.—Mileage of projects under contract on June 30, 1939—Continued

TOTAL—Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Georgia	6.7	29.4	9.5	351.1	56.7	8.0	461.4
Idaho				55.3	11.2	4.4	70.9
Illinois	8.4	1.0	1.1	231.1	93.8	6.2	341.6
Indiana		1.2		136.4	80.5	4.7	222.8
Iowa		.1	3.4	194.8	35.4	2.4	236.1
Kansas		.2		173.9	17.7	6.7	198.5
Kentucky				101.9	87.7	7.1	196.7
Louisiana		10.4	6.1	58.6	60.0	16.1	151.2
Maine	.1	1.1		29.4	13.4	5.3	49.3
Maryland	3.0	7.1	2.0	53.9	17.7		83.7
Massachusetts				25.0	9.2	1.8	36.0
Michigan			.6	154.7	31.6	7.7	244.6
Minnesota	1.5		.4	371.1	62.5	3.6	439.1
Mississippi	5.2	.3		328.7	61.4	2.5	398.1
Missouri		.4		221.2	121.1	2.3	345.0
Montana				195.2	58.2	5.7	259.1
Nebraska		.8	.6	460.2	143.8	15.6	621.0
Nevada				45.3	15.5	1.4	62.2
New Hampshire				31.4	2.4	1.4	35.2
New Jersey	1.9	.2		29.9	12.5	.7	45.2
New Mexico				122.2	28.1	1.0	151.3
New York	1.1	5.5		209.7	105.4	6.9	326.6
North Carolina			1.8	395.8	119.0	7.5	524.1
North Dakota	.6		9.7	28.6	8.3	4.9	52.1
Ohio		8.9	1.2	116.1	37.1	4.1	167.4
Oklahoma			.3	29.7	.8	2.9	33.7
Oregon			.1	128.0	72.3	1.1	201.5
Pennsylvania	1.0			116.8	116.3	2.1	236.2
Rhode Island				14.1	2.2	.8	17.1
South Carolina	1.4	5.1	1.9	86.3	56.9	8.4	160.0
South Dakota	4.8	4.7	1.0	418.7		8.0	437.2
Tennessee			.6	112.8	32.0	.7	146.1
Texas		8.4	.6	632.1	219.0	31.1	891.2
Utah		1.8		105.4	27.2		134.4
Vermont				22.4	4.5		26.9
Virginia	.2	1.4	.3	75.9	57.8	2.9	138.5
Washington				36.0	40.1	1.6	77.7
West Virginia	2.3	4.3	.5	51.5	8.3	1.6	68.5
Wisconsin			.6	307.7	32.7	6.9	347.0
Wyoming				148.5	24.0	.5	173.0
Hawaii	1.8			12.8	4.6	2.2	21.4
Puerto Rico				35.2	12.5	1.3	49.0
Total	41.5	98.7	42.4	7,294.7	2,315.3	219.5	10,012.1

TABLE 12.—Mileage of projects approved but not under contract on June 30, 1939

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama			0.1	4.6		4.7
Arizona				10.1		10.1
Arkansas				1.8		1.8
California				4.5		4.5
Colorado				2.8		2.8
Connecticut				4.1	0.6	4.7
Delaware				24.9		24.9
Florida				29.5		29.5
Georgia				108.8		108.8
Illinois				24.6	2.0	26.6
Indiana				39.1	.3	39.4
Iowa				35.8		35.8
Kansas				192.0	4.8	196.8
Kentucky				51.5	.8	52.3
Louisiana				20.3		20.3
Maine				28.1	.5	28.6

TABLE 12.—Mileage of projects approved but not under contract on June 30, 1939—Continued

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Federal aid		Total
		Highways	Grade crossings	Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Maryland				12.6		12.6
Massachusetts				5.9		5.9
Michigan				23.6	0.5	24.1
Minnesota				104.6		104.6
Mississippi				39.8		39.8
Missouri				43.7	.8	44.5
Nebraska				287.0	.9	287.9
New Hampshire				12.4		12.4
New Jersey				1.5		1.5
New York				21.0	.4	21.4
North Carolina				57.3		57.3
North Dakota	14.1			316.9		331.0
Ohio				12.9	.4	13.3
Oklahoma				87.7		87.7
Pennsylvania				3.3		3.3
South Carolina				22.2		22.2
South Dakota				128.1		128.1
Tennessee				8.4		8.4
Texas				49.0	.5	49.5
Utah				10.5		10.5
Vermont				.6		.6
Virginia	.3			35.9	.4	36.6
Washington				10.0		10.0
West Virginia				29.1		29.1
Wisconsin				22.2		22.2
Wyoming				37.7		37.7
Hawaii		0.1		13.7		13.8
District of Columbia				2.0		2.0
Puerto Rico				.5		.5
Total	14.4	.1	0.1	1,982.6	12.9	2,010.1

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

	Miles	Miles	Miles	Miles	Miles	Miles
Arkansas				1.4		1.4
California			0.2	1.8		2.0
Connecticut				1.5		1.5
Delaware				.7		.7
Florida				1.8	0.4	2.2
Georgia	0.6			46.0		46.6
Illinois	.2			4.8		5.0
Indiana				1.5	.6	2.1
Iowa				9.7		9.7
Kansas				8.4	.7	9.1
Kentucky				1.0	.2	1.2
Louisiana				1.3		1.3
Maine				3.2		3.2
Maryland				.3		.3
Massachusetts				4.4		4.4
Michigan				.3		.3
Minnesota				5.1	.2	5.3
Mississippi				2.0		2.0
Missouri				1.5	.5	2.0
Nebraska				6.3		6.3
New York				.9	.6	1.5
North Carolina				2.1		2.1
North Dakota		0.5		3.7		4.2
Ohio				.5		.5
Oklahoma				5.6	.5	6.1
South Carolina				1.5	.2	1.7
South Dakota	.7			3.2		3.9
Texas				.8	1.0	1.8
Utah				.3		.3
Virginia				3.2	.3	3.5
Washington				.3		.3
West Virginia				1.0		1.0
Wyoming				.2		.2
Hawaii				.7		.7
District of Columbia					.1	.1
Total	1.5	.5	.2	127.0	5.3	134.5

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1939—*
Continued

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Public Works 1934-35	Works Pro- gram, grade crossings	Federal aid		Total
			Secondary or feeder	Grade crossings	
		<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Delaware.....			0.4		0.4
Georgia.....			1.1	1.0	2.1
Illinois.....			.6		.6
Louisiana.....			5.5		5.5
Minnesota.....			.8		.8
Missouri.....			.8		.8
Montana.....			.9		.9
Nebraska.....		0.5	.6	.2	1.3
New York.....				.8	.8
North Carolina.....			.7	.6	1.3
North Dakota.....				.1	.1
Ohio.....				.4	.4
Oklahoma.....			.5		.5
Tennessee.....				.3	.3
Texas.....				.5	.5
Utah.....				.1	.1
Virginia.....				.1	.1
Washington.....			1.2	.1	1.3
Wisconsin.....			.1		.1
Total.....		.5	13.2	4.2	17.9

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Arizona.....	0.7				0.7
Arkansas.....			4.1		4.1
California.....			3.7		3.7
Colorado.....			1.4		1.4
Delaware.....		4.5	7.4		11.9
Georgia.....	.2		17.8		18.0
Illinois.....			12.1		12.1
Indiana.....			22.5		22.5
Iowa.....				2.3	2.3
Kansas.....			15.8		15.8
Kentucky.....			45.5		45.5
Louisiana.....			15.5	1.0	16.5
Maine.....			12.4		12.4
Maryland.....			7.6		7.6
Massachusetts.....			3.2		3.2
Michigan.....			29.6		29.6
Minnesota.....			14.6		14.6
Missouri.....			42.0		42.0
Montana.....			16.9		16.9
Nebraska.....			66.5		66.5
Nevada.....			9.5		9.5
New Hampshire.....				.8	.8
New Jersey.....			7.4	.9	8.3
New York.....			5.7		5.7
North Carolina.....			9.6		9.6
North Dakota.....			8.2		8.2
Ohio.....			8.3	.6	8.9
Oklahoma.....			36.9	1.2	38.1
Oregon.....			3.3		3.3
Pennsylvania.....			7.5	1.1	8.6
South Carolina.....			12.3		12.3
Tennessee.....				.3	.3
Texas.....			27.1		27.1
Utah.....			8.2		8.2
Vermont.....			2.6		2.6
Virginia.....			8.2		8.2
Washington.....			15.1		15.1
West Virginia.....				.3	.3
Wisconsin.....			3.7		3.7
Wyoming.....			27.9		27.9
Hawaii.....			1.3		1.3
Total.....	.9	4.5	541.4	8.5	555.3

TABLE 12.—Mileage of projects approved but not under contract on June 30, 1939—
Continued

State	Public Works, 1934-35	Works Program		Federal aid			Total
		Highways	Grade crossings	Highways	Secondary or feeder	Grade crossings	
		Miles	Miles	Miles	Miles	Miles	
Alabama			0.1	4.6			4.7
Arizona	0.7			10.1			10.8
Arkansas				3.2	4.1		7.3
California			.2	6.3	3.7		10.2
Colorado				2.8	1.4		4.2
Connecticut				5.6		0.6	6.2
Delaware		4.5		25.6	7.8		37.9
Florida				31.3		.4	31.7
Georgia	.8			154.8	18.9	1.0	175.5
Illinois	.2			29.3	12.8	2.0	44.3
Indiana				40.6	22.5	.9	64.0
Iowa				45.5		2.3	47.8
Kansas				200.6	15.8	5.3	221.7
Kentucky				52.6	45.5	.9	99.0
Louisiana				21.6	21.0	1.0	43.6
Maine				31.3	12.4	.5	44.2
Maryland				12.9	7.6		20.5
Massachusetts				10.3	3.2		13.5
Michigan				23.9	29.6	.5	54.0
Minnesota				109.7	15.4	.2	125.3
Mississippi				41.8			41.8
Missouri				45.2	42.8	1.3	89.3
Montana					17.8		17.8
Nebraska			.5	293.3	67.0	1.2	362.0
Nevada					9.5		9.5
New Hampshire				12.4		.8	13.2
New Jersey				1.5	7.4	.9	9.8
New York				22.0	5.7	1.7	29.4
North Carolina				59.3	10.4	.6	70.3
North Dakota	14.1	.5		320.6	8.2	.1	343.5
Ohio				13.4	8.3	1.4	23.1
Oklahoma				93.3	37.3	1.8	132.4
Oregon					3.3		3.3
Pennsylvania				3.3	7.5	1.1	11.9
South Carolina				23.7	12.3	.2	36.2
South Dakota	.7			131.3			132.0
Tennessee				8.3		.7	9.0
Texas				49.7	27.1	2.1	78.9
Utah				10.8	8.2	.1	19.1
Vermont				.6	2.6		3.2
Virginia	.3			39.1	8.2	.8	48.4
Washington				10.3	16.3	.1	26.7
West Virginia				30.1		.3	30.4
Wisconsin				22.2	3.8		26.0
Wyoming				37.9	27.9		65.8
Hawaii			.1	14.4	1.3		15.8
District of Columbia				2.0		.1	2.1
Puerto Rico				.5			.5
Total	16.8	5.1	.8	2,109.6	554.6	30.9	2,717.8

TABLE 13.—*Status of grade-crossing elimination and protection projects on June 30, 1939*
COMPLETED DURING FISCAL YEAR

State	Crossings eliminated				Separation structures reconstructed				Crossings protected					
	Works Program		Federal aid		Total	Works Program grade crossings	Federal-aid grade crossings	Total	Public Works, 1934-35	Works Program		Federal aid		
	High-ways	Grade crossings	High-ways	Grade crossings						High-ways	Grade crossings	High-ways	Grade crossings	
Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	
Alabama		4	7	11									6	6
Arkansas		5	14	19						2				2
California			5	6			3	3	15					15
Colorado		3	2	5										6
Connecticut		4	4	2										23
Delaware		2		2										45
Florida		1	1	2				11	11					14
Georgia	1	18	1	20										1
Idaho		1	5	6										22
Illinois	1	11	2	4	18		4	4	4					53
Indiana		1	4	5			2	2	2				1	20
Iowa		13		13										32
Kansas		5	6	11										5
Kentucky		3	1	4				3	3					31
Louisiana		4	1	5				1	1					1
Maine		1	2	3										14
Maryland		2	3	5										45
Massachusetts	1							2	2					3
Michigan		1	8	9				1	1					1
Minnesota		2		2										4
Missouri		5	4	9				1	1					3
Missouri		1	4	5				2	2					4
Montana		1	8	9										6
Nebraska		3	1	4										2
Nevada								3	3					8
New Hampshire														3
New Jersey		3	1	4				1	1					1
New Mexico			7	7										3
New York		7	5	12				2	2					8
North Carolina		4	3	7				1	1					8
North Dakota			1	1				1	1					1
Ohio		23		23										5
Oklahoma		2		2										1

TABLE 13.—*Status of grade-crossing elimination and protection projects on June 30, 1939—Continued*
 COMPLETED DURING FISCAL YEAR—Continued

State	Crossings eliminated						Separation structures reconstructed				Crossings protected					
	Public Works, 1934-35		Works Program		Federal aid		Works Program		Federal aid		Works Program		Federal aid		Total	
	Number	Grade crossings	Number	High-ways	Number	Grade crossings	Number	High-ways	Number	Grade crossings	Number	High-ways	Number	Grade crossings	Number	Grade crossings
Oregon.....	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2
Pennsylvania.....	18	15	1	2	5	4	4	5	4	1	1	5	5	4	4	9
South Carolina.....	4	4	4	11	15	4	4	4	4	1	1	5	5	4	4	14
South Dakota.....	5	5	5	4	9	4	4	9	4	1	1	5	5	4	4	14
Tennessee.....	3	3	3	3	3	3	3	3	3	1	1	2	2	2	2	7
Texas.....	1	1	1	17	19	3	3	3	3	1	1	2	2	2	2	7
Utah.....	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
Vermont.....	6	6	6	6	6	6	6	6	6	2	2	2	2	2	2	4
Virginia.....	17	17	17	17	21	3	3	3	3	2	2	2	2	2	2	8
Washington.....	2	2	2	2	13	4	4	4	4	3	3	3	3	3	3	8
West Virginia.....	10	10	10	9	11	1	1	1	1	4	4	4	4	4	4	3
Wisconsin.....	1	1	1	2	6	1	1	1	1	1	1	1	1	1	1	3
Wyoming.....	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	6
Hawaii.....	2	2	2	1	3	1	1	1	1	2	2	2	2	2	2	23
District of Columbia.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
Puerto Rico.....	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	4
Total.....	2	1	173	15	382	38	48	86	21	154	3	1	258	438		

APPROVED BUT NOT UNDER CONTRACT

State	Crossings eliminated			Separation structures reconstructed		
	Works Program grade crossings	Federal aid		Works Program grade crossings	Federal-aid grade crossings	Total
		Highways	Grade crossings			
	Number	Number	Number	Number	Number	Number
Alabama				1		1
California	5					5
Connecticut					1	1
Delaware						
Florida		2				2
Georgia			1			1
Illinois		1	2		2	3
Indiana			2		1	3
Iowa			5			5
Kansas			5			5
Kentucky			1			1
Louisiana			2		1	3
Maine			1			1
Maryland			1			1
Massachusetts						
Michigan		1				1
Minnesota						
Missouri			3			3
Nebraska			2		2	4
New Hampshire			2			2
New Jersey			1			1
New York			6		1	7
North Carolina			4			4
North Dakota			2			2
Ohio			5		1	6
Oklahoma			3			3
Pennsylvania			3			3
South Carolina						
Tennessee			1		1	2
Texas			3			3
Utah			1			1
Virginia			1			1
Washington			1			1
West Virginia					2	2
District of Columbia			1			1
Total	5	5	65	2	15	75
						17

South Carolina.....	11.7	27.2	215.9	27.7	69.6		2.5	25.3	24.8	1.5	.3	378.8
South Dakota.....	93.9			80.2	62.3		177.0	61.4	89.6	.3	.2	361.4
Tennessee.....	4.4			321.4	684.8		17.1	126.8	299.8	1.3	.4	237.3
Texas.....	322.1			61.1	8.9		125.0	4.2	6	12.3	.1	1,710.0
Utah.....	.2			6	16.6		28.9		4.3	.1		200.1
Vermont.....				8.9	58.2	.1	86.7	44.5	96.2	1.7	.1	50.6
Virginia.....	5.7	5.6	72.3	137.0	4.9		14.0	2.6	21.6	1.4	.5	380.4
Washington.....	7.4			5.6			19.6	29.8	16.0	1.4	.3	184.3
West Virginia.....	8.8			55.9			6.6	.3	89.3	.7	.2	107.1
Wisconsin.....	68.6			29.1			270.7			.8	.3	221.7
Wyoming.....	70.4						1.1		.2	.4	.1	371.1
Hawaii.....							23.0					24.5
District of Columbia.....							28.0			.1	.2	28.3
Puerto Rico.....							348.0	138.2	2,517.0	64.2	14.0	
Total.....	1,392.3	245.4	737.3	2,209.7	2,367.7	183.6	2,568.1	646.2	2,517.0	50.3	.3	13,482.3

BUREAU OF PUBLIC ROADS

TABLE 15.—Mileage, by types of construction, of projects under contract on June 30, 1939

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland-cement concrete	Block	Bridges and approaches	Grade separations		Total
	Miles	Miles	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Miles	Miles	
Alabama	0.1	13.2	14.1	162.9	18.5	76.1	0.2	2.4	2.4	3.9	1.4	3.9	364.5				
Arizona	4.7	9.8	51.7	27.3	64.5	8.5	15.0	203.7	15.0	0.8	1.1	1.0	299.9				
Arkansas	9.7	13.4	125.6		11.6	2.9	3.3	64.5	8.5	0.5	0.6	0.1	115.9				
California	0.4												126.6				
Colorado													18.6				
Connecticut													31.0				
Delaware			18.1	9.7	0.5	32.5	12.7	12.7	2.9	1.0	0.2	0.2	80.3				
Florida	25.0		55.2	113.4	33.3	12.8	11.4	43.2	35.8	2.1	0.7	0.7	461.4				
Georgia	31.1	31.2	38.3		6.5	28.4	3.4	3.4	3.4	2.1	0.6	0.6	70.9				
Idaho	2												341.6				
Illinois	91.8		26.0	5.4	8.1	4.5	127.6	98.9	3.5	2.3	1.5	2.7	232.8				
Indiana	36.0		45.0	17.8	44.2	8.8	109.2	109.2	3.5	0.9	1.0	1.0	236.1				
Iowa	53.4		50.1	32.9	19.5	17.8	12.8	12.8	19.5	1.0	0.2	0.2	198.5				
Kansas	51.5		104.4		25.3	18.3	38.1	38.1	18.3	1.6	0.6	0.6	196.7				
Kentucky	8.6		59.5	0.3	27.8	2.0	10.6	10.6	8	2.1	0.1	0.1	151.2				
Louisiana	64.8		1.1		4.1	6.3	4.1	4.1	0.8	0.3	0.3	0.3	49.3				
Maine	2.4		14.3	2.1	1.5	2.7	2.1	2.1	4.1	0.3	0.3	0.3	83.7				
Maryland									14.9	55.9	0.1	0.1	36.0				
Massachusetts									6.6	2.8	0.3	0.3	244.6				
Michigan	85.4		43.0	16.0	3.1	89.1	1.4	89.1	1.4	0.1	0.1	0.1	439.1				
Minnesota	133.3	4.8	63.2	49.4	123.4	13.2	2.0	33.6	2.0	0.6	0.6	0.6	308.1				
Mississippi	135.4		22.1	30.1	36.0	1.7	1.8	29.3	1.7	1.3	0.9	0.9	345.0				
Missouri	48.0		143.7	39.6	80.3	18.9	18.9	18.9	1.8	1.3	0.9	0.9	239.1				
Montana	53.5		8.4	34.4	121.9	47.3	1.2	1.2	1.2	1.7	0.5	0.5	621.0				
Nebraska	133.7	141.6	14.7		13.5	1.9	8.3	8.3	1.9	0.1	0.1	0.1	62.2				
Nevada									10.2	3.5	0.1	0.1	35.2				
New Hampshire	2.5		4.1	3.3	7.2	6.6	6.6	6.6	3.5	0.1	0.1	0.1	45.2				
New Jersey	21.9		66.4	49.2	1.1	152.7	1.1	152.7	4.9	6.0	1.2	1.2	151.3				
New Mexico	35.8		27.7	100.8	5.1	53.2	0.3	60.9	5.1	1.2	0.3	0.3	329.6				
New York	36.1	2.8	5.8	152.9	4.0	1.3	1.3	1.3	6.8	1.1	0.1	0.1	524.1				
North Carolina	19.0	8.4	7.3	11.9	29.1	6.8	79.6	20.1	4.0	0.7	0.7	0.7	167.4				
North Dakota	19.0	5.0	23.2		35.2	11.0	8.6	20.0	6.8	1.1	0.6	0.6	33.7				
Ohio	2.5		5.6	99.9	43.9	13.1	13.1	13.1	11.0	8.6	3.8	3.8	201.5				
Oklahoma	6.4		36.4		35.2	44.1	97.6	97.6	44.1	13.1	0.7	0.7	236.2				
Oregon	35.3												201.5				
Pennsylvania	5.8												236.2				

Rhode Island.....	21.0	21.5	99.6	5.7	69.0	132.2	8.3	14.0	2	8.5	1	.5	17.1
South Carolina.....	218.7			50.1	14.8					1.7	1.7	.1	160.0
South Dakota.....	20.9			140.2	282.4	14.9			.3	10.8	1.6	.1	437.2
Tennessee.....	257.2		8.8	48.2					55.1	103.7	7.9	1.6	146.1
Texas.....	1.3								2.5	17.1	.1	1.6	891.2
Utah.....													134.4
Vermont.....					6.1	20.6	.1						26.9
Virginia.....	6.3	29.4	29.4	3.9	29.4	26.4		15.0		26.7	1.1	.3	138.5
Washington.....	7.2			45.7	11.1					12.0	1.7		77.7
West Virginia.....	4.0			12.4		18.5		7.6		8.0	1	.9	68.5
Wisconsin.....	58.7			109.3						177.4	1.7	.8	347.9
Wyoming.....	72.3			20.4	17.8	61.7					.2	.1	173.0
Hawaii.....	1.3					19.2	.7				.2		21.4
Puerto Rico.....						47.8					.6		49.0
Total.....	1,787.9	223.5	830.5	1,700.0	1,383.3	69.7	113.0	212.7	1,880.8	20.4	59.6	18.0	10,012.1
						387.7	1,824.6					.4	

BUREAU OF PUBLIC ROADS

TABLE 16.—Mileage, by types of construction, of projects approved but not under contract on June 30, 1939

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland-cement concrete	Block	Bridges and approaches	Grade separations, and high-ways	Total
	Miles	Miles	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								
Alabama				4.6			10.1									4.7
Arizona									0.7							10.8
Arkansas	0.6				5.7				4.6	3.6	1.4	0.9		0.1		7.3
California					4.2											10.2
Colorado								0.2		2.3						4.2
Connecticut																6.2
Delaware																37.9
Florida	5.5							.4	5.3					.1		31.7
Georgia	13.4			51.9	11.8	27.0		66.8								175.5
Illinois	9.7				8.3						2.0			.3		44.3
Indiana					1	6.6		4.1	12.9		.2			.2		64.0
Iowa					8.7	31.1								.1		47.8
Kansas	43.1			30.2	110.0	12.6			1.4		43.7			1.5		221.7
Kentucky					48.1					2.1				.4		99.0
Louisiana	6.7				22.0									.3		43.6
Maine									15.7	2.7	5.6			.1		20.5
Maryland	9.5				6.2			3.3								13.5
Massachusetts																54.0
Michigan	3.2				6.4	20.1			5.2					.1		125.3
Minnesota	11.4				4.1	27.6			13.2					.2		41.8
Mississippi	18.9								75.9					.4		89.3
Missouri	11.4													.4		17.8
Montana	12.5				45.8											362.0
Nebraska	99.9			58.7	114.0	3.0	3.7		57.9					.7		9.5
Nevada									9.5					.4		13.2
New Hampshire								6.0	7.1					.1		9.8
New Jersey					4.7											29.4
New York					.1			4.7		.5				.2		70.3
North Carolina	4.2					25.0			10.0					.3		343.5
North Dakota	44.9			8.2		127.7			162.3							23.1
Ohio								.4								132.4
Oklahoma	5.4				65.3	1.4								2.7		3.3
Oregon																11.9
Pennsylvania								3.3		.6				.3		36.2
South Carolina	23.6			6.6				7.5								132.0
South Dakota	26.9								26.8					.2		9.0
Tennessee					3.2	53.2								.1		

Texas	11.3			7.6	52.9			5.3			.6	.7		.3		.2	78.9
Utah	1.3			1.0				17.7				.6					19.1
Vermont				1.0				1.6									3.2
Virginia	.1	5.3		3.0	1.0	7.9		15.1			12.1	22.8		.2			48.4
Washington	3.2			3.0	.4	5.4					5.5	1.3		.7		.1	26.7
West Virginia	11.3	10.8		1.8							2.5	18.9					30.4
Wisconsin				10.4	45.0			10.2				2.0		.1			26.0
Wyoming	4.9													.2			65.8
Hawaii							9.9				1.1	.9					15.8
District of Columbia							.5										2.1
Puerto Rico																	.5
Total	383.8	91.3	229.1	398.9	445.4	9.9	131.5	459.8	11.8	125.0	416.2	2.7	9.4	3.0			2,717.8

CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Special authorizations and appropriations have been made by Congress for the survey, construction, reconstruction, and maintenance of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, and Federal reservations other than the forest reservations, where such land is more than 5 percent of the total area of the State. There are 14 of these Federal-land States, all of them west of the Mississippi River. The percentage of such lands in the several States varies considerably and reaches a maximum of approximately 73 percent in Nevada.

The construction of highways across these relatively large areas that do not contribute to State revenues imposes a serious burden on State highway funds.

The Federal-land highways differ from the forest highways and the Federal-aid highways in that there is no Federal-land highway system. Federal-land funds may be expended on roads which are on the Federal-aid system or on main roads not on the Federal-aid system. Contributions from the States are not required to be used in conjunction with Federal-land funds, but cooperative funds from the States may be used. Federal-land funds are sometimes expended under the supervision of State highway departments, following Federal-aid procedure, and sometimes under the detailed supervision of this organization.

Authorizations for the construction of roads in public lands have been made by eight congressional acts, passed up to the end of the fiscal year 1939. Authorizations have been made available for each fiscal year from 1931 through 1941, with the exception of 1932 and 1937, and total \$23,000,000. The authorization for 1939 was \$2,500,000; for 1940, \$1,000,000; and for 1941, \$2,000,000.

Federal-land projects, in large part, involve the grading and draining of new roads and the reconstruction of old roads to greater widths and to higher standards of grade and alinement. Most of these roads are subsequently improved by the addition of gravel and bituminous surfacing. In the effort to spread the relatively small funds over a considerable mileage of road, very little mileage of the higher types of surface, such as bituminous concrete and portland-cement concrete, has been constructed.

During the fiscal year 244 miles of road were brought to completion, and at the end of the year 200 miles were under construction or had been contracted for. The total improved mileage at present is 1,623 miles. Tables 17 to 20 show details concerning work completed during the year and the status at the end of the year.

TABLE 17.—*Public-lands funds allotted to projects completed during the fiscal year 1939*

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona	\$315, 826	\$335, 830	54. 5	Oklahoma	\$52, 097	\$59, 473	0. 1
California	5, 395	5, 395	7. 7	Oregon	60, 179	64, 432	8. 5
Colorado	94, 780	94, 780	6. 8	Utah	23, 905	24, 538	9. 4
Idaho	63, 019	63, 019	3. 2	Washington	38, 349	38, 985	2. 5
Montana	151, 769	164, 891	14. 0	Wyoming	141, 526	145, 796	23. 1
Nevada	507, 569	532, 232	100. 8				
New Mexico	104, 918	104, 919	13. 0	Total	1, 559, 332	1, 634, 290	243. 6

TABLE 18.—Public-lands funds allotted to projects under contract and under construction, June 30, 1939

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona.....	\$344, 217	\$344, 217	29. 6	South Dakota.....	\$67, 580	\$67, 580	6. 5
California.....	173, 092	173, 092	20. 2	Utah.....	281, 910	281, 910	12. 2
Colorado.....	30, 170	30, 170	3. 7	Washington.....	38, 089	38, 089	1. 5
Montana.....	138, 501	141, 211	8. 4	Wyoming.....	197, 450	197, 450	32. 7
Nevada.....	208, 416	215, 416	56. 8	Total.....	1, 737, 181	1, 746, 491	199. 9
North Dakota.....	104, 074	104, 074	5. 2				
Oregon.....	153, 282	153, 282	23. 1				

TABLE 19.—Public-lands funds allotted to projects approved but not under contract and balance available for programmed projects, June 30, 1939

State	Public-lands funds	Estimated total cost	Miles	Balance available for new projects	State	Public-lands funds	Estimated total cost	Miles	Balance available for new projects
Arizona.....				\$220, 194	Oklahoma.....				\$39, 825
California.....	\$242, 089	\$250, 457	6. 5	156, 936	Oregon.....				74, 656
Colorado.....				90, 204	South Dakota.....				61, 372
Idaho.....				126, 530	Utah.....				141, 601
Montana.....				60, 595	Washington.....				14, 930
Nevada.....	34, 471	34, 471	4. 6	221, 054	Wyoming.....				124, 628
New Mexico.....	772	772		302, 892	Total.....	\$277, 332	\$285, 700	11. 1	1, 648, 342
North Dakota.....				12, 925					

TABLE 20.—Mileage of public-lands roads, by types of construction, completed as of June 30, 1939

State	Graded and drained	Gravel		Macadam, treated	Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Bridges	Total
		Un-treated	Treated							
Arizona.....	Miles 5. 9	Miles	Miles 79. 9	Miles	Miles 80. 8	Miles	Miles	Miles	Miles 0. 5	Miles 167. 1
California.....	. 2	13. 8	21. 3		60. 2				. 3	95. 8
Colorado.....		21. 7			8. 0				. 1	29. 8
Idaho.....	9. 2	50. 1			31. 5					90. 8
Montana.....	33. 0	18. 2			18. 2				. 3	69. 7
Nevada.....		36. 5			501. 5				. 1	538. 1
New Mexico.....		31. 3	10. 8		28. 8			6. 0	. 3	77. 2
North Dakota.....	9. 4	16. 0							. 1	25. 5
Oklahoma.....					5. 6		1. 8	2. 5	. 1	10. 0
Oregon.....	3. 5	130. 6	5. 8	4. 0					. 1	144. 0
South Dakota.....	12. 5	2. 9	4. 3							19. 7
Utah.....		32. 6			141. 6		6. 8		. 1	181. 1
Washington.....	4	16. 8				2. 6		3. 7		23. 5
Wyoming.....	23. 7		15. 6		110. 8				. 3	150. 4
Total.....	97. 8	370. 5	137. 7	4. 0	987. 0	2. 6	8. 6	12. 2	2. 3	1, 622. 7

Notable from the standpoint of continuous Federal-land construction during the fiscal year are: the Oceanside-Kane Springs highway in California, the Death Valley National Monument-Easterly highway in California, the Railroad Pass-Searchlight highway in Nevada, and the Mineral Hot Springs-Poncha Springs highway in Colorado.

RESTORATION OF FLOOD-DAMAGED ROADS

Special acts during the period 1928-31 authorized funds for reconstruction of flood-damaged roads and bridges in 11 States. Work is still active in 4 States. All authorized funds have been absorbed in

completed work in Florida, New Hampshire, South Carolina, and Vermont. All work planned in Alabama, Georgia, and Louisiana has been completed.

Construction was completed on 43 miles costing \$511,947 during the year; 21.1 miles estimated to cost \$829,669 were under contract at the close of the year, as shown in table 21; and three States had unobligated balances as follows: Arkansas, \$122,507; Kentucky, \$15,240; and Mississippi, \$140,433.

TABLE 21.—*Status of flood-relief funds provided under special flood-relief acts*

Status and State	Flood-relief funds	Estimated total cost	Miles	Status and State	Flood-relief funds	Estimated total cost	Miles
Completed during the fiscal year:				Under contract:			
Arkansas.....	\$103,544	\$207,505	25.2	Arkansas.....	\$96,256	\$192,513	9.4
Kentucky.....	146,470	304,442	17.8	Kentucky.....	159,068	318,136	7.2
				Mississippi.....	142,300	299,900	3.4
				Missouri.....	8,562	19,120	1.1
Total.....	250,014	511,947	43.0	Total.....	406,186	829,669	21.1

The Bureau has continued to supervise other projects involving the reconstruction of flood-damaged bridges at the request of the Works Progress Administration. These projects are financed by that organization and the States and, in some instances, partly with Works Program funds administered by the Bureau. Flood-damaged bridges and bridge approaches are reconstructed for the most part on secondary roads. In this work, which is done by contract, the Bureau cooperates closely with the State highway departments much the same as on Federal-aid construction.

During the year 3.2 miles of bridges and approaches costing \$3,250,950 were completed. This brings the total of this class of work completed to 38 miles costing \$12,283,140. At the close of the year work estimated to cost \$250,000 was under contract as shown in table 22.

TABLE 22.—*Status of funds allotted for reconstruction of flood-damaged bridges by the Works Progress Administration to be supervised by the Bureau of Public Roads*

Status and State	Works Progress flood reconstruction funds	Estimated total cost	Miles
Completed during the fiscal year:			
Massachusetts.....	\$1,248,296	\$2,304,174	1.6
New Hampshire.....	123,750	165,000	.1
Pennsylvania.....	438,726	690,764	1.4
Vermont.....	41,689	91,012	.1
Total.....	1,852,461	3,250,950	3.2
Under contract:			
West Virginia.....	60,500	250,000	.2

Federal funds to aid the States in the immediate repair of highways and bridges on the Federal-aid system damaged by floods or other forces of nature have been made available by two congressional acts. The Hayden-Cartwright Act of June 18, 1934, authorized \$10,000,000, and the Federal Aid Highway Act of 1938, authorized \$8,000,000 from

any funds available for expenditure under the Federal Highway Act and authorized future appropriation of funds to replace the funds expended for such purposes. These acts make possible the immediate repair of damaged roads and bridges without waiting for specific authorization of funds. The States are required to match these funds in the same manner as regular Federal-aid funds.

Work was completed on 31.2 miles costing \$2,759,748 during the year, as shown in table 23. Work estimated to cost \$4,124,118 was under contract, and work estimated to cost \$448,960 was approved but not yet under contract. Funds paid to the States during the year under this authorization amounted to \$1,704,554, bringing the total paid to the States under the Hayden-Cartwright Act to \$4,274,430. Funds paid to States during the fiscal year were as follows:

California.....	\$867, 830	New Hampshire.....	\$5, 405
Colorado.....	74, 032	New York.....	10, 523
Kansas.....	7, 982	Ohio.....	592, 591
Kentucky.....	5, 345	Vermont.....	47, 579
Maine.....	6, 655	Virginia.....	2, 359
Maryland.....	78, 673		
Missouri.....	5, 580	Total.....	1, 704, 554

TABLE 23.—Status of flood-relief funds provided under section 3 of the Hayden-Cartwright Act

Status and State	Emergency relief funds	Estimated total cost	Miles	Status and State	Emergency relief funds	Estimated total cost	Miles
Completed during the fiscal year:				Under contract—			
California.....	\$687, 806	\$1, 190, 870	19.3	Continued			
Kansas.....	94, 108	197, 420	.2	Maryland.....	\$87, 500	\$179, 000	0.6
Kentucky.....	14, 171	29, 239	.7	Missouri.....	24, 334	48, 668	.6
Maryland.....	9, 900	20, 615	.1	Ohio.....	664, 060	1, 330, 780	9.6
Missouri.....	5, 580	11, 420	.2	Texas.....	321, 650	657, 000	.6
Ohio.....	531, 607	1, 076, 023	8.0	Vermont.....	26, 400	52, 800	.3
Vermont.....	37, 586	79, 800	2.5	Total.....	2, 194, 463	4, 124, 118	49.9
Virginia.....	77, 180	154, 361	.2	Approved but contract not awarded:			
Total.....	1, 457, 938	2, 759, 748	31.2	Missouri.....	55, 560	207, 160	8.7
Under contract:				Ohio.....	120, 950	241, 800	3.2
California.....	1, 036, 337	1, 787, 506	37.4	Total.....	176, 510	448, 960	11.9
Kentucky.....	34, 182	68, 364	.8				

Including work completed in previous years, the total obligations to the end of the fiscal year amounted to \$8,387,607, leaving a balance of \$9,612,393 for new projects.

WORK-RELIEF HIGHWAY PROJECTS

Work-relief highway projects, begun in the fall of 1933 to relieve distress in drought-stricken areas, have been continued. Road work has been carried on by an arrangement under which the Federal Emergency Administration of Public Works has granted funds to pay material and equipment costs, limited to not more than 30 percent of the total cost, and the labor has been supplied from relief rolls and paid first by the Federal Emergency Relief Administration and later by the Works Progress Administration.

The Bureau, cooperating with the respective State highway departments, has assumed the responsibility of supervising road work under this arrangement.

During the year 625 miles of this kind of work costing \$3,824,253 was completed, bringing the total to date to 7,014 miles. Work was under contract at the close of the year on 414 miles, estimated to cost \$5,505,828, as shown in table 24.

TABLE 24.—*Status of National recovery work-relief projects*

Status and State	National recovery work-relief funds	Total cost	Miles	Status and State	National recovery work-relief funds	Total cost	Miles
Completed during the fiscal year:				Under contract:			
Oklahoma.....	\$122,400	\$408,000	110.0	Minnesota.....	\$717,468	\$3,630,851	19.9
Texas.....	979,433	3,416,253	514.7	Oklahoma.....	447,600	1,592,000	332.7
				Texas.....	82,522	282,977	61.5
Total.....	1,101,833	3,824,253	624.7	Total.....	1,247,590	5,505,828	414.1

LOAN-AND-GRANT HIGHWAY PROJECTS

The Federal Emergency Administration of Public Works has continued the policy of aiding, by loans or grants or both, the construction of roads and bridges in a number of States. Projects of this kind are initiated by their sponsors with the administration and, after agreement has been reached and funds allotted, are turned over to the Bureau for detailed administration of construction. Practically all of this work is done by the contract method.

This work was begun in 1934 with funds provided by the National Industrial Recovery Act and has been continued with funds allocated under authorization of the Emergency Relief Appropriation Act of 1935 and the Work Relief and Public Works Appropriation Act of 1938. At the close of the fiscal year loans and grants of \$76,816,461 had been made for specific projects 17,238 miles in length and estimated to cost \$174,746,773. This represents a net increase during the year of 7,760 miles involving \$20,380,189 of loan-and-grant funds and estimated to cost \$48,355,522. Details by States are shown in table 25.

TABLE 25.—Status on June 30, 1939, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit

ALLOTMENTS FROM NATIONAL INDUSTRIAL RECOVERY ACT

State	Funds allotted by Public Works Administration			Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments				
	Tentative allotment by special board for Public Works	Allotment by contracts executed		Miles	Estimated total cost	Funds assigned		
		Grant	Loan			Grant	Loan	Other
Alabama.....	\$70,248	\$20,617	\$49,631	6.8	\$70,248	\$20,617	\$49,631	-----
California.....	1,310,864	1,310,864	-----	16.3	6,063,238	1,310,864	-----	\$4,752,374
Connecticut.....	1,207,596	1,207,596	-----	68.9	4,825,941	1,207,596	-----	3,618,345
Illinois.....	2,400,618	2,400,618	-----	97.6	8,256,422	2,400,618	-----	5,855,804
Indiana.....	200,662	200,662	-----	34.4	765,294	200,662	-----	564,632
Iowa.....	307,587	307,587	-----	823.7	1,061,690	307,587	-----	754,103
Kansas.....	5,119,130	1,524,130	3,595,000	410.0	5,686,101	1,524,130	3,595,000	666,971
Louisiana.....	269,258	88,258	181,000	47.3	300,515	88,258	181,000	31,257
Maryland.....	4,220,000	1,590,000	2,630,000	72.2	5,131,317	1,410,902	2,630,000	1,090,415
Massachusetts.....	1,702,395	1,702,395	-----	105.1	5,508,720	1,634,636	-----	3,874,084
Michigan.....	10,000	10,000	-----	29.0	39,818	10,000	-----	29,818
Minnesota.....	1,337,211	952,211	385,000	472.9	3,261,752	952,211	385,000	1,924,541
Mississippi.....	559,135	161,149	397,986	85.2	559,135	161,149	397,986	-----
Missouri.....	1,026,000	1,026,000	-----	50.6	3,473,587	1,026,000	-----	2,447,587
Montana.....	1,829,000	679,000	1,250,000	697.8	1,955,463	579,000	1,250,000	120,463
Nebraska.....	11,500	11,500	-----	59.6	40,120	11,500	-----	28,620
New York.....	736,814	375,033	361,781	30.9	1,282,140	375,033	361,781	545,326
Ohio.....	793,180	139,878	653,302	27.1	995,845	139,878	653,302	202,668
South Carolina.....	76,083	21,283	54,800	28.0	76,083	21,283	54,800	-----
Texas.....	1,471,021	931,421	539,600	238.2	3,254,907	931,421	539,600	1,783,886
Washington.....	2,270,890	2,270,890	-----	1,275.1	8,209,058	2,270,890	-----	5,938,168
West Virginia.....	2,000,000	2,000,000	-----	453.7	6,771,399	2,000,637	-----	4,770,762
Wisconsin.....	454,300	142,300	312,000	86.4	526,177	142,300	312,000	71,877
Total.....	29,383,492	18,973,392	10,410,100	5,216.8	68,114,973	18,772,172	10,410,100	38,977,701

ALLOTMENTS FROM EMERGENCY RELIEF APPROPRIATION ACT OF 1935

California.....	\$57,821	\$57,821	-----	.4	\$128,842	\$57,821	-----	\$71,021
Colorado.....	3,000,000	3,000,000	-----	266.6	7,267,500	3,000,000	-----	4,267,500
Florida.....	71,514	71,514	-----	.6	158,921	71,514	-----	87,407
Illinois.....	586,673	586,673	-----	114.1	1,396,151	586,673	-----	809,478
Iowa.....	393,319	393,319	-----	862.1	903,659	393,319	-----	510,340
Kansas.....	14,463	14,463	-----	.6	33,364	14,463	-----	18,901
Maryland.....	1,000,000	1,000,000	-----	25.4	1,852,497	833,624	-----	1,018,873
Michigan.....	119,435	119,435	-----	16.5	290,093	119,435	-----	170,658
Minnesota.....	152,389	152,389	-----	69.2	345,351	152,389	-----	192,962
Mississippi.....	15,325,683	15,325,683	-----	1,395.0	34,165,014	15,229,197	-----	18,935,817
Missouri.....	396,700	396,700	-----	364.5	881,690	396,700	-----	484,990
Nebraska.....	6,612	6,612	-----	18.0	14,915	6,612	-----	8,303
New Jersey.....	29,863	29,863	-----	3.1	66,362	29,863	-----	36,499
New York.....	212,872	212,872	-----	28.7	518,538	212,872	-----	305,666
Ohio.....	744,519	356,123	\$388,396	229.5	805,399	356,123	\$388,396	60,880
Pennsylvania.....	349,969	349,969	-----	1.7	625,682	281,557	-----	344,125
South Carolina.....	707,069	474,069	233,000	249.7	1,071,831	474,069	233,000	364,762
Texas.....	2,930,193	2,440,193	490,000	381.9	5,857,571	2,440,193	490,000	2,927,378
Utah.....	45,900	45,900	-----	29.1	116,353	45,900	-----	70,453
Washington.....	730,093	730,093	-----	184.8	1,889,022	730,093	-----	1,158,929
Total.....	26,875,087	25,763,691	1,111,396	4,241.5	58,388,755	25,432,417	1,111,396	31,844,942

TABLE 25.—*Status on June 30, 1939, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit—Continued*

ALLOTMENTS FROM WORK RELIEF AND PUBLIC WORKS APPROPRIATION ACT
OF 1938

State	Funds allotted by Public Works Administration		Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments					
	Tentative allotment by special board for Public Works	Allotment by contracts executed		Miles	Estimated total cost	Funds assigned		
		Grant	Loan			Grant	Loan	Other
Alabama.....	\$84,965	\$84,965		12.0	\$188,811	\$84,965		\$103,846
California.....	205,278	205,278		22.7	388,153	174,667		213,486
Colorado.....	454,950	454,950		51.6	1,010,950	446,150		564,800
Connecticut.....	1,784,250	1,784,250		20.0	2,257,569	1,013,991		1,243,578
Florida.....	769,223	769,223		83.2	1,812,306	747,752		1,064,554
Georgia.....	605,700	605,700		85.9	1,242,930	556,090		683,840
Idaho.....	54,418	54,418						
Illinois.....	2,409,191	2,409,191		239.0	4,624,670	1,929,795		2,694,875
Iowa.....	1,140,116	1,140,116		1,138.4	2,073,052	941,061		1,131,991
Kansas.....	504,098	504,098		26.7	786,325	353,846		432,479
Kentucky.....	100,945	100,945		25.0	224,322	100,945		123,377
Massachusetts.....	49,050	49,050		2	95,467	42,960		52,507
Michigan.....	1,917,990	1,937,790	1	325.0	4,011,479	1,805,004		2,206,475
Minnesota.....	2,138,563	2,255,092	1	1,542.7	3,258,923	1,443,310		1,815,613
Mississippi.....	3,074,295	3,074,295		387.2	7,052,430	3,003,714		4,048,716
Missouri.....	787,156	787,156		685.1	1,709,664	767,857		941,807
Nebraska.....	24,750	24,750		5	60,936	24,750		36,186
New Jersey.....	37,006	37,006		4	82,235	37,006		45,229
New York.....	90,000	90,000		2	220,138	90,000		130,138
North Dakota.....	590,180	590,180		255.0	1,260,945	567,420		693,525
Ohio.....	1,008,594	1,008,594		1,319.3	1,671,252	751,254		919,998
Oklahoma.....	105,300	105,300		80.4	224,331	100,036		124,295
Oregon.....	489,519	489,519		123.4	972,710	433,510		539,200
Pennsylvania.....	178,627	178,627		4.6	371,456	167,155		204,301
South Carolina.....	713,135	805,435		371.2	1,173,229	527,953		645,276
Texas.....	2,387,338	2,387,338		590.1	5,017,892	2,258,329		2,759,563
Vermont.....	250,035	242,489		4.1	458,576	202,408		256,168
Washington.....	1,529,070	1,567,270		242.3	3,005,638	1,339,200		1,666,438
West Virginia.....	1,156,070	1,156,070		130.1	2,560,137	1,065,744		1,494,443
Wisconsin.....	160,875	160,875		13.1	426,469	155,504		270,965
Total.....	24,800,747	25,055,950		7,779.4	48,243,045	21,135,376		27,107,669

¹ Differences due to "advice of contracts" not yet received from Public Works Administration.

NATIONAL-FOREST ROAD CONSTRUCTION

Improvement of the system of forest highways of 21,981 miles located in 36 States, Alaska, and Puerto Rico was continued during the year when 413 miles were brought to completion under Bureau supervision. However, much of the work was further improvement of previously improved roads, and only 164 miles were improved for the first time.

When the improvement of forest roads and trails with annual authorizations began 23 years ago, the forest areas were almost inaccessible to wheeled vehicles. During the first years of improvement, the construction was almost entirely of the pioneer type. As improvement of main highways throughout the country advanced, the standards of forest-highway improvement were raised. When the Federal-aid and State highway systems were designated, it became necessary to designate and provide for the improvement of routes across forest areas forming essential links in these systems. Thirty-nine percent of the forest-highway system as now constituted provides necessary links in the Federal-aid system, and another 39 percent is similarly related to portions of State systems not on the

Federal-aid system. As improvement of these systems has progressed, there has been strong pressure to open the impassable sections through the forests. To accomplish this, with the funds that have been available, many miles of road have been built according to the principles of stage construction. The first stage has included only a partial provision of the improvement known to be ultimately desirable but has been so designed that further improvements may be provided in successive steps as funds are provided.

At the end of the fiscal year, work had been done on 6,832 miles, or 31 percent, of the forest-highway system. The greater portion of the system is still unimproved, but greatly increased use of the surfaced sections, increase in speed of vehicles, and a general raising of highway standards have made necessary a concentration of present efforts on the modernizing of those highways built in the early stages of the program. Of the 413 miles completed in 1939, 249 miles were second- or third-stage improvement, and work was done for the first time on 164 miles. The existing forest highways are being raised to higher standards and are attracting increasing thousands of tourists each year, but extension of the surfaced mileage in the system is progressing at a slow pace.

Construction of forest highways, within the limits of Federal funds authorized, is not contingent upon the provision of State or local funds, but in past years the State and local interest in obtaining construction of particular roads has led to the provision of cooperative funds that have materially accelerated the program. In the past few years, there has been a marked decrease in the amount of State and local funds offered for use on forest roads, and the program has been supported almost wholly with Federal funds. This is partly explained by the small mileage of entirely new construction. Communities adjacent to the forests have a stronger interest in the opening up of new routes than in betterment of routes already open to travel.

The work done under the direction of this Bureau and reported here includes all improvements classified as major. Minor road improvements are administered by the Forest Service. Major projects include all work on the forest-highway system except those that do not require the technical services of a highway-engineering organization or those having an estimated average cost of less than \$2,000 per mile. Forest-development road projects of an estimated average cost greater than \$5,000 per mile, and those requiring the services of a highway-engineering organization are also classed as major projects.

Authorizations for forest-road work have been at the rate of \$14,000,000 annually in the fiscal years 1938 and 1939, and \$10,000,000 for 1940.

At the beginning of the year the active program involved \$10,224,747, of which \$6,825,767 was involved in work under contract and force account construction, \$1,647,091 in surveys, \$1,426,578 in maintenance, and \$325,311 for miscellaneous items. There was available for new work \$16,758,024, of which \$6,728,897 was for programmed work not under contract, and \$10,029,127 was available for additional new projects. Of the latter amount \$8,180,139 has been assigned to major projects and \$219,429 to minor projects during the year, leaving a balance of \$1,629,559 available at the end of the year for new projects. The amount of \$10,029,127 consists of

\$6,666,667 authorized by the act of June 8, 1938, for the fiscal year 1940, apportioned December 27, 1938, and \$3,362,460 from previous apportionments.

Major work to cost \$8,657,996 was put under contract, and the roads completed cost \$8,026,652.

At the close of the year the forest-road work amounted to \$10,-856,091, of which work under contract and force-account construction was \$7,815,957, surveys \$1,448,368, maintenance \$1,237,599, and miscellaneous items \$354,167. The amount available for new work was \$7,880,599, of which \$6,251,040 had been assigned to specific projects then placed under contract, and \$1,629,559 was available for additional projects. These amounts include the \$10,000,000 authorized for forest-road work in the fiscal year 1940.

Tables 26-29 show the mileage of the forest-road system, progress in improvement during the past year, and the present condition of improvement.

TABLE 26.—Classification of the mileage of the forest-highway system at end of fiscal year 1939

Region and State	Class 1 ¹	Class 2 ²	Class 3 ³	Total
Western:	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alaska.....			352.8	352.8
Arizona.....	345.8	268.6	445.0	1,059.4
California.....	670.7	1,252.7	501.8	2,425.2
Colorado.....	625.0	1,091.0	94.0	1,810.0
Idaho.....	721.2	165.3	191.5	1,078.0
Montana.....	666.0	304.6	231.0	1,201.6
Nevada.....	104.7	282.2	31.0	417.9
New Mexico.....	162.0	522.0		684.0
Oregon.....	719.3	352.6	310.4	1,382.3
South Dakota.....	227.0		86.0	313.0
Utah.....	191.5	471.4	67.2	730.1
Washington.....	391.3	123.1	246.8	761.2
Wyoming.....	387.3	37.0	217.7	642.0
Total.....	5,211.8	4,870.5	2,775.2	12,857.5
Eastern:				
Alabama.....	4.0	20.0	31.0	55.0
Arkansas.....	274.6	310.3	44.6	629.5
Florida.....	27.4	218.9		246.3
Georgia.....	110.3	36.5	58.5	205.3
Illinois.....	223.1	27.5	35.0	285.6
Kentucky.....	132.8	132.1	28.5	293.4
Louisiana.....	66.1	369.4	21.9	457.4
Maine.....			11.0	11.0
Michigan.....	466.7	283.8	274.4	1,024.9
Minnesota.....	179.4	217.7	186.9	584.0
Mississippi.....	204.0	264.0	71.0	539.0
Missouri.....	426.2	160.1	247.3	833.6
Nebraska.....	10.4		18.4	28.8
New Hampshire.....	40.9	92.1	41.7	174.7
North Carolina.....	483.6	279.0	51.5	814.1
Oklahoma.....	31.5	17.0	13.5	62.0
Pennsylvania.....	123.8	228.7	18.9	371.4
Puerto Rico.....			21.0	21.0
South Carolina.....	237.8	99.2	11.0	348.0
Tennessee.....	146.2	98.8	85.0	330.0
Texas.....	123.4	168.4	111.2	403.0
Vermont.....	32.7	43.2	58.6	134.5
Virginia.....	79.0	135.4	241.7	456.1
West Virginia.....	131.0	168.2	66.6	365.8
Wisconsin.....	85.7	177.0	186.3	449.0
Total.....	3,640.6	3,547.3	1,935.5	9,123.4
Grand total.....	8,852.4	8,417.8	4,710.7	21,980.9

¹ Class 1. Forest roads forming sections of the Federal-aid highway system, either wholly within or, when so designated by the Chief of the Forest Service and the Chief of the Bureau of Public Roads, partly without and adjacent to the national forests.

² Class 2. Forest roads, not of class 1, which are parts of approved State highway systems, when so designated by the Chief of the Forest Service and the Chief of the Bureau of Public Roads.

³ Class 3. All other forest roads of primary importance to counties or communities.

TABLE 27.—Mileage of forest-highway projects completed during year and total completed to end of fiscal year ¹

Region and State	Initial improvement and stage construction	Initial improvement	Total to June 30, 1939
Western:	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alaska.....	32.6	8.4	248.5
Arizona.....	28.8	2.6	576.4
California.....	81.1	44.2	825.7
Colorado.....	12.4	8.1	544.6
Idaho.....	29.0	9.1	700.1
Montana.....	32.8	16.4	625.8
Nevada.....	19.5	9.4	185.8
New Mexico.....	22.6	1.4	315.1
Oregon.....	37.9	10.4	1,027.0
South Dakota.....	4.0	-----	61.1
Utah.....	12.2	7.3	362.9
Washington.....	16.7	9.5	340.0
Wyoming.....	29.5	2.4	300.2
Total.....	359.1	129.2	6,171.2
Eastern:			
Alabama.....	-----	-----	5.1
Arkansas.....	8.8	8.8	133.8
Florida.....	.2	-----	61.6
Georgia.....	15.8	-----	21.3
Illinois.....	-----	-----	4.7
Kentucky.....	-----	-----	.1
Louisiana.....	-----	-----	.5
Michigan.....	-----	-----	56.7
Minnesota.....	-----	-----	120.1
Mississippi.....	.1	.1	.1
Missouri.....	6.2	6.2	14.2
Nebraska.....	-----	-----	8.7
New Hampshire.....	1.1	1.1	29.1
North Carolina.....	3.2	.1	50.9
Oklahoma.....	-----	-----	16.1
Pennsylvania.....	-----	-----	10.6
South Carolina.....	.8	.8	16.9
Tennessee.....	-----	-----	43.2
Texas.....	5.1	5.1	5.1
Virginia.....	6.6	6.6	29.5
West Virginia.....	1.7	1.7	10.3
Wisconsin.....	4.1	4.1	22.4
Total.....	53.7	34.6	661.0
Grand total.....	412.8	163.8	6,832.2

¹ Changes in the mileage of completed road, resulting from abandonments, relocations, and correction resulting from recent surveys are reflected in this table.

TABLE 28.—Mileage of forest highways under construction as of June 30, 1939

Region and State	Graded and drained	Water-bound macadam	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete pavement	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Western:								
Alaska	24.3	13.0						13.0
Arizona	48.7	1.7	18.8					44.8
California			29.2	20.5			0.2	98.6
Colorado		23.6					(1)	28.6
Idaho	22.1	40.1		.9			.1	63.2
Montana	5.0	1.2	25.2					31.4
Nevada		6.9						6.9
New Mexico		4.1						4.1
Oregon	5.8	7.1	34.0		2.0	0.2		49.1
South Dakota			3.8	3.4			(1)	7.2
Utah	1.6	5.6						7.2
Washington	13.5							13.5
Wyoming		8.7	2.1				.1	10.9
Total	121.0	112.0	113.1	24.8	2.0	.2	.4	373.5
Eastern:								
Arkansas	1.8	.3		1.6			0.1	3.8
Louisiana		.3					(1)	.3
Michigan		9.7					(1)	9.7
Minnesota	20.4						(1)	20.4
Missouri		16.9					(1)	16.9
New Hampshire		7.5					.1	7.6
North Carolina		8.8	9.1					17.9
Pennsylvania					1.3			1.3
Texas		6.5					(1)	6.5
West Virginia		6.4						6.4
Wisconsin	7.1							7.1
Total	29.3	56.4	9.1	1.6	1.3		.2	97.9
Grand total	150.3	168.4	122.2	26.4	3.3	.2	.6	471.4

¹ Mileage less than 0.1.

TABLE 29.—Completed forest highways by States and by types to June 30, 1939

Region and State	Graded and drained	Sand-clay	Traffic-bound surfaces of miscellaneous material	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete	Bridges	Highway-railroad grade separation	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Western:										
Alaska	244.1							2.4		246.5
Arizona	209.7		285.7	41.4	15.4	23.4		.8		576.4
California	269.3		170.5	273.6	109.6			2.6	0.1	825.7
Colorado	153.6		245.3	12.6	132.8			.2	.1	544.6
Idaho	292.7		266.7		138.3		0.1	2.3		700.1
Montana	215.1		246.0	37.5	125.2			1.9	.1	625.8
Nevada	46.1		61.5	16.1	62.0			.1		185.8
New Mexico	42.3		195.0	12.3	65.3			.2		315.1
Oregon	154.6		614.4	167.1	72.3	14.5	.3	3.8	(1)	1,027.0
South Dakota			42.4		18.7					61.1
Utah	133.5		166.9	25.0	36.9			.6		362.9
Washington	96.1		237.5	4.4				2.0		340.0
Wyoming	38.7		227.1	8.7	84.4			1.3		360.2
Total	1,651.7		3,003.1	598.7	860.9	37.9	.4	18.2	.3	6,171.2
Eastern:										
Alabama			5.1							5.1
Arkansas	95.9		37.2					0.7		133.8
Florida		4.3		26.6	29.8			.9		61.6
Georgia	3.0		10.4	7.9				(1)		21.3
Illinois			4.7							4.7
Kentucky								.1		.1
Louisiana			.4					.1		.5
Michigan			56.7					(1)		56.7
Minnesota	43.8		60.0		16.1			.2		120.1
Mississippi	(1)							.1		.1

¹ Mileage less than 0.1.

TABLE 29.—Completed forest highways by States and by types to June 30, 1939—Con.

Region and State	Graded and drained	Sand-clay	Traffic-bound surfaces of miscellaneous material	Bituminous surface treatment	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete	Bridges	Highway-railroad grade separation	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Eastern—Contd.										
Missouri.....			14.2							14.2
Nebraska.....	2.2	6.5								8.7
New Hampshire.....			14.5	14.5				0.1		29.1
North Carolina.....	11.0		9.8	30.1				(1)		50.9
Oklahoma.....	.1		16.0							16.1
Pennsylvania.....			1.7			8.9				10.6
South Carolina.....				16.8				.1		16.9
Tennessee.....			43.2							43.2
Texas.....	5.0							.1		5.1
Virginia.....	3.6		2.3	17.1		6.5		(1)		29.5
West Virginia.....	7.6		2.6					.1		10.3
Wisconsin.....	8.3		14.1							22.4
Total.....	180.5	10.8	292.9	113.0	45.9	15.4		2.5		661.0
Grand total..	1,832.2	10.8	3,296.0	711.7	906.8	53.3	.4	20.7	0.3	6,832.2

ROAD CONSTRUCTION IN NATIONAL PARKS AND MONUMENTS

National parks and monuments have been established in 33 States, the largest and best known being in the Western States. These areas of exceptional natural phenomena and places of particular historic significance and scenic beauty are recreation grounds for the entire Nation. Nature and events in past history have provided places that everyone desires to see, and highways are the primary requirement in making them accessible to thousands of people who must plan vacation trips of moderate cost.

In addition, over 900 miles of parkways have been established by Congress in the East. These parkways connect points of special interest to tourists and are located on a right-of-way sufficiently broad to give complete control of roadside development. One follows closely the crest of the Blue Ridge Mountains between the Shenandoah National Park in Virginia and the Great Smoky Mountains National Park in North Carolina. Another follows the old historic trail between Natchez, Miss., and Nashville, Tenn.

The construction of roads in and approaching national parks, monuments, and parkways is a responsibility of the Bureau under an agreement with the National Park Service. Highway construction in national parks and monuments is carried on with the cooperation of the Branch of Plans and Design of the National Park Service in locating and planning highways to fit them into and preserve the natural beauty of the parks.

At the close of the year, 1,577 miles of road had been constructed in the national parks and monuments, an increase of 146 miles during the past year. This mileage includes both approach roads and parkways. In addition, 143 miles of road previously constructed were further improved, in most instances by placing a better surface. The completed mileage is shown by parks and monuments in table 30, and by types in table 31.

TABLE 30.—Highways completed in or leading to national parks and monuments during fiscal year 1939¹

Park, monument, or parkway	Initial im- provement and stage con- struction	Initial im- provement completed	Total to June 30, 1939
	Miles	Miles	Miles
Acadia.....	0.1	0.1	15.4
Blue Ridge.....	67.2	19.3	134.1
Boulder Dam.....	9.4	9.4	9.4
Bryce Canyon.....			21.7
Carlsbad Caverns.....			8.4
Chalmette.....			.5
Chickamauga-Chattanooga.....			17.0
Colonial.....	2.0	2.0	14.5
Crater Lake.....	19.1	2.5	60.5
Devils Tower.....			.3
Fort Donelson.....			2.7
Fort Matanzas.....			.6
Fort Pulaski.....			.3
Fredericksburg-Spotsylvania.....			23.1
General Grant.....	5.1	4.7	15.0
George Washington Birthplace.....			2.6
Gettysburg.....	2.2	2.2	9.5
Glacier.....			74.4
Grand Canyon.....	46.3	30.9	193.0
Great Smoky Mountains.....	6.5	2.8	29.1
Guilford Courthouse.....			2.6
Hawaii.....			35.6
Hot Springs.....			3.5
Kill Devil Hill.....			1.6
Lassen Volcanic.....			35.1
Meriwether Lewis.....			1.8
Mesa Verde.....			32.0
Morristown.....			2.6
Mount Rainier.....	4.6	4.6	86.3
Natchez Trace.....	36.1	36.1	36.1
National Capital parks.....	1.6	.5	6.1
Petersburg.....	1.9	.6	7.9
Petrified Forest.....	4.8		31.1
Rocky Mountain.....			51.4
Scotts Bluff.....			1.6
Sequoia.....	12.5		46.1
Shenandoah.....	42.4	14.1	102.7
Shiloh.....			10.6
Vicksburg.....	3.1	3.1	8.4
Wind Cave.....			15.9
Yellowstone.....	13.0	12.5	302.2
Yosemite.....	11.0	.5	104.5
Zion.....			18.7
Total.....	288.9	145.9	1,577.1
Low-standard access roads (not included above).....	9.8	7.0	18.0

¹ Changes in mileage due to division of regular and low-standard roads and to corrections resulting from final surveys are reflected in this table.

TABLE 31.—Highways completed in or leading to national parks and monuments at end of fiscal year 1939, by types

Park, monument, or parkway	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Bituminous macadam	Bituminous concrete	Portland cement concrete	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Acadia.....			7.4	29.1	8.0				15.4
Blue Ridge.....	0.6	86.1	18.0					0.3	134.1
Boulder Dam.....				9.4					9.4
Bryce Canyon.....				21.7					21.7
Carlsbad Caverns.....				8.4					8.4
Chalmette.....							0.5		.5
Chickamauga-Chattanooga.....				10.4			7.2		17.6
Colonial.....	2.7	.1	1.1				10.4		14.5
Crater Lake.....	2.9	10.1	1.9	38.7	6.8			.2	60.5
Devils Tower.....								.1	.3
Fort Donelson.....				2.7					2.7
Fort Matanzas.....				.5				.1	.6

TABLE 31.—Highways completed in or leading to national parks and monuments at end of fiscal year 1939, by types—Continued

Park, monument, or parkway	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Bituminous macadam	Bituminous concrete	Portland cement concrete	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Fort Pulaski	0.1							0.2	0.3
Fredericksburg-Spotsylvania			17.7	5.2		0.2			23.1
General Grant	12.6		2.4						15.0
George Washington Birthplace			2.6						2.6
Gettysburg			2.2	.8		6.5			9.5
Glacier	16.4	23.7	34.1					.2	74.4
Grand Canyon		.7	31.7	160.5				.1	193.0
Great Smoky Mountains	.4	1.2	23.5	4.0					29.1
Guilford Courthouse						2.6			2.6
Hawaii			10.6	9.0	16.0				35.6
Hot Springs			3.5						3.5
Kill Devil Hill				1.6					1.6
Lassen Volcanic				35.1					35.1
Meriwether Lewis				1.8					1.8
Mesa Verde				32.0					32.0
Morristown		2.6							2.6
Mount Rainier	25.1	24.7		20.7	15.5			.3	86.3
Natchez Trace	36.1								36.1
National Capital parks			1.0			4.4	0.6	.1	6.1
Petersburg			6.0				1.9		7.9
Petrified Forest			4.9	26.0				.2	31.1
Rocky Mountain			8.0	43.4					51.4
Scotts Bluff							1.6		1.6
Sequoia			8.1	37.9				.1	46.1
Shenandoah	6.2	13.8	3.0	68.5		11.2			102.7
Shiloh	.2	.1		3.7			6.6		10.6
Vicksburg	.2	.4	.4			.1	7.2	.1	8.4
Wind Cave				15.9					15.9
Yellowstone		37.4	108.1	155.9				.8	302.2
Yosemite	9.4	10.5	26.3	27.7	15.8	8.3	6.2	.3	104.5
Zion				17.6			1.1		18.7
Total	112.9	211.4	322.5	788.2	62.1	33.3	43.3	3.4	1,577.1
Low-standard access roads (not included above)									18.0

In Grand Canyon National Park the grading and base-course construction of the northern approach from Jacobs Lake to the north rim of the canyon were completed. Funds have already been allotted for a bituminous plant-mix surface on this highway. In Mount Rainier National Park both the Westside and Stevens Canyon routes, which are of considerable length, are being improved by including sections in each year's program. Work is now being concentrated in Stevens Canyon. In Crater Lake National Park the last section of the loop around the lake between Government Camp and Kerr Notch is approaching completion. In Yosemite the Big Oak Flat road route, involving difficult location and construction, is completed. The tunnels on this route are being lined and sections between these tunnels are being surfaced. There still remains a long uncompleted gap on the Tioga Road in Yosemite. This is a superb mountain highway through some of the most rugged of the high Sierras, crossing the Sierras at Tioga Pass at an elevation of nearly 10,000 feet. Additional work on this road is planned. Roads within Yellowstone National Park and the approach roads from the east and northeast are being improved. Another section of the Fresno-General Grant Approach Road was completed, leaving only one more section, about 5 miles in length, to be built in order to complete the highway.

In the Eastern States attention is being centered on the construction of parkways. The Blue Ridge Parkway following closely the crest of the Blue Ridge Mountains for approximately 480 miles passes through Virginia and North Carolina and connects the Shenandoah and Great Smoky Mountains National Parks. Approximately 134 miles has been completed and 170 miles is under construction. A portion of the mileage under construction is surfacing of roads previously graded.

The Natchez Trace Parkway passes through historic sections of Mississippi, Alabama, and Tennessee for approximately 455 miles. Approximately 36 miles of this parkway are now complete, and 11 additional miles are under construction.

Mileage of highways under construction is listed by location and types in table 32.

TABLE 32.—Highways under construction in or leading to national parks and monuments at end of fiscal year 1939, by types

Park, monument, or parkway	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Portland-cement concrete	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Acadia.....			3.1				3.1
Blue Ridge Parkway.....		70.2	38.7	62.1			171.0
Boulder Dam recreational area.....				3.4			3.4
Chickamauga-Chattanooga.....			9.0				9.0
Crater Lake.....	8.3						8.3
Glacier.....			16.7	22.0			38.7
Great Smoky Mountains.....		1.5					1.5
Mount Rainier.....	2.5		13.7				16.2
Natchez Trace.....	10.6						10.6
National Capital parks.....						0.1	.1
Rocky Mountain.....				8.1			8.1
Sequoia.....				19.8			19.8
Shenandoah.....			4.4	9.4			13.8
Vicksburg.....					1.2		1.2
Yellowstone.....			9.2	66.9		.2	76.3
Yosemite.....	2.2	2.1	8.6	42.3	.5	.1	55.8
Zion-Bryce Canyon.....		6.8					6.8
Total.....	23.6	80.6	103.4	234.0	1.7	.4	443.7

The mileage of approach roads completed and under construction and approved for construction is reported in table 33.

TABLE 33.—Location and length of approach roads to national parks and monuments, June 30, 1939

Road	Park	Designated	Under construction	Completed
		Miles	Miles	Miles
Fresno-General Grant.....	General Grant.....	13.2		8.6
Cameron-Desert View.....	Grand Canyon.....	28.1		28.1
South Approach.....	do.....	52.3		52.3
Jacobs Lake-North Rim.....	do.....	31.2		1 30.9
Mineral-Lassen Volcanic.....	Lassen Volcanic.....	8.8		4 4.7
Sequoia-General Grant.....	Sequoia-General Grant.....	13.5		2 4.1
Custer-Wind Cave.....	Wind Cave.....	8.6		13.5
Southwest Approach.....	Yellowstone.....	13.9		8.6
Moran-Yellowstone.....	do.....	24.0		13.9
Red Lodge-Cooke City.....	do.....	59.7		5.8
East Approach.....	do.....	23.0	8.8	59.7
Zion-Bryce Canyon.....	Zion-Bryce Canyon.....	29.1	6.8	13.7
Cedar Breaks.....	Cedar Breaks.....	2.6		
Total.....		308.0	15.6	239.8

¹ Reflects correction resulting from final survey.

² Graded as a forest-road project. Figure not included in total.

INTER-AMERICAN HIGHWAY

For some years the Government of the United States has assisted Central American countries in the improvement of the highway from the southern border of Mexico to Panama City, Panama, which is a part of the projected route from Laredo, Tex., to Panama City. The cooperation has been through the Department of State, the Bureau of Public Roads supplying the needed engineering services and direction. In 1934 a route was recommended after a careful reconnaissance survey. Recent activity by this Government has been supported by an authorization of \$1,000,000 made in 1934 for cooperation in the survey and construction of highways. Surveys have been made in several countries, and assistance was given to Panama, Costa Rica, Nicaragua, Honduras, and Guatemala in the erection of bridges.

During the year the bridge construction was largely completed, and the giving of engineering advice and assistance was continued under an authorization of \$50,000 made in June 1938.

The Chiriqui Bridge in Panama and approaches were completed in March 1939, and the structure was formally opened by the President of the Republic during a special fiesta proclaimed for the purpose. Panama is obligated under a cooperative arrangement to erect the Rio Chirigagua and the Rio San Cristobal Bridges between David and Conception. Steel for these bridges has been supplied by the United States. The substructures for both of these spans had been completed and arrangements were made for the erection of steel in May 1939, but erection has been postponed until the next dry season. There is reluctance in Central America to carry on hazardous work during the rainy season.

In Guatemala, bridges over Rio Tiucal, Rio Zonjon, and Rio Mongoy were finished by local forces.

Engineering assistance was given in the construction of 12.5 miles of road in Guatemala, 18 miles in Nicaragua, and 25 miles in Costa Rica. The Nicaraguan section of road was practically complete in June 1939. The work in Guatemala is expected to be completed soon. Steady progress has been made on the 25 miles of construction in Costa Rica between Cartago and San Marcos. This highway crosses the Continental Divide at an altitude of approximately 7,200 feet, over a range of mountains having very precipitous slopes and at places the material is very unstable. Several months more will be required to complete the work.

The cooperative work of the United States has aroused a strong interest in Central American countries in the Inter-American Highway, and several countries are planning, on their own account, to extend or reconstruct sections of the route. During the past fiscal year requests for additional surveys have been received from Nicaragua, Honduras, and Guatemala. All needed survey work in Panama was completed in the preceding year.

The survey requested in Nicaragua between Las Maderas Bridge and the town of Sebaco, a distance of 22.5 miles, has been completed, and construction should begin during the present year.

In Honduras, 34 miles were surveyed from the Choluteca Bridge westward to the Nacaome River. This section of road passes through all of the largest towns on the Pacific side, including San Lorenzo, the only Pacific port of entry.

In Guatemala, surveys on 89.5 miles of road between Asuncion Mita and Guatemala City were completed. A passable highway exists throughout this section, but it has sharp curves and some bad location that can be rectified. This survey completes the detailed planning of the route from Guatemala City to the frontier of El Salvador.

All road plans resulting from surveys have been drafted according to the standards used on Federal-aid work in the United States, and the plans will be furnished to the respective countries for their use in continuing construction.

Table 34 indicates the condition of the Inter-American Highway from Laredo, Tex., to the Canal Zone at the close of the year.

TABLE 34.—*Status of improvement of the Inter-American Highway*¹

Type	Mexico	Guatemala	El Salvador	Honduras	Nicaragua	Costa Rica	Panama	Total
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Paved.....	825	72	72	16	47	163	1,123	
All weather.....	156	273	48	30	17	145	669	
Dry weather.....	329	43	53	29	99	66	34	653
Trails.....	402		8	31	113	243	25	822
Total.....	1,712	316	181	90	245	356	367	3,267

¹ From the United States-Mexico border to the Panama Canal.

During the year Bureau engineers have been loaned to Venezuela, Colombia, and Ecuador, under provisions of the acts, Public No. 545, Seventy-fifth Congress, and Public No. 63, Seventy-sixth Congress.

An engineer was assigned to Venezuela in January 1939, for 6 months, to advise regarding the location of new roads. An American contracting concern has notified the Bureau that it has contracted for approximately 150 miles of road recommended by our engineer.

A soil expert was assigned to the State of Cundinamarca, Colombia, which includes the Federal district and the capital of that Republic. His assignment for 3 months has been extended for a second like period.

In June 1939, an engineer was furnished the Republic of Ecuador, on request of that Government, to advise on a general system of improved roads, and at the close of the fiscal year he was engaged in that work.

On May 25, 1939 the Export-Import Bank of Washington officially requested the Secretary of Agriculture to arrange for the assignment of engineers from the Bureau of Public Roads to assist the bank in connection with the extension of credits for public road construction in Latin America. Authority for such assignments was given by the Secretary of Agriculture, and negotiations covering details were in progress at the close of the year. In this connection a request has been received for the assignment of an engineer to Paraguay.

In January 1939, the Third Pan American Highway Congress was held at Santiago, Chile, and a representative of the Bureau was designated as the technical head of the American delegation.

The Congress took steps to obtain concerted action by the several countries of South America in designating a Pan American highway

system to connect at Panama with the highway projected from the United States and to establish the necessary international highway connections throughout the southern continent.

Under the Pan American Highway Convention, signed at Buenos Aires in 1936, a financial committee was created and the Bureau has cooperated with the American representative of this committee by furnishing estimates and information pertinent to its work.

Under that same convention, the Bureau was officially designated by the Secretary of State as the depository for exchange of highway information, with similar agencies designated for each of the Latin American countries.

TRANSPORTATION, ECONOMIC, AND STATISTICAL INVESTIGATIONS

HIGHWAY-PLANNING SURVEYS

At the close of the year 46 States and the District of Columbia had undertaken State-wide highway-planning surveys in cooperation with the Bureau under authority contained in the Hayden-Cartwright Act of 1934 and subsequent legislation which authorized the Secretary of Agriculture to approve allotments of not to exceed 1½ percent of the amount of Federal highway funds apportioned for any year for surveys, plans, and engineering, and economic investigations of projects for future construction.

In a number of States preliminary reports have been prepared summarizing portions of the data for the guidance of the legislature in connection with specific proposals, or to aid the State highway departments in setting up yearly programs. In several States work has been started on a comprehensive initial report, summarizing and correlating the data obtained in all phases of the survey, following in general an outline suggested by the Bureau. While few comprehensive reports have yet been completed, highway officials in all States are making constant use of the information in connection with problems that arise from day to day.

One of the most generally useful products of the planning surveys is a series of large-scale State and county maps. The county maps, generally on a scale of 1 inch to 1 mile or greater, show, in addition to transportation facilities, all physical features and man-made improvements, and will form the first up-to-date and comprehensive series of county maps ever made. At the end of the year there had been approved 2,962 sheets covering 1,924 counties, approximately 70 percent of the total to be completed. Other series of maps to be drafted on the base maps show highway and other transportation systems, bus and truck routes, postal routes, school-bus routes, and traffic volume.

There has been an increasing public demand for these maps, and many requests from private agencies and individuals have been received by the States concerned. Arrangements have been made with the States to supply copies or complete sets to a number of Federal agencies, including the Library of Congress, the Soil Conservation Service, the Agricultural Adjustment Administration, the Farm Credit Administration, and the Bureau of the Census. These maps are also used by the Rural Electrification Administration which makes tracings from copies of maps furnished for their studies.

In cooperation with the Bureau of the Census, boundary limits around the settled areas of unincorporated urban communities of 800

or more population have been established by the planning surveys in 29 States. The maps will show these boundaries, which will be used in the 1940 census, making possible, for the first time, census reports for such unincorporated settlements.

Field surveys, which form the basis of the map work, and also an inventory of the present extent and condition of all rural roads have been completed in 43 States, covering an aggregate of 2,748,853 miles. In 3 other States, with an estimated road mileage of 133,258, the mileage inventoried to June 30, 1939, was 118,375, leaving only 14,883 to be completed.

The surveys include collection of data on sharp curves, steep grades, sight distances, and banking of road surface on curves, on the primary highways with the location and nature of critical restrictions. These data are assembled in two groups: (1) Nonmountainous roads having sight distance of less than 1,000 feet, curvature exceeding 6°, grades exceeding 5 percent; (2) mountainous roads having sight distances less than 650 feet, curvature exceeding 14°, grades exceeding 8 percent. These data will reveal critical sections of the highway system requiring early attention and, when correlated with traffic density and accident records, will indicate the priority that should be given projects in improvement programs. Nearly all of the field work and most of the initial tabulations have been completed.

In cooperation with the Association of American Railroads, pertinent facts relating to rural and urban grade crossings are being supplied which will be combined with data from a field inventory of the crossings and traffic counts to arrive at a priority improvement program. Most of the data to be supplied by the railroads have been received and await completion of the urban-crossing inventory. About half the field work has been completed.

Field work on the traffic surveys has been completed by all but 9 States. At 3,237 loadometer and pit-scale weighing stations, the weights of trucks, commodities carried, and other data were recorded for thousands of trucks, tractor-truck semitrailers, and trucks with full trailers. Information on the flow of weight over the highways will be obtained from the loadometer stations, while more detailed and precise data will be obtained at the pit-scale stations to determine loading practices as related to regulation and taxation. Information regarding the weights and dimensions of busses and number of passengers carried is also obtained at these stations. Large-scale traffic maps have been completed for all counties in 7 States, and active work is under way in the preparation of such maps in 15 other States which have submitted advance copies for approval as to form and method. State traffic maps covering the primary road system and important local roads have been completed in final form in 4 States and in preliminary form in 17 other States.

There are now installed 411 automatic traffic-recording machines, recording the number of vehicles passing hourly. The design of these units was originally conceived by the Bureau and later perfected by commercial organizations. Installed at strategically located points, these machines provide a long period record of traffic volume. Completeness of the records permits the determination of characteristic traffic patterns and factors with which to expand short-period counts to annual averages and to show minimum, average, and maximum traffic volumes.

Supplementing these permanently located machines and also making it possible to reduce the number of manual counts, a number of States are now using portable automatic recorders, most of which have been constructed according to plans developed by the Bureau in its studies of motor-vehicle performance.

The financial surveys, which include four closely related studies, consist of the collection and analysis of information regarding the ability of the State to finance the highway program. In the fiscal study, complete data on income, expenditure, and debt of the State and all governmental subdivisions such as counties, townships, municipalities, school districts, and highway districts have been collected for a typical 1-year period. These studies will indicate the importance of highway transactions in comparison with other activities such as general government, education, and public welfare. They will show the present source of highway funds and will indicate where and how these funds are spent.

The road-use studies provide information regarding the relative use of the rural highways and streets by the different classes of motor-vehicle owners resident in various rural and urban classifications. Summarization of these data obtained from approximately 650,000 personal interviews with vehicle owners and operators, when correlated with results of the fiscal study, will indicate the relationships existing between contribution to highways and the benefits derived through their use.

The motor-vehicle-allocation study, based on analysis of more than 3,300,000 questionnaires, shows the registered location of motor vehicles and the proportionate amounts of gasoline taxes and license fees paid by residents of cities, towns, and rural areas. This information will be used to determine the amounts that may be anticipated from such sources in the future.

The road-life study consists of an analysis of the life of various types of surfacing and roadway elements on the State highway system. Data from the records of State highway departments form the basis of actuarial studies which will indicate the average service lives that may be expected from the several types of highway surfaces as well as the other elements of the highways such as earthwork, drainage structures, shoulders, bridges, and guardrail. This information, supplemented by analyses of construction and maintenance costs and salvage values, will make possible reliable estimates of the amount and cost of highway replacement and construction that will be required each year in the future. The highway construction and reconstruction program may then be scheduled over a period of time to correspond with funds likely to be available in the future for highway purposes.

Information regarding land uses, present and potential, will be obtained from the Department's land-use-planning program now under way in most of the States and involving the participation not only of many Federal and State agencies but of farmers as well. This work will provide a classification of the best uses of land by small local areas and will permit highway plans to be more closely correlated with those for agriculture.

ECONOMICS OF TRANSPORTATION

Shortly after the inception of the highway-planning surveys, the Bureau materially augmented its studies of the economics of transportation. In the planning of highway systems for the Nation, the States, and the individual counties and communities, as must be done in the future, careful consideration should be given to the economic and social activities served and to be served. In determining the extent to which highway transportation is economically sound and defensible it cannot be considered apart from other modes or kinds of transport. The transportation problem as a whole must be carefully studied, utilizing such materials as are available from other official sources, the results of the highway-planning surveys, and other special studies and analyses.

The work on economics of transportation has involved the preparation for use by the cooperating States of tables presenting the essential data on population, agriculture, industry, mining, and trade in each county; tables and maps for division of the States into areas of similar economic characteristics for use in analyzing traffic-count data; percentage factors by counties based on population and economic data to provide the States with a factual basis for equitable allocation of Federal-aid secondary mileage among the counties, and critical analyses from the economic viewpoint of allocation proposals made by the States; and outlines for detailed study of individual counties and county analyses to demonstrate to the States the data available and their use in determining present and probable future road needs.

Studies of truck movement of commodities have been developed from the loadometer data in Franklin County, Ohio, Baltimore, Md., and truck movement to and from ports. A special study has been outlined and put under way on the relation between income and population (changes and trends) and motor-vehicle usage (registration, gasoline consumption, costs, and expenditures).

A detailed continuing study will determine the relation between industrial relocation, decentralization and other industrial changes, and the need and demand for transportation (kinds, amounts, length of haul, costs, rates, etc.). This is an intensive, comparative, and analytical study designed to show the relation between the various modes of transport; the changes in demands on the various transport agencies due to industrial and economic changes and shifts; the influence of changes and improvements in transportation facilities on population, industry, agriculture, trade, and employment; and the relative adequacy of various transportation agencies and how transportation planning may be used as a directive force in industrial development.

An important part of the work has been conferences with other organizations and individuals on transportation problems, recommendations as to additional statistical data needed, and the stimulation of research by others.

SAFETY RESEARCH

Studies in highway safety, initiated under authority of the act of Congress approved June 23, 1936, were practically completed. Although full reports on a number of research projects previously have been transmitted to Congress, several unfinished studies necessitated the continuation of the cooperative research with the Highway

Research Board through the year. Final reports on these studies, including particularly an investigation of the validity and utility of driver test clinics for identifying or indicating needed education of the accident-prone motor-vehicle driver, were in preparation at the close of the year.

MAINTENANCE-COST STUDIES

Agreements with the State Highway Departments of Connecticut and New Hampshire, and the Department of Public Works of Rhode Island for a study of highway-maintenance costs in relation to traffic volume were renewed for the fifth year's work. Traffic records for the fourth consecutive year were obtained for 33 sections of highway in Connecticut, 52 sections in New Hampshire, and 102 sections in Rhode Island. The annual cost of general highway maintenance for various items on each section is being kept by the States and detailed records on traffic are being compiled.

The objective of this study is to determine the maintenance costs for the different types of road surface in relation to the traffic carried and various other items. Due to nonperiodic or infrequent costs of maintenance incurred, no determinations can be made until the records have been kept for a period of at least 5 years.

HIGHWAY-CAPACITY AND VEHICLE-PERFORMANCE STUDIES

Data collected in the field studies conducted last year in cooperation with the Illinois highway-planning survey and in previous field studies were analyzed and the results published.

Studies of the performance of trucks on highway grades were continued. The studies so far have involved only new trucks, which were given exhaustive tests on two grades located on route U S 40 east of Baltimore. From the results of these tests it is possible to compute accurately the performance of a given vehicle on any given grade. The results will also be used to evaluate other less exhaustive methods of test. These methods include the acceleration method, dynamometer tests, and various performance meters. One of these methods will be selected to test a much larger number of used trucks typical of vehicles in service on the road.

Twenty-two vehicles have been tested thus far. Several manufacturers have furnished the trucks and in most cases the driver, and have also delegated an automotive engineer to inspect the work and offer advice. The Quartermaster Corps of the War Department has made available the facilities of the Holabird Quartermaster Depot, which include a gasoline supply, storage of trucks and equipment, dynamometer laboratory, and machine shop, and the Army automotive engineers have been available for consultation and assistance. The National Bureau of Standards has rendered considerable assistance in a consulting capacity. J. T. Thompson, of Johns Hopkins University, has also acted as consultant, and the university has furnished space and equipment for the analysis of field data. A complete description of the tests and the procedures involved were reported to the Highway Research Board in December 1938 and published in *Public Roads*, February 1939.

The development of satisfactory equipment for the detailed study of the movement of vehicles and of passing practices has been a difficult problem. These studies are made on a half-mile section of

highway and involve the measurement at 50-foot intervals of time and position of vehicles as they travel through the section. A new type of electrical road detector was developed, in which the electric contact is made by the displacement of air in a rubber tube laid across the roadway as a vehicle passes over it. Several miles of telephone and electrical cables were necessary, and six 20-pen time recorders were assembled in units to time and record graphically the impulses received from the road detectors.

Satisfactory field and office procedure has now been worked out in experimental tests, and arrangements have been made with interested State highway departments to cooperate in extensive field work during the coming year. At present, work is under way in Massachusetts and is scheduled in Illinois and Texas.

In the case of the study of lateral placement of vehicles on the highway, a similar development has taken place. Equipment has now been perfected and consists of a road detector to measure the lateral placement at 1-foot intervals, and a speed meter which records automatically the speed of each vehicle passing. With this equipment it will be possible to determine the lateral position assumed by various types of vehicles traveling at various speeds on tangents, curves, and grades.

An outgrowth of the experimental work on equipment has been the development of a simple and very satisfactory automatic traffic counter which utilizes the pneumatic road detector. An adaptation of the counter has also been made which permits the independent counting of vehicles traveling in each direction. By using a road detector consisting of several units, it is possible to segregate and record, by traffic lanes, vehicles traveling in either direction as well as the total traffic, a development that is particularly useful in city traffic surveys.

NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY

Active cooperation with the National Conference on Street and Highway Safety was continued. Early in the year the committee on uniform traffic laws and ordinances of the conference met to revise the five acts of the Uniform Vehicle Code and the Model Traffic Ordinances. Extensive changes in acts II and V of the code necessitated printing a new (1939) edition of these two acts.

A meeting was held of the joint committee of the National Conference on Street and Highway Safety and the American Association of State Highway Officials to revise the Manual on Uniform Traffic Control Devices for Streets and Highways. The recommended changes were published as a supplement to the 1935 edition of the manual.

With the cooperation of the National Bureau of Standards and a prominent manufacturer of pigments, a new supply of color cards was prepared by the Bureau, showing the correct shade of yellow for highway signs as prescribed by the manual. Samples of the color have been furnished to all State highway authorities for use in purchasing standard paints and enamels.

AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS

With the beginning of the year, the Bureau of Public Roads with the Automotive Safety Foundation and the National Conservation Bureau undertook to cooperate more closely with the American Association of Motor Vehicle Administrators, in order to promote more effective measures for assuring greater safety on the highways and greater freedom for interstate traffic.

Cooperative work has been specifically directed toward improving motor-vehicle inspection, driver examination, and reciprocity among the States, with respect to drivers' licenses and registration.

A special group of investigators has been compiling the codes for motor-vehicle investigations and driver examinations, and it is expected that these will be ready for approval of the association and the Bureau following the annual meeting of the association in August.

The general trend toward compulsory motor-vehicle inspection conducted directly under the motor-vehicle administrations of the several States has made it desirable that effective and rapid methods of inspecting great numbers of vehicles be studied and devised, and so far as possible introduced into the several States in order to establish uniformity of requirements in the operation and efficiency of vehicles.

It is likewise desirable that more exacting requirements be adopted in the examination of drivers before granting permits to operate cars, and that these examinations be standardized and so far as possible made uniform with respect to methods and ratings in the tests of driver proficiency.

Both of these studies are fundamental to the development of the desired reciprocity among the several States with respect to the operation of motor vehicles.

In connection with the studies carried on to determine adequate methods of vehicle inspection, the Bureau and the association cooperated with the Society of Automotive Engineers in a series of brake tests which promise to be of great importance not only for the purpose of inspection of cars but in future brake design.

During the year, the Bureau took an active part in three of the four regional meetings of the association and intends to continue cooperating during the forthcoming fiscal year.

STATISTICAL RESEARCH ON ESTIMATING HIGHWAY-TRAFFIC VOLUME

As additional data on highway-traffic volume have become available from the highway-planning surveys, research on principles and methods of estimating traffic volume from short-time counts has been extended in several directions. The work is of importance because of the necessity of preparing traffic-flow maps for a great mileage of highway which must be based on many traffic counts. The duration and frequency of the counts should be held to the lowest practical minimum as a matter of economy.

A report on dispersion of highway traffic by time periods was made to the Highway Research Board, extending the analysis to hours of the day, days of the week, and months of the year, for the entire period of a year in each case. Study was also made of the variation in traffic by hours of the day for each month.

Traffic counts on 25 legs of 14 trunk-line crossings in Michigan, chosen as representative of traffic variation in that typical industrial State, are now being analyzed and studied. Counts by hours for a period of 1 year have been tabulated and are being analyzed. Extensive use of tabulating machines is making possible a thorough analysis of a large mass of data.

The problem of estimating traffic volume at low cost and with sufficient precision is now being attacked with a larger number of continuous counts from a wider selection of typical stations. There are now available continuous counts at 3 stations in Maryland on local, county, and State highways by periods of 5 minutes for an entire year. These data will make it possible to determine the shortest count that may be safely used in estimating traffic. The 315,360 counts of 5-minute periods at the 3 stations were obtained with automatic traffic counters, and the analysis is being made almost entirely by mechanical means.

RAILROAD-ABANDONMENT STUDIES

The examination of dockets and reports in the files of the Interstate Commerce Commission covering the abandonment of railroad lines throughout the country was completed, and the abstracting of currently issued abandonment reports was kept up to date.

The data abstracted from the dockets and reports were largely assembled by States, tabulated, mapped, and in general prepared for the use of this Bureau and State highway officials in studying the abandonment of railroad lines. As of June 30, 1939, 1,275 abandonment cases had been examined since the inception of these studies, involving 18,847 miles of railroad.

Beginning in March 1939, advance information concerning proposed railroad abandonment has been sent promptly to district engineers of the Bureau, upon the filing of abandonment applications with the Interstate Commerce Commission, thus assisting the field representatives of the Bureau in their consideration of requirements at grade crossings for signal devices or structural changes. Subsequently, uniformly arranged abstracts of the Commission's reports have also been sent the district engineers when abandonments have been allowed.

The same advance information has been supplied to State highway officials to aid in present planning activities, and to encourage their study of the causes for and effects of changing railroad patterns as they bear on the whole transportation problem, and the demand for highway transport.

PHYSICAL RESEARCH

Previous annual reports have mentioned the new laboratories on the Mount Vernon Memorial Highway near Washington, where the physical research work of the Bureau is to be conducted. The buildings have been completed and the installation of laboratory equipment and furniture was well under way at the close of the year. The activities of the Bureau at the Arlington Experiment Farm of the Department will be transferred to the new research station in the near future. The improved facilities for conducting a continuing research program and the assurance of a permanent location for field tests place this work on a much more satisfactory basis.

SUBSURFACE EXPLORATION

Study of various applications of the electrical resistivity and seismic methods of subsurface exploration to highway problems has been continued. A number of minor changes and improvements have been made in the seismic equipment tending to simplify electrical circuits, reduce weight, and better the performance.

In May 1939, in cooperation with the highway department of Iowa, a rather extensive investigation was made to determine the value of both the resistivity and the seismic methods of exploration for locating rock formations and gravel deposits as sources of road-building material. While the results of this survey will not be definitely known until more excavations are made at the places tested, the present indication is that both methods are useful in locating materials.

Several other Federal agencies are now making shallow explorations by the seismic method, essentially as developed by the Bureau, and the experience with it seems to be generally favorable. It is particularly adapted to reconnaissance surveys, and its use results in a great saving of both time and expense.

MOTOR-VEHICLE-IMPACT INVESTIGATIONS

Study of the relative elastic properties of concrete when subjected to comparable static and impact forces, applied by a vehicle wheel, has been actively pursued throughout the year. The special pendulum-type testing machine, described in the report for last year, and other equipment designed and built for this purpose have functioned well. This research is developing data of a fundamental character and the work is necessarily of a slow and painstaking nature. It constitutes an important part of a broad program of research, the aim of which is to rationalize the structural design of concrete pavements.

The data obtained are of sufficient scope to justify the issuing of a progress report at an early date.

MEASUREMENT OF ROAD-SURFACE ROUGHNESS

The degree of road-surface roughness is one of the major factors that determine the magnitude of the impact forces developed by motor vehicles.

This research has for its object the development of apparatus, instruments, and testing technique for quickly and reliably establishing an index of roughness for any road surface. There has been no universally accepted method for measuring the roughness of road surfaces in spite of the generally recognized need for such measurement.

The equipment that has been developed by the Bureau shows evidence of having reached a satisfactory state of development. However, thorough field trials remain to be made before it can be stated definitely that this equipment is ready to be offered for general use.

EROSION TEST FOR COATED CULVERT PIPE

The study of the erosion test for determining the quality of the bituminous coatings used on corrugated-metal culvert pipe has been continued. Experiments with both full-weight and reduced-weight erosive charges of cement-mortar cubes have been completed.

All data obtained, both in the cooperative check tests mentioned in previous annual reports and in the subsequent tests made by the Bureau, have been assembled and analyzed, and a report prepared.

The data indicate certain inherent deficiencies in the present method of test. The use of cement-mortar cubes appears to result in more consistent data than are obtained with other materials but does not overcome other undesirable characteristics of the test.

STRUCTURAL DESIGN OF CONCRETE PAVEMENTS

Work in this field of investigation has been continued along the lines described in previous annual reports. A more detailed study of the structural action of pavement slab corners has been found necessary. Because of climatic conditions, the work had to be done during the early summer months. It involved extensive strain measurements to determine the direction of critical stresses. A report on this special study is scheduled for the coming fiscal year, following the completion of the fifth report of the original series, mentioned in previous annual reports.

The supplementary study of dowel plate joints, mentioned in the last annual report, has been continued whenever favorable weather conditions obtained, and a considerable amount of valuable data has been accumulated.

An analysis has been made of the data obtained in the condition survey of the older concrete pavements in Michigan, a survey made in cooperation with the Michigan State Highway Department last year. The pavements examined ranged in age from 3 to 20 years, and their selection was based on the presence of factors, such as subgrade type, which might be expected to influence the pavement condition. The detailed data covering the history and present condition of 46 miles of selected pavement have been studied and analyzed, and a report is being prepared.

The construction of an experimental pavement in Indiana, in cooperation with the State Highway Commission, mentioned in the last annual report, was completed during October 1938. The purpose of this research project is to determine the desirability and economy of introducing longitudinal steel reinforcement to permit an increase in the length of concrete-pavement slabs. The slabs constructed in the experimental pavement range in length from 10 to 1,320 feet and the steel reinforcement varies correspondingly from a light welded fabric to an exceedingly heavy bar construction. The behavior of the different sections under the normal traffic conditions on a transcontinental highway and the climate of central Indiana will be observed in periodic surveys in which detailed measurements will be made on certain selected sections. Two sets of observations have been made. It is expected that a preliminary descriptive report of this project will be prepared for publication during the coming year.

STRUCTURAL DESIGN OF NONRIGID PAVEMENTS

Work on the complex problem of the structural design of nonrigid pavements has been directed principally toward the development of instruments for measuring the effect of static and moving loads upon plastic materials such as compose pavements of the so-called flexible type. Several different types of pressure-recording devices have been built and their characteristics studied. It is expected that the development of apparatus will be continued and that both field and laboratory experiments in pressure measurement will be started in the near future.

INVESTIGATION OF THE FATIGUE STRENGTH OF ARC-WELDED JOINTS

In investigating the fatigue strength of arc-welded joints the Bureau has been cooperating with the University of Illinois, the American Welding Society, and the welding research committee of the Engineering Foundation.

Engineers in this country have been slow to adopt the practice of welding in fabricating steel highway bridges because they have been uncertain about the behavior of welded connections, particularly when subjected to fatigue caused by alternating or pulsating stresses as occur in bridges. Because of this uncertainty, engineers have not taken advantage of the inherent economy in the use of welded structures.

A laboratory study of the fatigue strength of full-size welded connections is being made, and the results will be used to establish methods of design that will assure safe welded bridges.

A program of testing was drawn up by a committee representing the various interested parties, and testing at the laboratory of the University of Illinois has proceeded during the year. Significant results have already been obtained, and these results will be made available to engineers through publication in bulletins of the university.

This investigation will have a direct effect on future practice in bridge design and construction.

INVESTIGATION OF BRIDGE FLOORS

The investigation of bridge floors is being conducted cooperatively by the Bureau, the Illinois Division of Highways, and the University of Illinois.

In the past empirical rules have been used in designing highway bridge floors because of the lack of any rational method of analysis of stresses in floor systems. These rules are based upon very limited investigations and therefore many questionable assumptions have to be made in applying them. Uncertainties have been provided for by designs that may be overly conservative and which unnecessarily add to the cost of the structure.

Several years ago the Bureau made a start in the rationalization of the design of bridge floors by making an extended mathematical analysis of the simplest case—wide concrete slab simply supported on rigid supports and subjected to wheel loads. This has permitted a somewhat greater accuracy in the design of floors. However, the conditions in most floors do not correspond closely to the assumptions in this case. In order to arrive at a complete solution of the problem it is necessary to make theoretical analyses of the types of floor in use and then verify these analyses by experimenting with actual floors under load.

The cooperative work was begun in 1936. Theoretical analyses have been made of numerous designs of floors, and the results of these studies are now available in bulletins of the University of Illinois. The results of tests on small-scale plaster models and on one full-size bridge floor have also been published in bulletins of the university. Additional tests on full-size floors are now in progress.

The results of this investigation will have direct application to practically all modern highway bridges and to many other structural-design problems and will lead to more satisfactory structures.

INVESTIGATION OF SUPPORTING STRENGTH OF FLEXIBLE CULVERT PIPE IN EARTH EMBANKMENTS

The cooperative culvert investigation by the Bureau and the Iowa Engineering Experiment Station was continued. Observations of pipe deformations and fill settlements were made on culverts that had been constructed during the previous year. A theory of the action of flexible pipes in fills has been developed at the experiment station and comparisons between this theory and the actual behavior of pipe are being made. The purpose of the investigation is to establish, for various conditions of installation, numerical factors that must be considered in determining the strength of pipe required. Because of the large quantity of culvert pipe used in highway work, this investigation will have a direct value in the economical design of highways.

PORTLAND CEMENT

Much interest has recently been aroused among cement technicians regarding the possible effect on durability of adding small quantities of certain substances to portland cement during the manufacturing process. These materials, known as grinding aids, are used primarily to assist in the grinding of the clinker, and it is only recently that attention has been called to the possible effect of such additions on the quality of the cement. Some observers have felt that the beneficial effect of using a blend of portland and natural cement, such as was used in New York and to which reference was made in last year's report, may have been due to a grinding aid used in the natural cement. They believe that portland cement containing a suitable grinding aid would have produced the same results without the use of natural cement. Others believe that the improvement was due to the addition of the natural cement, as such, and that the same results would have been secured had the natural cement contained no foreign material. The various agencies interested in this problem are now cooperating in a series of laboratory and field investigations in an effort to develop the facts. Experimental roads containing cements with and without grinding aids have been constructed in four States, while in the laboratory tests are under way to determine in just what respects the physical characteristics of portland cement are affected by the presence of such substances.

There is a definite feeling on the part of many engineers that some of the troubles with concrete which have recently occurred may be due, in part at least, to a lack of durability in the cement. These engineers are firmly convinced that the so-called old-fashioned cement, which contained less lime than the average modern cement, produced a more durable concrete. Partly in recognition of this possibility, the cement manufacturers recently proposed an accelerated soundness test for cement known as the autoclave test. This test is supposed to insure cement entirely free from the so-called delayed unsoundness to which some of the concrete-road failures have been attributed. An investigation of this test has been under way in the laboratory for over a year. This work includes the testing of cements now being used in road construction, the place of use of the cement represented by each sample being noted in order that the results of the tests may later be correlated with service behavior.

MASONRY CEMENT

The efflorescence that is frequently observed on the surface of masonry walls, while not serious structurally, is objectionable from the standpoint of appearance. A study was begun last year in an effort to determine whether there is a relation between tendency toward efflorescence and the type of cement used, and also whether it is possible to control efflorescence through the use of certain chemicals that preliminary laboratory tests have shown to be effective. A 30-panel brick wall has been erected, using masonry mortars prepared with different brands of cement with and without the addition of the so-called efflorescence-retarding chemicals. Results of this study should be available during the current year.

AGGREGATES

Investigation of the Los Angeles abrasion test and the various procedures for determining soundness of aggregates are being continued. The possibility of modifying the Los Angeles test so that any size material may be tested is being studied. At present only the 1½- to ¾-inch size can be tested, a disadvantage in the case of materials that are nonuniform in quality. The tests comparing the results of the Los Angeles test with the action of a 10-ton road roller, referred to in last year's report, have been completed, and a report is being prepared for publication.

CONCRETE

The program of tests begun several years ago, that had for its object the development of a satisfactory laboratory test for rating the efficiency of materials used for curing concrete, was partly completed, and a paper was published describing the procedure as well as reporting the results obtained with a large number of materials.

An extensive series of tests was initiated for the purpose of studying the volume-change characteristics of concrete. Experience in certain States has indicated a marked difference in service behavior of concrete roads that apparently is related in some way to the aggregates used. Failure is usually manifested by excessive expansion of the concrete after a few years' service. The tests are for the purpose of determining whether the tendency to excessive volume change is due to the nature or grading of the aggregate or to both. In all cases the materials meet the specification requirements now in force so that this study is of fundamental importance.

PAVING BRICK

The need for further information regarding the significance of tests for paving brick resulted in the construction last year of an experimental brick road in Ohio, in which brick from every plant in the State were used. This is a cooperative project, the Ohio State Highway Department, the National Paving Brick Association, and the Bureau participating. A complete series of tests, including many special tests not now used in specifications, is being made by each cooperating agency. The results will be compared later with the behavior of the pavement under traffic.

BITUMINOUS ROAD MATERIALS

As in previous years, investigations have been continued to determine the significant properties of bituminous materials and aggregates for bituminous road surfaces and to correlate these properties with their service behavior. Laboratory tests were made on materials for (1) compliance with given specifications governing the construction of certain roads, (2) standardization of test methods in cooperation with State highway departments and other technical organizations, (3) the modification and development of specification requirements, and (4) the determination of the suitability of new materials or new combinations of materials for use under various conditions. Periodic observations of selected sections of road, in which materials of known characteristics have been used, serve to correlate the results of laboratory tests with the actual service performance of these materials.

Investigations designed to verify accepted theories or to develop additional information on bituminous materials and mixtures are being carried on alone or in cooperation with the State highway departments and committees of technical organizations. Recent cooperative efforts have led to suggested changes in the grades of liquid asphaltic road materials of the medium-curing and rapid-curing types and in the specification requirements for the different grades, that will result in technical improvements.

Laboratory investigations of the physical and chemical properties of asphaltic materials, tars, and emulsions, and the behavior of surfacings containing them must be made continuously for informational purposes. These studies are always necessary because of the development of new sources of supply, changes in refining methods, and the introduction of new paving mixtures.

A very important phase of this work has been the recent laboratory examination of 40 asphalt cements of the 2 grades, 50-60 and 85-100 penetration, from representative refineries using both domestic and foreign crude petroleum. The test data have been assembled in a report for publication. The examination of the materials included not only tests commonly used in standard specifications but also many special tests that have been proposed. The results of this study indicate that the adoption of certain of the proposed tests would restrict the available supply of asphalt to a great degree by eliminating many asphalts that have given satisfactory service under severe traffic and climatic conditions.

Research on the behavior of bituminous materials under laboratory tests designed to produce accelerated weathering have been continued by exposing both the bituminous materials and aggregate containing them to the light, heat, and moisture conditions of a special accelerated weathering device. The possibilities of specifying the required behavior of films of bituminous materials of microscopic thickness are being studied.

Research on bituminous mixtures to determine their probable behavior under actual traffic has continued. Accelerated traffic tests on a small circular track and many of the mechanical strength tests have been employed to study the characteristics of bituminous surfacing mixtures and bituminous stabilized-base courses. Although bituminous materials have been used successfully in stabilized-base

construction, more exact information is needed as to the type and quantity of material required for given conditions, methods of incorporating the binder, and the details of laying and compacting the mixture.

Experiments with cotton fabric in highway construction are being continued. Fabric is being used as reinforcement in bituminous road surfaces, as reinforcement in bituminous ditch linings and spillways, and for the temporary protection of the seeded slopes of cuts and fills. A great deal of experimental work has been done with cotton fabric in bituminous surfacing. Twenty-four States, using fabric furnished by the Department of Agriculture, have reported the construction of 127 projects representing more than 350 miles of fabric-reinforced roads. These include various types of surfaces such as surface treatment, penetration, plant mix, and road mix. Reports are being received on the construction, maintenance requirements, and service behavior. Inspections were made of 81 projects in 15 States and included practically all types of bituminous surfacing in which fabric has been used.

Among these are the four special cooperative experiments constructed in Alabama, North Carolina, South Carolina, and Tennessee, which have received and are receiving more detailed study than is usually given to routine projects. These, as well as the other test sections, will be observed as long as required to establish definitely the economic worth of fabric thus used.

The laboratory study of asphalt cements that has been conducted cooperatively with the Minnesota State Highway Department and the University of Minnesota has been completed and a report prepared for publication.

SUBGRADE INVESTIGATIONS

Soil studies were continued along the lines described in former reports. They consisted of studies of laboratory test methods, studies of low-cost road surfaces placed on small tracks and subjected to destructive forces similar to those of traffic and nature, observations of experimental roads and embankments constructed in cooperation with the various State highway departments, and surveys of roads constructed of low-cost materials.

The Bureau's tests for determining the grading, plasticity, and related properties of soil indicative of the stability have been adopted as standard methods of test by the American Association of State Highway Officials and the American Society for Testing Materials. The demand from other laboratories for standard samples for use in making check tests to improve their technique and apparatus has continued.

Investigation was made of new apparatus for determining particle-size distribution of fine-grain soils. The apparatus utilizes a new principle of dispersion that eliminates objectionable features of the mechanical method now in use. Photomicrographic studies of the structure and formation of soil in its natural state and the effect of moisture content and admixtures on the soil fabric were begun. The research on the microchemical analysis of soil solutions reported last year has progressed and quantitative chemical analyses by spectrographic methods has received consideration.

A world-wide survey of soil-testing apparatus made in cooperation with the Highway Research Board contributed materially to the Bureau's progress in the soil-testing field.

Tests for the control of embankment and stabilized-soil road construction attained the status of standard methods, and correlation of the compaction characteristics with the structural properties of soil was begun. Satisfactory devices were developed for making direct shear and stabilometer tests and simplified procedures were developed for determining permeability and capillarity which disclose drainage characteristics and the possibility of frost heave of soil.

In the realm of soil mechanics, analyses utilizing the theories of elasticity and of plastic equilibrium were simplified to facilitate their practical application to the problems of highway construction. Reports of this work previously published were supplemented by one on the design of abutments and retaining walls and another on the considerations involved in the construction of embankments on soft undersoils. To facilitate the correlation of theory, field observations and laboratory-test data in relation to such problems, the work is to be extended to include studies of stress distribution by means of photoelastic equipment and models constructed with differently colored layers of earth.

To meet the urgent need for information on the moot question of the relative effect of surface tension exerted externally, and of colloidal phenomena acting within, on volume change, compressibility, compactibility, and stability of stressed earth masses at different moisture contents, the performance of soil and water mixtures was compared with that of the same soil mixed with other liquids that have greater and less surface tensions than water. Studies of the permeability of soil-bentonite mixtures made in cooperation with the United States Forest Service were continued.

In the field of soil stabilization, efforts were devoted to studies of special local materials, construction methods, tests for bituminous- and cement-stabilized soil, and the preparation of specifications.

Among the local materials studied with special reference to their suitability for use in base courses were the volcanic ash deposits of Arizona, certain topsoils in the Southern States, and crusher-run aggregates.

The experimental embankments, referred to in last year's report, have been constructed in Ohio and Indiana, and observations are being made of the performance of sections constructed by different methods.

Comparison of data furnished by the circular track tests, mentioned in last year's report, with road performance has demonstrated the value of the tests for determining quickly and at relatively small expense the serviceability of road-building materials. These track tests have been found to be an excellent tool in determining which laboratory tests, out of the many suggested, disclose most accurately the information required in the construction of stabilized-soil roads. Among the materials investigated by track tests are various mixtures of sand-clay, sand-clay-gravel, and crusher-run aggregates, with and without treatment with deliquescent chemicals, and soils of different types with admixtures of portland cement and the various types of bituminous binders.

Specifications for stabilized road surfaces, base courses, and embankments, based on the Bureau research in cooperation with the several State highway departments, have been adopted as standards of construction by the American Association of State Highway Officials and are being considered by the American Society for Testing Materials.

To provide adequate control of the construction of stabilized-soil surfaces, portable trailer laboratories fully equipped for the making of desired soil tests have been developed and will be placed in the field.

Courses of instruction in soil surveying and sampling, soil testing, and soil mechanics were held in the Western States during the winter months. Seven 1-week courses were presented. Included in the attendance at both day and night sessions were approximately 500 representatives of Federal bureaus, State highway departments, and universities.

