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**REPORT OF THE CHIEF OF THE BUREAU  
OF PUBLIC ROADS, 1937**

UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF PUBLIC ROADS,  
Washington, D. C., September 15, 1937.

Hon. HENRY A. WALLACE,  
*Secretary of Agriculture.*

DEAR MR. SECRETARY: I submit herewith the report of the Bureau of Public Roads for the fiscal year ended June 30, 1937.

Sincerely yours,

THOMAS H. MACDONALD, *Chief.*

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**INTRODUCTION**

More than 22,000 miles of highway of all classes were brought to completion under Bureau supervision in the fiscal year, exceeding by several hundred miles the work completed in the previous year and also the record of 21,700 miles completed in 1934. For the past 4 years road construction supervised by the Bureau and financed in whole or in part with Federal funds, with the primary objective of providing employment to those on relief rolls, has progressed at a rate of approximately 20,000 miles a year. Although the volume of such work remained large, the past year was definitely a period of transition from an emergency program to the more normal Federal-aid road-construction operations.

Emergency funds available for new projects were reduced to a small remainder at the end of the year. Considerable emergency work under construction was carried over into the new year and when this is completed the emergency program will have been practically concluded.

While the end of the year marks the last stage of the emergency road-construction program it also marks the beginning of a broadened Federal-aid program. Improvement of the Federal-aid highway system, begun in 1921, is being continued and two new classes of Federal-aid operation are being initiated—Federal aid for secondary or feeder roads and for the elimination of hazards at railroad grade crossings. Federal participation in these classes of work was begun in the emergency program with direct grants of funds and is to be continued under specific Federal-aid authorizations of \$25,000,000 for secondary-road improvement and of \$50,000,000 for elimination of hazards at grade crossings in each of the fiscal years 1938 and 1939.

### AVAILABLE FUNDS INSUFFICIENT FOR HIGHWAY NEEDS

During the pioneer period of road development the attention of State and Federal Governments was properly centered on the Federal-aid system, the network of main rural highways of interest to all classes of highway users. The initial surfacing of most of this system has now been completed, and service is being given to a rapidly growing and altering traffic of tremendous economic and social significance; but much remains to be done to provide an entirely adequate service. Meanwhile there has developed a widespread and justified demand for better road service for communities not directly on the main highway system, a demand which has been answered in a measure by the congressional provision for improvement of secondary and feeder roads. And, at the same time, it has been recognized that extension of the main routes into and through cities is a general responsibility. Such routes are rapidly being placed under the care of State highway departments, and, beginning with the fiscal year 1936, Federal aid became available for extensions of the Federal-aid system into and through cities. In consequence of these developments, State and Federal highway officials are now confronted with the necessity of planning and constructing three important classes of highways—the main rural highways, extensions of these routes through cities, and the secondary or feeder roads.

It is now evident that the States must depend mainly on special revenue from road users for funds with which to carry on this work. Property taxes and appropriations from general funds for highways have shrunk to small proportions and there is little reason to expect that they will be increased, yet nearly one-sixth of present motor-vehicle revenues are being assigned to nonhighway uses. Federal contributions are continued but not on the scale of the past 4 years when large emergency funds were made available. The new fund of \$25,000,000 for secondary and feeder roads represents an increase in regular Federal-aid funds and will provide a considerable mileage of much needed roads but the sum is small compared with the needed mileage of feeder roads. However, these funds have an important and timely significance in that they place this important problem in the hands of State and Federal road-building agencies and give to them the opportunity for orderly planning of the larger operations that must follow if a satisfactory solution is to be had.

The State highway departments, confronted with increased responsibilities out of all proportion to the revenues available to them and pressed with sound arguments to provide improvements in all directions, face difficult problems in administration.

### IMPROVEMENT OF MAIN HIGHWAYS MUST CONTINUE

Improvement of secondary roads is important but such work must not be allowed to impede the necessary further work on the main highways. Construction of through routes was begun some 15 or 20 years ago when the speed of vehicles was much slower and traffic considerably less in volume. The roads built were designed for conditions as they were then foreseen, and were influenced somewhat by the necessity of rapidly extending the mileage. Engineering standards in respect to sight distance, curvature, and grade have been steadily raised but much of the early construction reflects the earlier lower standards and is unsafe for modern traffic. The outstanding reason for continued improvement of the main highways is to permit travel with facility and safety. The condition of these highways cannot be considered satisfactory so long as many sections present unexpected dangers to the motorist.

Grade crossings continue to take an annual toll in lives and may be expected to continue to do so as long as they remain on heavily traveled roads. Many have been eliminated with Federal funds in the emergency program and the regular Federal aid now provided for grade-crossing eliminations will continue this work on a reduced scale. But the great number of crossings still existing present a difficult problem to the highway administrator.

Confronted with these various and urgent needs and with limited funds at their disposal, highway officials find their problems more difficult than ever before. It is of the greatest importance that there be a clear understanding of the essential needs for each class of improvement in order that funds may be allotted fairly and with due recognition of the needs of all classes of highway use. It is also important that there be a more accurate measure of the extent of the improvements needed on each class of road in order that we may know the cost and plan operations without misunderstanding as to how much can be accomplished. To this end highway-planning surveys are now being conducted in 44 States with Federal assistance and according to a general plan prepared by the Bureau that will result in a complete picture of our present highway situation. For the first time, as a result of the studies, the actual present condition of all highways will be determined and clear indication will be given as to the extent of further improvement that will be justified by present and future traffic. Progress in the surveys is described on page 65.

### SELECTION OF SECONDARY ROADS FOR IMPROVEMENT ONE OF IMPORTANT OBJECTIVES OF SURVEYS

Selection of those secondary roads that should be ranked as having first priority for improvement is one of the primary objectives of the planning surveys. In general the selection can be guided by present traffic and that traffic which will be attracted from other unimproved highways as a result of improvement. The roads so selected will be desirable improvements. However, it may not be in the best interest of the country as a whole to follow this method invariably. It is believed by many that a better national economy will result by bringing about a shift of population from lands of low productivity to those of high productivity. The Department is now making an exhaustive study of the benefits that may accrue to the agricultural producer and to the consumer from better land utilization and it appears that the selective improvement of secondary roads may be an important instrumentality for bringing about an eventual resettlement more consistent with the greater economic and social good of the Nation. Improvement can be withheld from roads serving lands of low productivity and extended to those capable of higher production. Such a course is logical if the matter is considered solely from the viewpoint of earnings accruing to highway funds from investments in highway construction. In many cases roads through submarginal lands can be constructed only through a subsidy that in effect comes from the users of other highways. It is always true that those secondary roads serving the richest lands are the biggest producers of highway revenue.

### HIGHWAY SAFETY

The thousands of people killed and injured each year in motor-vehicle accidents place upon highway officials the responsibility of making the highways as safe as they can be made. It is probable that highway conditions contribute to only a small proportion of the accidents, and it must be realized that no matter how safe the highways are made, accidents will continue to occur, but this does not lessen the necessity for removal of many dangerous conditions as rapidly as available funds permit. There is general agreement that the main highways must be raised uniformly to standards of improvement that are adequate for present traffic conditions. During the year a committee of 12 outstanding experts in highway engineering was appointed by the Secretary of Agriculture to work with the Bureau in the development of design standards for the promotion of safety of traffic and the advancement of the utility of highways to a maximum degree. Members of the committee are all State highway officials and the work being done has the full support of the American Association of State Highway Officials. Research work is being done by the Bureau as an aid to the committee in establishing standards concerning such matters as road widths, maximum grades and curvature, design of multilane highways, protection of grade crossings, and many other problems that enter into highway construction.

During the year the Bureau conducted studies of traffic conditions and measures for their improvement as directed by Congress in 1936 to the extent possible within the limits of the \$75,000 authorized to be expended for the purpose.

For the purpose of bringing to bear upon the different problems the best thought of those who have been giving them long and careful study, the Bureau arranged for cooperation with the Highway Research Board of the National Research Council and other agencies in the development of the required reports. An advisory committee composed of those who are nationally recognized in the field of traffic safety and who represent organizations that have been giving the subject long study, was requested to act with the Bureau in the preparation of the reports and recommendations. In the research program, particular attention was given to three phases of the highway-safety problem:

(1) Detailed study of the lack of uniformity of State motor-vehicle laws which is regarded as an important contributing cause of highway accidents.

(2) Study of the characteristics and habits of drivers, including the identification of dangerous drivers.

(3) Improvement of the basic data, particularly accident reporting, needed for the study of accident causes and prevention.

Detailed investigations in this field were organized and carried on by the Bureau and through cooperation with the Highway Research Board.

At the close of the year a report to Congress discussing the data collected and making specific recommendations for action to be taken was nearing completion. The recommendations prepared for inclusion in the report are given on page 66.

The highway-planning surveys now being conducted in cooperation with the State highway departments will yield not only a detailed picture of those highway conditions that are substandard, and information as to the cost of raising them to satisfactory standards, but, for the first time, will supply something more than general intimation as to the effect of these conditions in causing accidents. Miles of travel by vehicles is an essential factor in making accident comparisons, and in every State where satisfactory accident statistics can be obtained they will be carefully related to the road conditions where accidents occur and to the volume of traffic at these places. The result should be a more definite indication as to the causes of accidents.

### **SPECIAL SERVICE HIGHWAYS WITH LIMITED ACCESS NEEDED**

The large volumes of traffic that now flow between densely populated localities have created a demand for wide, multiple-lane highways, built according to the highest standards of grade and alinement, with opposing traffic separated by a center parkway, bypassing all cities, with structures separating streams of traffic at all highway and rail crossings, and with access from side roads permitted only at carefully selected points. Such highways offer great savings in time and in vehicle-operating costs to commercial vehicles, and to drivers of private vehicles they offer freedom from dangers of the highway and from other vehicles as nearly complete as it is possible to attain.

That large volumes of traffic would flow constantly over such highways between densely populated localities there is no doubt—a traffic large enough to justify the high cost of such improvement with reasonable assumptions as to the value of the savings in fuel and time and those resulting from greater safety and freedom of travel. However it is not readily apparent how any large mileage of such highways might be financed.

Since the benefits will accrue to the motor user it may be said that the cost should be paid by further motor-vehicle imposts. However motor-vehicle users are already heavily taxed and there are many motorists who would find little opportunity to use such highways. It may be that the most practicable way to obtain such improvements is through a form of payment that will be directly proportional to the amount of use—that is, through the payment of tolls.

Large volumes of traffic such as flow between thickly populated regions would be required to support the high cost; consequently the field of such special development will be definitely limited by the presence of a sufficient traffic volume.

**SUMMARY OF HIGHWAY PROGRAM TO RELIEVE UNEMPLOYMENT**

One of the major efforts of the Federal Government to relieve unemployment through a large-scale road-construction program began with an authorization of \$400,000,000 as a direct grant to the States by the National Industrial Recovery Act of June 16, 1933. One year later the Hayden-Cartwright Act of June 18, 1934, authorized a supplementary \$200,000,000. These funds are known as the 1934 and 1935 Public Works highway funds. The Hayden-Cartwright Act also provided \$125,000,000 as Federal aid to the States in each of the fiscal years 1936 and 1937. The emergency program was continued by allocation of \$200,000,000 for highways and \$200,000,000 for grade-crossing elimination and protection, as direct grants to the States made from funds provided by the Emergency Relief Appropriation Act of April 8, 1935. These various acts also provided lesser amounts for the improvement of highways in national parks, national forests, public lands, and other Federal areas.

The work of highway construction carried out under these several acts had resulted, at the end of the last fiscal year, in the construction of 55,920 miles of road at a total cost of \$956,138,230, of which \$807,140,005 was paid by the Federal Government; and there were under construction, or approved for construction, 12,446 miles additional, involving an estimated total cost of \$343,996,739, of which \$200,395,350 was to be met with Federal funds. The remaining Federal funds available for new projects, including Federal aid for the fiscal year 1938, but exclusive of the new funds for secondary roads and grade crossings, amounted to \$150,214,645. This amount consists largely of the Federal-aid authorization for 1938.

Under the grade-crossing program with both highway and special grade crossing funds, 1,849 crossings had been eliminated, 206 existing crossing structures reconstructed, and 737 crossings protected by safety devices at a total cost of \$121,187,314, of which \$116,478,687 was Federal funds. There were under construction or approved for construction 834 crossing eliminations, reconstruction of 151 existing elimination structures, and protection of 733 crossings with safety devices. The total cost of this work was estimated at \$106,563,341, of which \$102,433,856 was Federal funds. The emergency funds for elimination of hazards at grade crossings were practically all absorbed in completed or active work since only \$8,729,528 remained for new work.

During the last 4 years the road construction described above and that carried on under other appropriations in Federal areas of various kinds has provided 7,700,000 man-months of direct employment, or an average rate of nearly 2,000,000 man-months per year, which is approximately double the average of employment furnished in the 2 years preceding the beginning of the enlarged emergency program.

**SOURCES OF FUNDS USED DURING THE FISCAL YEAR**

The combined Works Program highway and grade-crossing appropriations supplied the largest part of the funds available for the year's work, and regular Federal-aid funds were next in amount. At the beginning of the year the totals involved in current work and available for new work were as follows: Works Program grade crossings \$192,780,710, Works Program highways \$179,753,886, Federal aid \$229,175,190, and Public Works highways \$53,398,198. Of these funds \$349,502,946 was allotted to work under contract and partly completed, \$52,368,113 was involved in projects approved but not under contract, and \$253,236,925 was available for new work. These sums include the Federal-aid authorization of \$125,000,000 for the fiscal year 1937 which, after deduction of the administrative percentage, was apportioned as shown in table 1.

The total amount of all funds available for new contracts was \$305,605,038.

TABLE 1.—*Apportionments of Federal aid for the fiscal years 1937 and 1938 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, 1935	Grade crossings, 1938	Total
	1937	1938			
Alabama.....	\$2,603,967	\$2,664,693	\$532,939	\$1,015,170	\$6,816,769
Arizona.....	1,783,362	1,829,952	365,990	314,594	4,293,898
Arkansas.....	2,133,206	2,187,752	437,550	893,403	5,651,911
California.....	4,751,712	4,858,220	971,644	1,874,656	12,456,232
Colorado.....	2,286,333	2,336,054	467,211	657,357	5,746,955
Connecticut.....	791,660	805,426	161,085	426,784	2,184,955
Delaware.....	609,375	625,000	125,000	250,000	1,609,375
Florida.....	1,659,835	1,704,765	340,953	712,816	4,418,369
Georgia.....	3,168,222	3,233,279	646,656	1,223,099	8,271,256
Idaho.....	1,534,142	1,570,687	314,137	418,115	3,837,081
Illinois.....	5,165,226	5,238,798	1,047,760	2,644,980	14,096,764
Indiana.....	3,096,645	3,149,011	629,802	1,308,113	8,183,571
Iowa.....	3,234,910	3,291,322	658,264	1,410,787	8,595,283
Kansas.....	3,314,031	3,374,126	674,825	1,307,669	8,670,651
Kentucky.....	2,307,812	2,349,316	469,863	919,174	6,046,165
Louisiana.....	1,780,991	1,829,490	365,898	799,226	4,775,605
Maine.....	1,087,030	1,122,670	224,534	352,468	2,786,702
Maryland.....	1,025,000	1,043,938	208,787	519,993	2,797,718
Massachusetts.....	1,743,487	1,769,936	353,987	1,047,500	4,914,910
Michigan.....	3,831,476	3,893,528	778,706	1,664,807	10,168,517
Minnesota.....	3,426,001	3,495,178	699,036	1,342,809	8,963,024
Mississippi.....	2,191,112	2,247,708	449,542	806,707	5,695,069
Missouri.....	3,800,344	3,877,890	775,578	1,528,920	9,982,132
Montana.....	2,561,884	2,621,728	524,346	671,204	6,379,162
Nebraska.....	2,586,267	2,641,423	528,285	892,976	6,648,951
Nevada.....	1,593,978	1,632,385	326,477	250,000	3,802,840
New Hampshire.....	609,375	625,000	125,000	250,000	1,609,375
New Jersey.....	1,676,718	1,701,826	340,365	997,689	4,716,598
New Mexico.....	1,990,724	2,040,685	408,137	432,291	4,871,837
New York.....	6,156,604	6,258,857	1,251,771	3,424,399	17,091,631
North Carolina.....	2,940,809	2,998,371	599,674	1,244,662	7,783,516
North Dakota.....	1,958,107	1,996,414	399,283	803,068	5,156,872
Ohio.....	4,565,769	4,640,344	928,509	2,141,704	12,275,876
Oklahoma.....	2,937,406	2,995,620	599,124	1,156,175	7,688,325
Oregon.....	2,045,078	2,092,368	418,474	588,377	5,144,297
Pennsylvania.....	5,347,386	5,434,356	1,086,871	2,905,671	14,774,284
Rhode Island.....	609,375	625,000	125,000	250,000	1,609,375
South Carolina.....	1,688,441	1,722,188	344,438	752,928	4,507,995
South Dakota.....	2,041,872	2,084,100	416,820	694,096	5,236,888
Tennessee.....	2,630,111	2,681,110	536,222	958,753	6,806,196
Texas.....	7,771,317	7,957,610	1,591,522	2,724,825	20,045,274
Utah.....	1,416,208	1,447,780	289,556	322,885	3,476,429
Vermont.....	609,375	625,000	125,000	250,000	1,609,375
Virginia.....	2,280,725	2,328,369	465,674	941,656	6,016,424
Washington.....	1,954,781	2,002,877	400,575	767,991	5,126,224
West Virginia.....	1,359,961	1,390,447	278,089	671,712	3,700,209
Wisconsin.....	3,044,947	3,107,053	621,411	1,252,871	8,026,282
Wyoming.....	1,562,528	1,600,350	320,070	344,961	3,827,909
District of Columbia.....	.....	.....	.....	250,000	250,000
Hawaii.....	609,375	625,000	125,000	250,000	1,609,375
Puerto Rico.....	.....	625,000	125,000	369,959	1,119,959
Total.....	121,875,000	125,000,000	25,000,000	50,000,000	321,875,000

## EMPLOYMENT ON ROAD WORK

Continuing the policy of the past 4 years, all highway work was administered with employment of those on relief rolls as a primary objective. The nine different classes of work supervised by the Bureau provided a total direct employment of 1,792,760 man-months, slightly exceeding that of the previous year but less than the peak years 1934 and 1935.

The employment by months, shown in table 2, reflects the transition from large emergency expenditures to lesser amounts of regular Federal aid. From July through October employment exceeded that for the same months in any other year with the exception of 1935. Numerous highway and grade-crossing elimination projects financed with Works Program funds were completed in the fall months and the labor released was not reemployed in the Federal highway program. By February the number employed was less than that for the same months in the years 1933 through 1936 and it remained below the 1933-36 level for the remainder of the year. However, it did not sink to the 1932 level in any month and in June the employment was more than twice that of June 1932.

TABLE 2.—Comparison of employment during the fiscal years 1932, 1933, 1934, 1935, 1936, and 1937 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						Total men employed on all Federal and State highway construction and maintenance					
	1932	1933	1934	1935	1936	1937	1932	1933	1934	1935	1936	1937
July.....	164,708	81,042	129,205	335,223	191,041	249,271	385,349	305,372	332,277	549,203	375,442	435,971
August.....	151,418	89,346	111,211	297,224	178,756	247,841	380,949	333,403	329,813	531,034	382,846	433,533
September.....	116,100	122,193	115,047	247,880	143,455	227,916	356,617	374,405	337,973	498,151	340,073	414,147
October.....	88,869	124,106	154,016	210,079	135,660	206,113	330,104	373,246	384,029	450,322	323,374	389,966
November.....	62,466	129,933	185,860	201,046	118,898	172,295	289,316	371,667	420,069	426,603	290,523	333,971
December.....	37,991	98,271	174,358	147,101	103,493	128,314	244,971	290,465	362,031	323,700	252,229	288,248
January.....	29,518	75,498	154,154	96,594	82,731	76,829	229,189	266,443	315,989	240,414	202,884	210,027
February.....	26,673	78,215	156,814	81,257	70,418	57,844	218,218	255,256	306,090	221,406	200,451	190,336
March.....	28,008	95,704	144,053	90,999	86,050	69,946	211,549	279,213	296,265	217,539	227,586	200,794
April.....	42,205	122,256	187,637	123,063	132,834	88,361	245,843	299,882	345,278	282,740	287,478	226,286
May.....	59,008	139,831	271,972	167,535	193,269	122,655	259,615	330,138	466,504	331,000	374,191	299,063
June.....	71,772	152,276	336,414	193,263	237,330	145,375	280,636	359,605	545,013	362,339	423,466	313,149
Total (man-months).....	876,736	1,308,671	2,120,761	2,191,264	1,673,935	1,792,760	3,441,356	3,839,095	4,441,331	4,434,451	3,680,543	3,755,491

While employment on highway work financed with Federal funds was decreasing most rapidly conditions indicated an improvement in general employment, particularly of semiskilled and skilled labor. A shortage of these classes of labor became evident in several sections of the country. Wages for these classes rose above the minimum prescribed in highway contracts and in a few States wages of common labor also rose above the prescribed minimum—a sure indication that contractors were bidding for services. During the last half of the year it was found unnecessary to continue the requirement that skilled and semiskilled labor be obtained through the United States employment service.

Table 3 shows the employment on the various classes of work supervised by the Bureau and that resulting from State work without Federal assistance. The greatest employment was given by Works Program highway construction, followed closely by regular Federal-aid work, with Works Program grade-crossing work ranking third. However, the grade-crossing program furnished an unknown amount of employment in addition to that shown in the table. Considerable work was done under contract by railroad forces that has not been reported.



TABLE 3.—Direct job employment during the fiscal year 1937 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—										Total men employed	
	In whole or in part with Federal funds											
	National-forest highways	National-park highways	Public-lands highways	Federal-aid highways	Public Works highways	Works Program highways	Works Program grade-crossing eliminations	Loan-and-grant highways <sup>1</sup>	National work-relief highways	With State funds only, on State highways		Men employed on road maintenance by State highway departments
July.....	2,344	5,237	250	56,097	15,967	115,923	37,352	10,730	5,371	21,744	164,956	435,971
August.....	2,450	6,090	167	58,800	13,969	107,321	41,905	11,481	5,649	26,810	158,582	433,533
September.....	2,876	5,898	134	58,874	11,574	89,298	41,776	11,902	5,584	34,459	151,772	414,137
October.....	2,510	5,168	62	58,511	9,886	72,655	40,775	11,425	5,131	34,136	149,717	389,966
November.....	1,868	4,319	7	50,490	7,576	55,045	36,045	11,053	4,994	27,988	153,688	353,971
December.....	1,783	2,771		38,152	4,744	38,265	28,692	9,217	4,688	21,394	138,540	288,248
January.....	693	1,422	25	22,671	2,859	19,369	18,953	6,533	4,304	15,622	117,576	210,077
February.....	419	1,313	28	17,010	1,964	12,353	14,493	5,408	4,856	11,705	120,786	190,336
March.....	403	1,407	45	22,000	2,547	13,604	16,497	7,531	5,820	11,802	119,046	200,794
April.....	651	2,090	54	32,384	3,207	15,920	18,276	8,678	6,101	13,164	124,761	225,283
May.....	1,105	2,700	67	52,261	4,639	21,605	21,940	11,687	6,601	17,241	159,167	299,063
June.....	1,423	3,303	180	70,239	4,520	23,513	23,346	12,984	5,667	19,382	148,392	313,149
Total (man-months).....	18,527	41,927	1,009	538,579	83,452	585,771	340,100	118,629	64,766	255,448	1,707,283	3,755,491

<sup>1</sup> Projects transferred by the Public Works Administration for engineering supervision.

State highway maintenance, a class of work financed entirely with State funds, required 1,707,283 man-months of labor—an amount nearly equaling the employment on work involving Federal funds. The great mileage of surfaced highways now in use requires continuous attention. In the future less work will be required in maintaining low-type surfaces inadequate for present traffic as these roads are raised to higher standards. But meanwhile additional surfaces will be constructed and the trend of maintenance expenditures and employment may be expected to continue upward.

The total employment for the year on work supervised by the Bureau—1,792,760 man-months—is the equivalent of an average full-time employment each month of 149,400 men. The number of individuals actually employed, some of them on a part-time basis, averaged approximately 209,000 persons per month. Indirect 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 indirect employment of 2,868,000 man-months, and this, added to the direct employment, gives a full-time employment of 4,661,000 man-months, the equivalent of the full-time continuous employment of 388,400 men.

### ROADSIDE IMPROVEMENT

The Bureau has continued to emphasize the importance of roadside improvement, urging the States to greater participation in the work. During the year 566 additional projects were included in the program at an estimated cost of \$3,861,073, bringing the total number of projects to date to 1,867 as shown in table 4. This represents that portion of the work that could be definitely separated from other classes of improvements and is by no means a complete measure of what is being done. The best roadside development is much more than a planting superimposed on a completed highway. It involves also features of highway design and construction such as gentle side slopes, shallow ditches, placing topsoil on graded areas, wide shoulders, center parkways, and parking areas. Construction features important in producing safe and attractive highways are being incorporated in construction, more and more each year. Practices introduced a few years ago on outstanding roadside developments such as the Mount Vernon Memorial Highway and the Westchester Parkways in New York are now found on many newly constructed highways. The Bureau and the State highway departments are carrying on roadside improvement as an integral part of highway construction and not as a separate activity.

TABLE 4.—Roadside improvement projects completed, under construction, and approved for construction financed with Public Works funds, Works Program funds, and Federal-aid funds, to June 30, 1937

Funds	Projects	Total Federal funds	Estimated total cost
	Number	Dollars	Dollars
Public Works funds under acts of June 16, 1933, and June 18, 1934.....	982	4, 289, 243	4, 695, 707
Federal-aid funds for fiscal years 1936, 1937, and 1938.....	558	1, 963, 239	3, 906, 577
Works Program highway funds under act of Apr. 8, 1935.....	290	2, 296, 024	2, 378, 813
Works Program grade-crossing funds under act of Apr. 8, 1935.....	37	105, 760	108, 091
Total.....	1, 867	8, 654, 266	11, 089, 188

### ADMINISTRATION OF HAYDEN-CARTWRIGHT ACT PENALIZING DIVERSION OF MOTOR-USER REVENUES FROM HIGHWAY PURPOSES

The Hayden-Cartwright Act of 1934 requires 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.

Administration of this requirement is placed under the Secretary of Agriculture and has necessitated a detailed review of State laws pertaining to disposition of motor-user revenue as they existed on the date of the act and of all subsequent legislation. State officials have been required to submit at yearly intervals, certified statements showing the actual disposition made of revenues to which the act applies.

During the past year a careful review of official reports showed that motor-vehicle revenues had been diverted from highway purposes by legislative acts subsequent to 1934 in Georgia, Maryland, New Jersey, and Pennsylvania. Each of the States was notified of this finding and given an opportunity to show why a deduction in Federal-aid funds should not be made. The State Governments of Maryland and Pennsylvania restored to highway funds amounts equal to those diversions to which the act applies and it is considered that the purpose of the act has been accomplished. Georgia officials have given assurance that they will follow a similar course.

New Jersey was formally notified on April 17 of the Bureau's findings that diversion had been made requiring imposition of a penalty. The matter was called to the attention of the State highway department again in May and in June. In the absence of any responsive action by the State it became necessary to apply the penalty and the Department, by formal certificate made a reduction of \$250,000 in the Federal-aid funds provided for the fiscal year 1937. This action occurred on August 7, 1937.

### **PREPARATION MADE FOR NEW FEDERAL-AID PROGRAMS FOR SECONDARY ROADS AND GRADE-CROSSING ELIMINATION**

During the year \$25,000,000 of Federal aid for secondary or feeder roads and \$50,000,000 for elimination of hazards at grade crossings, authorized for the fiscal year 1938 by the act of June 16, 1936, were apportioned to the States as shown in table 1. These funds make it possible to continue, on a reduced scale, the activities first undertaken as part of the emergency program to provide employment.

Regulations to govern this work were issued in February. Administration is to be in cooperation with the State highway departments under the same general plan as has been followed in improving the Federal-aid system. The State highway departments will select projects for improvement, prepare plans, and supervise construction, all subject to the approval of the Bureau acting for the Secretary of Agriculture.

The funds for secondary roads must be matched with State funds and the States must guarantee that the roads will be satisfactorily maintained after completion. Each State is required to select a connected system of secondary roads for improvement, not exceeding 10 percent of the highway mileage, and carefully designed to connect agricultural districts with the main highway system. Selection of these systems requires much careful study of data now being collected in the highway-planning surveys. Prior to the selection and approval of such systems only those secondary roads that may reasonably be expected to form part of the system are to be approved for construction.

The grade-crossing funds are made available to the States to pay the full cost of projects without matching and the regulations stipulate that no involuntary contribution shall be required of the railroads. The funds are available for separation of rail and highway grades, relocations to avoid crossings, and for safety devices protecting traffic at crossings.

### **MILEAGE OF FEDERAL-AID SYSTEM**

Since the Federal-aid system was originally designated as required by the Federal Highway Act of 1921 there have been numerous changes in mileage, often relatively small, but in the aggregate sufficient to require correction of the reported mileage. When the system was designated, detailed location had been made for only a small part of it and the mileages used were therefore estimates. Small corrections were necessary with almost every project. In recent years there has been much relocation of earlier construction, in almost every case shortening the distance between termini. Table 5 shows the approved mileage in the system at the end of the year.

TABLE 5.—Designated Federal-aid highway system mileage as of June 30, 1937

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	3,958		3,958	New Hampshire	967	33	1,000
Arizona	1,490	580	2,070	New Jersey	1,526		1,526
Arkansas	5,028	174	5,202	New Mexico	3,274	381	3,655
California	5,592	558	6,150	New York	8,994	16	9,010
Colorado	3,354	437	3,791	North Carolina	6,746	176	6,922
Connecticut	1,046		1,046	North Dakota	7,138	84	7,222
Delaware	802		802	Ohio	7,081		7,081
Florida	2,477		2,477	Oklahoma	6,193	47	6,240
Georgia	5,629	57	5,686	Oregon	3,314	480	3,794
Idaho	2,806	589	3,395	Pennsylvania	7,630	108	7,738
Illinois	8,709	4	8,713	Rhode Island	515		515
Indiana	5,334		5,334	South Carolina	4,184		4,184
Iowa	7,652	2	7,654	South Dakota	5,795	477	6,272
Kansas	8,675	14	8,689	Tennessee	4,486	66	4,552
Kentucky	3,700	6	3,706	Texas	12,782		12,782
Louisiana	2,765		2,765	Utah	2,014	146	2,160
Maine	1,617	4	1,621	Vermont	1,036		1,036
Maryland	2,188		2,188	Virginia	4,294	48	4,342
Massachusetts	1,650		1,650	Washington	2,938	403	3,341
Michigan	5,884	48	5,932	West Virginia	2,213	29	2,242
Minnesota	7,169	165	7,334	Wisconsin	5,508	132	5,640
Mississippi	3,685	10	3,695	Wyoming	3,238	325	3,563
Missouri	7,957		7,957	Hawaii	539		539
Montana	4,656	1,081	5,737	Puerto Rico	858		858
Nebraska	5,565	20	5,585				
Nevada	1,758	21	1,779	Total	214,409	6,721	221,130

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 addition of 1 percent is permitted and further additions are permitted on the same basis. Twenty-two States have extended the system 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.

#### STATUS OF MAJOR FUNDS AND PROGRESS IN CONSTRUCTION

During the year 18,768 miles of highway were brought to completion, exclusive of work done in Federal areas and with special funds. The completed work included 10,257 miles on the Federal-aid system outside of municipalities, 1,093 miles on extensions of the system into and through municipalities, 571 miles of secondary or feeder roads in municipalities, and 6,847 miles of secondary or feeder roads outside of municipalities. Payments to the States for construction completed amounted to \$337,747,071, as shown in table 6.

TABLE 6.—Funds paid to the States during the fiscal year 1937

State	Federal-aid authorizations for 1933 and prior years	Public Works authorizations for 1934-35	Federal-aid authorizations for 1936-38	Works Program		Total
				Highways	Grade crossings	
Alabama	\$49,685	\$938,056	\$277,577	\$2,548,150	\$2,078,535	\$5,892,003
Arizona		333,611	1,117,750	1,534,345	820,735	3,806,441
Arkansas	17,774	598,998	1,163,568	1,845,434	1,973,076	7,598,850
California		1,325,675	5,460,715	5,471,033	4,251,505	16,508,928
Colorado		365,775	2,114,067	1,050,860	621,073	4,151,775
Connecticut	8,621	205,398	525,297	517,481	320,931	1,577,728
Delaware		416,210	408,220	491,176	115,700	1,431,306
Florida	17,512	288,186	443,929	1,665,520	1,300,054	3,715,201
Georgia	14,739	1,383,214	1,125,486	748,757	370,954	3,643,150
Idaho	9,042	520,138	1,399,399	1,629,180	769,256	4,327,015
Illinois	36,802	3,417,962	4,415,709	6,637,067	5,709,352	20,216,892

TABLE 6.—Funds paid to the States during the fiscal year 1937—Continued

State	Federal-aid authorizations for 1933 and prior years	Public Works authorizations for 1934-35	Federal-aid authorizations for 1936-38	Works Program		Total
				Highways	Grade crossings	
Indiana.....	\$4,440	\$1,263,755	\$2,188,548	\$4,098,318	\$3,441,593	\$10,996,654
Iowa.....		358,733	2,790,273	3,653,136	3,424,817	10,226,959
Kansas.....		601,898	3,317,645	3,600,285	3,999,940	11,519,768
Kentucky.....	3,322	785,016	571,420	2,330,811	1,475,357	5,165,926
Louisiana.....	61,984	656,048	794,892	2,067,373	1,111,861	4,692,158
Maine.....		134,487	729,508	1,066,877	760,274	2,691,146
Maryland.....		649,634	118,327	592,867	423,527	1,784,355
Massachusetts.....	3,076	794,321	920,187	1,059,377	1,834,019	4,640,930
Michigan.....		777,639	5,220,704	2,938,184	3,729,933	12,666,460
Minnesota.....		646,872	3,286,330	3,880,655	3,939,522	11,753,379
Mississippi.....	27,420	874,897	292,930	1,910,900	1,578,714	4,684,861
Missouri.....		1,469,451	3,604,427	3,633,197	4,031,973	12,739,048
Montana.....	1,871	364,814	2,037,712	1,663,537	1,270,452	5,338,386
Nebraska.....		866,002	1,689,988	2,803,710	1,816,762	7,076,462
Nevada.....		208,220	1,227,638	978,421	486,533	2,900,712
New Hampshire.....		57,255	234,912	549,335	441,277	1,282,779
New Jersey.....	1,202	1,225,452	1,207,455	2,024,803	1,767,671	6,226,583
New Mexico.....		712,020	2,168,075	1,498,827	1,176,139	5,555,061
New York.....	51,788	2,706,316	4,114,745	7,067,809	6,381,793	20,322,451
North Carolina.....		1,584,100	1,989,164	2,664,566	1,852,581	8,090,411
North Dakota.....	46,090	1,265,982	1,583,637	1,903,225	1,707,599	5,081,533
Ohio.....	7,297	1,616,869	2,636,617	4,434,050	2,615,324	11,310,157
Oklahoma.....	20,037	557,186	1,850,693	3,326,722	2,212,117	7,966,756
Oregon.....		516,565	1,704,140	1,785,476	1,391,133	5,397,314
Pennsylvania.....	34,462	1,598,937	4,471,597	2,763,027	4,022,972	12,890,995
Rhode Island.....		71,865	314,220	965,188	292,920	1,644,193
South Carolina.....	5,547	818,176	952,736	1,666,895	1,123,985	4,567,339
South Dakota.....		972,472	576,976	1,754,421	1,432,768	4,736,637
Tennessee.....	3,018	621,378	1,107,726	2,129,275	930,358	4,791,755
Texas.....		1,226,352	6,542,014	7,940,625	7,071,153	22,780,144
Utah.....	21,568	171,959	1,239,439	1,097,430	773,276	3,303,672
Vermont.....		69,967	429,307	594,678	271,628	1,365,580
Virginia.....	32,319	765,098	1,683,087	2,275,018	1,436,854	6,192,376
Washington.....		199,749	1,730,399	1,764,612	1,907,125	5,601,885
West Virginia.....	5,749	776,959	446,597	1,393,412	952,208	3,574,925
Wisconsin.....		607,965	1,822,321	3,817,316	3,014,483	9,282,085
Wyoming.....	6,560	315,960	1,361,453	1,390,720	745,501	3,820,194
District of Columbia.....		163,350		253,538	327,303	744,191
Hawaii.....	6,321	517,119	219,735	494,363	253,975	1,491,513
Total.....	498,246	39,384,061	86,104,191	116,001,982	95,758,591	387,747,071

Details concerning the status of the various funds by States and by classes of highways are shown in tables 7 to 10. The mileages of highway according to status, by States, and by class of highway are shown in tables 11, 12, and 13. Similar information for grade-crossing work is shown in table 14. Tables 15, 16, and 17 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.

#### PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION

The program of Public Works highway construction was in its last stages at the beginning of the fiscal year, and the year's work left only a small remainder of these funds for further construction. This program was financed with \$400,000,000 provided by the National Recovery Act and the supplementary \$200,000,000 provided by the Hayden-Cartwright Act of June 1934.

At the end of the year only \$4,570,020 of these funds remained for new projects. There have been completed since the beginning of the program 35,209 miles of highway, 698 railroad-highway grade separations, 88 separations of grade between highways, and 5,908 bridges, at a cost of \$575,924,780 from Public Works funds. Of the roads completed, 18,228 miles, involving \$270,872,272 of the Public Works funds, are on the Federal-aid system outside of municipalities; 2,649 miles, built at a cost of \$156,996,679 in Public Works funds, are on extensions of the Federal-aid system into and through municipalities; and 14,332 miles, costing \$148,055,829 in Public Works funds, are secondary roads.

Of this mileage, 1,262 was completed during the last year, including 471 miles on the Federal-aid system outside of municipalities, 130 miles on extensions of the system into and through municipalities, and 661 miles of secondary roads. The

work completed during the year involved \$35,206,723 of Public Works funds. Payments to the States for construction work in progress amounted to \$39,384,061.

At the close of the year 344 miles of Public Works highways, to which \$12,368,488 had been allotted, were under contract and largely under construction, and 61 miles had been approved for construction at an estimated cost to the Federal Government of \$1,136,712 but were not yet under contract. Details concerning the funds and mileage completed, under contract, and approved for construction, classified according to the four classes of improvement and by States appear in tables 7, 8, 9, 11, 12, and 13.

#### 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 the year 1937 provided by the Hayden-Cartwright Act of 1934. The apportionment of this fund, after deduction of the amount allowed for administrative purposes, is shown in table 1. This table also shows the apportionment of \$125,000,000 Federal aid for the fiscal year 1938 made in December 1936.

During the year 7,367 miles of highway financed with \$78,128,583 of Federal-aid funds were brought to completion. These projects involved \$72,908,738 of State funds. Payments to the States for completed work including work done on projects still under construction amounted to \$86,102,437.

At the close of the year projects under contract and in large part under construction included 8,554 miles of highway at an estimated cost of \$232,174,345 to be provided as follows: \$116,129,959 Federal aid, and \$116,044,386 from State funds. At the same time projects had been approved, but not yet contracted for, covering 1,541 miles and involving \$21,607,424 of Federal-aid funds and \$22,102,067 of State funds.

On June 30, 1937, there remained available for new projects \$139,883,121 of Federal-aid funds. In greater part they were funds provided for 1938. Tables 7 to 13 show the status of the work by States.

#### WORKS PROGRAM HIGHWAY CONSTRUCTION

Active construction on Works Program projects under an authorization of \$200,000,000 began in October of the preceding fiscal year. As the fiscal year 1937 began, 8,810 miles were under contract and largely under construction involving \$129,346,185; 1,112 miles involving \$16,998,071 were approved but not under contract, and there was an unobligated balance available for new projects of \$33,409,630.

The year's work resulted in the completion of 9,326 miles, bringing the total mileage completed in the program to 11,267. The Works Program funds involved amounted to \$139,817,552. State and other Federal funds were involved to the extent of \$6,936,294.

The classes of roads completed to date and the Works Program funds used to pay the cost were as follows: On the Federal-aid highway system outside of municipalities 2,501 miles costing \$37,627,756 in Works Program funds; on extensions of the Federal-aid system within municipalities, 889 miles costing \$27,823,366 in Works Program funds; on secondary roads within municipalities, 637 miles costing \$13,517,834 in Works Program funds; and secondary roads outside of municipalities, 7,240 miles costing \$60,848,596 in Works Program funds.

The 1,765 miles under contract and largely under construction were divided as follows: 224 miles on the Federal-aid system outside of municipalities, 151 miles on extensions of the Federal-aid system through municipalities, 142 miles of secondary road within municipalities, and 1,248 miles of secondary road outside of municipalities. Works Program funds involved were respectively \$10,294,044, \$10,291,873, \$7,385,366, and \$17,568,956.

Similar information for projects approved for construction but not yet under contract appears in tables 9 and 13. Details for work in all stages by States is presented in tables 7 to 13.

Funds available for new work and work approved but not yet under construction totaled \$9,642,209. Very little additional highway construction can be begun with Works Program funds and by the end of the fiscal year 1938 practically all emergency highway construction will have been completed.

## GRADE-CROSSING ELIMINATION AND PROTECTION PROGRAM

Grade-crossing elimination and protection work in 1937 far surpassed that of any other year. Eleven hundred and forty-nine crossings were eliminated, of which 1,086 were financed under the \$200,000,000 grade-crossing program authorized by the Emergency Relief Appropriation Act of 1935. Also 196 existing grade-separation structures were reconstructed and 574 crossings were protected by signals or other safety devices.

Works Program grade-crossing eliminations completed to date number 1,152; 206 existing crossing structures have been reconstructed; and 217 crossings have been protected by signals or other devices at a total cost of \$86,354,351 of which \$84,836,616 was Federal funds.

The importance of the work done during the past 2 years is not to be measured so much by the number of crossings eliminated as by the volume of highway traffic protected. The current program has been characterized by the large number of crossings eliminated in and near cities at a large cost. These crossings have not been eliminated before because of hesitancy to concentrate the expenditure of large amounts of highway funds at one place. The cost per project has been higher than ever before but the number of vehicles protected per dollar of expenditure is in even higher ratio.

At the end of the year work under contract consisted of 772 crossing eliminations, 133 elimination structures being reconstructed, and 922 crossings being protected. Of the crossings being eliminated 738 were financed with Works Program grade-crossing funds. Table 14 shows details of the above work by States and also the number of projects approved but not under contract at the end of the year.

As the year closed \$84,836,616 of Works Program grade-crossing funds had been expended on completed projects, \$93,322,368 had been assigned to work under contract, \$9,111,488 to projects approved but not then under contract, and \$8,729,528 remained available for new work. Tables 7 to 10, inclusive, show the assignment of funds to the four classes of work, and table 14 shows the corresponding number of crossings to be eliminated.

The new program of elimination of hazards at grade crossings supported by \$50,000,000 of Federal-aid funds for each of the fiscal years 1938 and 1939 was getting under way at the close of the year. New projects will be financed very largely with these funds. The apportionment is shown in table 1.

## SUMMARY

The year's work with the funds apportioned to all States resulted in the completion of 18,768 miles of highway and the elimination of 1,149 railroad-highway grade crossings at a cost of \$319,632,867 in Federal funds and \$86,882,091 in State funds. The types of highway completed are shown in table 15.

The completed work was divided as follows: 10,257 miles on the Federal-aid system outside of municipalities, 1,093 miles of extensions of the system into and through municipalities, 571 miles of secondary roads in municipalities, and 6,847 miles of secondary roads outside of municipalities. Federal funds involved in the respective classes of work were \$155,281,958, \$59,688,908, \$27,380,225 and \$77,281,776.

The roads under contract at the end of the year totaled 11,274 miles and involved \$268,445,582 of Federal funds, and there were 2,074 miles approved but not yet contracted for, involving \$36,542,365 of Federal funds. Unobligated balances available for new work totaled \$232,053,608, in large part newly apportioned funds for the fiscal year 1938. Tables 16 and 17, respectively, show the types of road under contract and the types approved but not yet under contract.

Rapid completion during the year of work financed with emergency funds greatly reduced the amount of such work in the current program and by the end of the calendar year 1937 the emergency program will have been completed with the exception of a few projects that will absorb the last remnants of these funds.

TABLE 7.—Funds allotted to projects completed during the fiscal year 1937

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total Federal funds	Estimated total cost
				Highways	Grade crossings		
Alabama.....		\$461,209	\$25,800	\$1,399,654	\$334,314	\$2,220,977	\$2,329,378
Arizona.....		6,291	1,287,454	641,088	471,993	2,406,826	3,097,543
Arkansas.....		106,688	65,029	903,767	706,247	1,786,731	1,793,376
California.....		186,635	5,310,414	894,061	1,616,559	8,007,669	12,288,787
Colorado.....		12,137	1,709,229	667,577	667,577	2,388,943	3,845,734
Connecticut.....		5,896	344,518	190,105	141,699	682,218	1,044,546
Delaware.....			360,062	244,536		604,698	1,001,398
Florida.....	\$30,435	37,876	355,829	220,198	1,100,895	1,745,236	2,174,277
Georgia.....	48,024	768,780	964,469	3,501	18,615	1,803,389	2,998,160
Idaho.....	3,207	39,347	1,599,359	402,801	611,301	2,656,015	3,881,628
Illinois.....	67,124	875,720	3,582,101	2,007,895	2,591,741	9,124,081	13,120,290
Indiana.....	32,852	628,580	2,104,373	407,476	984,078	4,157,359	6,694,851
Iowa.....		499	3,202,007	740,702	1,106,035	5,049,243	8,502,932
Kansas.....		35,766	2,292,794	1,743,383	1,959,057	6,036,000	8,326,868
Kentucky.....		167,710	759,606	67,932	137,859	1,133,107	1,969,175
Louisiana.....	256,602	267,840	795,487	209,400	335,552	1,864,881	3,075,975
Maine.....		32,529	722,460	114,661	339,739	1,259,395	2,012,875
Maryland.....		537,994		123,202		661,196	767,716
Massachusetts.....		407,929	166,965	70,007	292,474	937,378	1,174,306
Michigan.....		644,563	3,201,270	2,370,284	1,838,191	8,054,308	11,855,461
Minnesota.....		57,794	3,274,943	482,259	1,433,835	5,243,835	8,905,255
Mississippi.....	68,965	824,271	2,320	1,166,223	962,133	3,023,912	3,035,568
Missouri.....		631,049	1,961,777	72,922	553,446	3,219,194	5,229,701
Montana.....		427,365	1,995,809	1,010,111	1,303,285	4,736,570	6,539,618
Nebraska.....		217,715	1,235,465	1,360,990	1,302,949	4,117,119	5,568,128
Nevada.....		17,592	821,890		114,694	954,176	1,109,333
New Hampshire.....		1,946	361,381	39,882	223,696	626,905	1,016,083
New Jersey.....		153,323	1,251,927	554,811	364,464	2,324,525	3,649,124
New Mexico.....		56,013	2,148,695	645,039	345,100	3,194,852	4,557,407
New York.....		177,960	4,810,878	1,252,330	1,797,602	8,038,770	13,940,998
North Carolina.....		419,189	1,575,701	568,622	326,638	2,890,150	4,478,362
North Dakota.....	53,009	468,339	192,450	941,275	472,059	2,127,132	2,325,195
Ohio.....		296,782	1,687,152	408,562		2,392,496	4,184,199
Oklahoma.....		176,212	1,950,121	1,342,957	1,568,663	5,037,953	6,966,559
Oregon.....		219,655	1,653,547	519,325	520,512	2,912,442	4,057,002
Pennsylvania.....		260,412	3,339,940	360,376	1,073,837	5,034,565	8,673,071
Rhode Island.....			127,635	490,831	264,253	882,719	1,019,190
South Carolina.....		338,157	246,000	290,762	579,579	1,454,498	1,849,805
South Dakota.....		168,803	777,398	806,295	642,210	2,394,706	3,005,064
Tennessee.....	14,300	330,646	1,178,069	675,206	219,493	2,417,714	3,762,686
Texas.....		220,435	4,979,648	3,088,629	2,939,136	11,227,848	16,558,118
Utah.....		106,941	1,425,753	185,536	160,450	1,878,710	2,560,064
Vermont.....		80,513	609,999	165,526	279,659	1,135,697	1,813,558
Virginia.....		27,318	1,985,607	229,074	996,679	3,238,678	5,228,189
Washington.....		119,850	1,996,393	992,343	541,678	3,650,264	5,576,226
West Virginia.....	10,611	72,349	390,447	198,955	5,550	677,912	1,074,989
Wisconsin.....		275,544	2,101,067	1,180,477	616,808	4,173,896	6,497,071
Wyoming.....		13,551	1,437,665	968,137	512,076	2,931,429	3,930,643
Hawaii.....		252,457	14,542	393,020	98,722	758,741	800,945
Total.....	585,129	11,635,578	74,383,459	33,154,628	35,523,164	155,281,958	229,849,457

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total Federal funds	Estimated total cost
			Highways	Grade crossings		
Alabama.....	\$354,148		\$1,099,083	\$1,387,027	\$2,840,258	\$2,866,240
Arizona.....	56,946	\$56,473	188,076	254,046	555,541	641,190
Arkansas.....	106,310		257,530	386,108	749,948	751,975
California.....	113,664		510,986	1,278,866	1,903,516	2,942,839
Colorado.....			633,864	215,000	848,864	904,116
Connecticut.....	282,478	38,896	22,784		344,158	396,093
Delaware.....	133,489			139,000	263,489	264,566
Florida.....	144,119		728,670	294,730	1,167,519	1,205,276
Georgia.....	260,647		8,074		268,721	335,331
Idaho.....	266,214		331,231	114,403	711,848	732,876
Illinois.....	720,130	802,707	1,228,036	1,140,972	3,891,845	4,865,579
Indiana.....	967,655	134,240	1,266,976	433,010	2,801,881	3,130,074
Iowa.....	174,169	276,415	614,611	607,257	1,672,452	2,003,413
Kansas.....	45,472	51,386	751,523	497,274	1,345,655	1,409,786



TABLE 7.—Funds allotted to projects completed during the fiscal year 1937—Con.

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES—Continued

State	Public Works, 1934-35	Federal aid, *1936-38	Works Program		Total Federal funds	Estimated total cost
			Highways	Grade crossings		
Kentucky	\$607, 105	\$100, 491	\$403, 445	\$881, 022	\$1, 992, 063	\$2, 142, 970
Louisiana	89, 595	570			90, 165	101, 650
Maine	7, 752	62, 124	118, 927	233, 573	422, 376	457, 620
Maryland	231, 415		112, 131	81, 198	424, 744	479, 644
Massachusetts	2, 442, 240			207, 520	2, 649, 760	2, 741, 406
Michigan	72, 566	763, 244	1, 087, 995	772, 785	2, 696, 590	3, 672, 788
Minnesota	618, 596	406, 967	554, 758	1, 088, 323	2, 668, 644	3, 168, 029
Mississippi	179, 817		575, 018	122, 637	877, 472	923, 987
Missouri	775, 394	39, 682	394, 114	61, 087	1, 270, 277	1, 311, 318
Montana	17, 437		307, 022	451, 925	776, 384	786, 341
Nebraska	142, 260	316	497, 167	265, 033	904, 776	932, 384
Nevada	65, 146		7, 900	62, 823	135, 869	142, 877
New Hampshire	16, 653		161, 260		177, 913	189, 541
New Jersey	1, 280, 612	40, 470	118, 728	2, 088	1, 441, 898	1, 548, 743
New Mexico	12, 053		345, 215	42, 622	399, 890	404, 787
New York	775, 643		3, 979, 907	609, 200	5, 364, 840	5, 573, 024
North Carolina	73, 019	5, 611	404, 081	962, 205	1, 444, 916	1, 485, 335
North Dakota	198, 843		203, 660	339, 633	742, 136	751, 395
Ohio	425, 018	21, 537	915, 042	267, 518	1, 629, 115	1, 757, 418
Oklahoma	140, 756		98, 406	220, 016	459, 178	481, 490
Oregon	85, 886	108, 229	342, 904	221, 266	758, 285	894, 651
Pennsylvania	518, 691		70, 682	504, 622	1, 093, 895	1, 143, 263
Rhode Island	153, 832	11, 708	53, 463	201, 684	420, 687	448, 540
South Carolina	153, 772	900	105, 346	217, 954	477, 972	516, 773
South Dakota	535, 732	8, 968	451, 816	116, 071	1, 112, 587	1, 123, 798
Tennessee	335, 116	1, 317	444, 623	184, 471	965, 527	989, 598
Texas	637, 741	56, 630	2, 299, 871	1, 324, 094	4, 318, 336	4, 580, 312
Utah	3, 000		201, 566		204, 566	230, 720
Vermont	29, 012	9, 494	134, 433	2, 534	175, 473	216, 544
Virginia			289, 212	697, 555	956, 767	1, 049, 851
Washington	9, 880	44, 026	261, 090	33, 449	348, 445	398, 429
West Virginia	361, 819		161, 675	523, 494	989, 994	593, 290
Wisconsin		116, 464	919, 489	93, 041	1, 128, 994	1, 347, 822
Wyoming	8, 521	1, 130	474, 222	97, 732	581, 605	587, 743
Hawaii			216, 882	71, 666	288, 548	292, 121
District of Columbia	146, 775		222, 251		369, 026	369, 026
Total	14, 777, 138	3, 159, 995	24, 575, 835	17, 175, 940	59, 688, 908	66, 314, 582

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program		Total Federal funds	Estimated total cost
	Highways	Grade crossings		
Alabama	\$36, 378	\$857, 126	\$893, 504	\$893, 858
Arizona	114, 437	134, 121	248, 558	253, 716
Arkansas	174, 620	209, 618	384, 238	396, 815
California	774, 528	1, 509, 892	2, 284, 420	2, 314, 728
Colorado	46, 418		46, 418	46, 966
Connecticut	96, 556		96, 856	97, 728
Delaware	85, 745		85, 745	93, 528
Florida	19, 748	177, 153	196, 301	196, 519
Georgia	300, 056	28, 356	328, 412	329, 714
Idaho	262, 698	64, 178	326, 876	356, 464
Illinois	543, 228	1, 515, 034	2, 058, 262	2, 071, 237
Indiana	33, 757	35, 968	69, 725	109, 974
Iowa	187, 369	141, 207	328, 576	336, 403
Kansas	298, 852	2, 099	298, 951	298, 958
Kentucky	224, 726	11, 582	236, 308	237, 841
Louisiana	439, 092		439, 092	465, 109
Maine	258, 998		258, 998	263, 543
Maryland		83, 683	83, 683	83, 683
Massachusetts	63, 650	469, 316	532, 966	532, 976
Michigan	454, 520	1, 314, 150	1, 768, 670	1, 851, 625
Minnesota	962, 677	685, 460	1, 648, 137	1, 990, 285
Mississippi	35, 477	38, 623	74, 100	74, 116
Missouri	115, 410	34, 036	149, 446	149, 613
Montana	416, 892	221, 086	637, 978	647, 578
Nebraska	11, 984	56, 540	68, 524	68, 524

TABLE 7.—Funds allotted to projects completed during the fiscal year 1937—Con.

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES—Continued

State	Works Program		Total Federal funds	Estimated total cost
	Highways	Grade crossings		
Nevada.....	\$366,304	\$188,392	\$554,696	\$582,098
New Hampshire.....	76,745	-----	76,745	77,295
New Jersey.....	-----	105,201	105,201	105,201
New Mexico.....	304,418	345,739	650,157	650,549
New York.....	529,321	2,099,558	2,628,879	2,665,617
North Carolina.....	165,075	242,517	407,592	407,610
North Dakota.....	118,284	532,201	650,585	651,156
Ohio.....	731,710	14,795	746,505	746,505
Oklahoma.....	599,553	189,697	789,250	801,170
Oregon.....	247,563	-----	247,563	248,163
Pennsylvania.....	349,649	248,643	598,292	648,770
Rhode Island.....	185,024	-----	185,024	235,629
South Carolina.....	125,630	-----	125,630	131,175
South Dakota.....	8,960	33,775	41,835	41,966
Tennessee.....	152,762	17,622	169,784	173,915
Texas.....	345,339	1,738,506	2,083,845	2,194,948
Utah.....	342,665	17,517	360,182	461,955
Vermont.....	96,531	9,184	105,715	140,749
Virginia.....	295,655	9,567	305,222	320,042
Washington.....	341,781	1,010,600	1,352,390	1,454,705
West Virginia.....	77,771	5,750	83,521	83,521
Wisconsin.....	399,691	638,047	1,037,738	1,681,182
Wyoming.....	5,690	-----	5,690	5,713
District of Columbia.....	126,636	396,804	523,440	552,704
Total.....	11,947,473	15,432,752	27,380,225	28,623,929

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35 <sup>1</sup>	Works Program		Total Federal funds	Estimated total cost
		Highways	Grade crossings		
Alabama.....	\$248,758	\$794,741	\$181,248	\$1,224,747	\$1,328,937
Arizona.....	-----	546,915	182,852	729,767	936,560
Arkansas.....	68,921	831,760	153,127	1,053,808	1,054,932
California.....	397	3,558,072	645,466	4,203,935	4,354,920
Colorado.....	-----	577,230	240,592	817,822	919,645
Connecticut.....	177,598	276,592	-----	454,190	508,739
Delaware.....	-----	249,904	-----	249,904	290,775
Florida.....	103,402	982,696	166,921	1,253,019	1,316,837
Georgia.....	181,568	578,250	44,614	804,432	927,499
I Idaho.....	160,490	1,067,341	117,174	1,345,005	1,392,007
Illinois.....	725,922	3,300,072	425,650	4,451,644	4,746,541
Indiana.....	141,028	1,233,359	366,197	1,740,584	1,899,535
Iowa.....	65,140	2,030,237	1,012,299	3,107,676	3,239,709
Kansas.....	122,064	1,197,990	315,692	1,635,746	1,660,991
Kentucky.....	161,045	2,003,150	32,039	2,196,234	2,394,275
Louisiana.....	93,677	1,039,398	214,590	1,347,665	1,499,840
Maine.....	29,532	691,006	226,026	946,564	966,923
Maryland.....	227,307	234,072	198,034	659,413	673,758
Massachusetts.....	-----	90,570	262,317	352,887	390,289
Michigan.....	846,470	1,552,063	151,600	2,550,133	2,693,805
Minnesota.....	109,728	2,105,432	353,996	2,569,156	3,007,023
Mississippi.....	225,344	567,820	82,997	876,161	877,139
Missouri.....	85,293	2,837,362	174,311	3,096,966	3,137,824
Montana.....	182,717	945,936	259,472	1,388,125	1,422,227
Nebraska.....	132,648	1,062,690	136,181	1,331,519	1,361,415
Nevada.....	271,649	839,032	130,976	1,241,657	1,241,657
New Hampshire.....	-----	294,042	118,053	412,095	437,217
New Jersey.....	-----	297,207	421,503	658,710	660,034
New Mexico.....	40,094	291,210	101,527	432,831	549,485
New York.....	366,108	3,097,985	662,446	4,126,539	4,238,265
North Carolina.....	77,786	1,683,064	343,578	2,104,428	2,109,266
North Dakota.....	328,907	589,909	18,830	937,646	958,808
Ohio.....	561,361	1,359,128	133,370	2,053,859	2,133,124
Oklahoma.....	450,928	1,529,106	517,568	2,494,602	2,544,102
Oregon.....	76,706	926,687	446,131	1,449,584	1,449,584
Pennsylvania.....	588,362	1,169,388	226,233	2,023,983	2,366,619
Rhode Island.....	-----	287,806	182,508	470,314	449,553
South Carolina.....	252,527	1,082,257	306,149	1,640,933	1,740,704

<sup>1</sup> Includes some secondary roads within municipalities.

TABLE 7.—Funds allotted to projects completed during the fiscal year 1937—Con.

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

State	Public Works, 1934-35	Works Program		Total Federal funds	Estimated total cost
		Highways	Grade crossings		
South Dakota	\$121,708	\$526,195	\$287,656	\$935,559	\$937,557
Tennessee	329,675	994,131	346,062	1,669,868	1,711,852
Texas	322,789	3,805,636	1,188,522	5,316,947	5,573,689
Utah	81,173	400,550	134,644	616,367	684,863
Vermont	2,741	326,947	71,965	401,653	453,592
Virginia	233,113	1,688,353	135,434	2,056,900	2,078,913
Washington	-----	769,175	533,478	1,302,653	1,542,209
West Virginia	287,395	516,084	68,154	871,633	896,856
Wisconsin	99,418	1,728,628	1,127,288	2,955,334	3,255,388
Wyoming	28,352	558,121	-----	586,473	587,040
Hawaii	184,106	-----	-----	184,106	184,463
Total	8,794,007	55,002,299	13,485,470	77,281,776	81,726,990

## TOTAL

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total Federal funds	Estimated total cost
				Highways	Grade crossings		
Alabama	-----	\$1,064,116	\$25,800	\$3,329,855	\$2,759,715	\$7,179,486	\$7,418,413
Arizona	-----	63,237	1,343,927	1,490,516	1,043,012	3,940,692	4,929,009
Arkansas	-----	281,920	65,029	2,172,676	1,455,100	3,974,725	3,997,098
California	-----	300,666	5,310,415	5,737,646	5,050,783	16,399,540	21,881,274
Colorado	-----	12,137	1,709,229	1,257,512	1,123,169	4,102,047	5,716,461
Connecticut	-----	465,971	383,414	586,338	141,699	1,577,422	2,047,106
Delaware	-----	133,489	360,062	580,185	130,000	1,203,736	1,620,267
Florida	\$50,435	285,397	355,829	1,950,712	1,739,702	4,362,075	4,892,909
Georgia	48,024	1,210,994	964,469	889,882	91,585	3,204,954	4,590,704
Idaho	3,207	466,051	1,599,359	2,064,071	907,056	5,039,744	6,362,975
Illinois	67,124	2,321,772	4,384,808	7,078,731	5,673,397	19,525,832	24,803,647
Indiana	32,852	1,737,262	2,238,613	2,941,569	1,819,253	8,769,549	11,834,434
Iowa	-----	239,808	3,478,422	3,572,919	2,866,798	10,157,947	14,082,457
Kansas	-----	203,301	2,344,180	3,994,748	2,774,123	9,316,352	11,696,603
Kentucky	-----	935,860	860,096	2,699,253	1,062,503	5,557,712	6,744,261
Louisiana	256,601	451,112	796,058	1,687,890	550,142	3,741,803	5,142,664
Maine	-----	69,812	784,591	1,183,592	849,338	2,887,333	3,730,966
Maryland	-----	996,717	-----	469,405	362,914	1,829,036	2,004,796
Massachusetts	-----	2,850,169	166,967	224,227	1,231,628	4,472,991	4,808,977
Michigan	-----	1,563,599	3,964,514	5,464,862	4,076,726	15,069,701	20,073,679
Minnesota	-----	786,118	3,681,916	4,105,126	3,561,612	12,134,772	17,073,627
Mississippi	68,966	1,229,432	2,320	2,344,538	1,206,389	4,851,645	4,910,810
Missouri	-----	1,491,737	2,001,459	3,419,807	822,880	7,735,883	9,828,456
Montana	-----	627,518	1,995,809	2,679,962	2,235,768	7,539,057	9,395,764
Nebraska	-----	492,623	1,235,781	2,932,531	1,760,703	6,421,938	7,990,451
Nevada	-----	354,387	821,890	1,213,237	496,884	2,886,398	3,075,965
New Hampshire	-----	18,598	361,382	571,930	311,748	1,293,658	1,719,136
New Jersey	-----	1,433,925	1,292,396	910,746	893,257	4,530,334	5,963,102
New Mexico	-----	108,165	2,148,695	1,585,882	834,988	4,677,730	6,162,228
New York	-----	1,319,712	4,810,877	8,859,633	5,168,806	20,159,028	26,417,904
North Carolina	-----	569,994	1,581,312	2,820,841	1,874,929	6,847,086	8,480,573
North Dakota	53,009	996,900	192,450	1,853,227	1,362,723	4,457,499	4,686,554
Ohio	-----	1,283,161	1,708,688	3,414,442	415,684	6,821,975	8,821,246
Oklahoma	-----	767,896	1,950,121	3,567,023	2,495,943	8,780,983	10,793,321
Oregon	-----	381,709	1,761,777	2,036,479	1,187,909	5,367,874	6,649,400
Pennsylvania	-----	1,367,466	3,339,940	1,950,094	2,093,255	8,750,735	12,831,723
Rhode Island	-----	153,832	139,343	967,124	648,445	1,908,744	2,152,912
South Carolina	-----	744,457	246,900	1,603,995	1,103,684	3,699,033	4,283,457
South Dakota	-----	826,243	786,366	1,792,366	1,079,712	4,484,687	5,108,385
Tennessee	14,300	995,436	1,179,386	2,266,723	767,048	5,222,893	6,638,051
Texas	-----	1,180,966	5,036,277	9,539,474	7,190,259	22,946,976	28,907,067
Utah	-----	191,114	1,425,753	1,130,318	312,640	5,059,825	3,937,602
Vermont	-----	112,266	619,493	722,437	363,342	1,818,538	2,624,443
Virginia	-----	260,431	1,985,607	2,502,294	1,839,235	6,587,367	8,676,995
Washington	-----	129,730	2,040,419	2,364,389	2,119,214	6,653,752	8,971,569
West Virginia	10,611	721,563	390,447	954,485	79,454	2,156,590	2,648,656
Wisconsin	-----	374,962	2,217,531	4,228,285	2,475,184	9,295,962	12,181,463
Wyoming	-----	50,424	1,438,795	2,006,170	609,808	4,105,197	5,111,139
Hawaii	-----	436,563	14,542	609,901	170,389	1,231,395	1,272,529
District of Columbia	-----	146,775	-----	-----	-----	-----	-----
Total	585,129	35,206,723	77,543,454	124,680,235	81,617,326	319,632,867	406,514,958

TABLE 8.—Funds allotted to projects under contract on June 30, 1937

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal-aid grade crossings	Total Federal funds	Estimated total cost
				Highways	Grade crossings			
Alabama		\$86,540	\$743,501	\$136,800	\$60,519	\$15,227	\$1,042,587	\$1,786,088
Arizona		6,384	1,059,403	41,478	58,378		1,165,643	1,618,219
Arkansas		41,327	3,764,816	83,113	393,352		4,282,608	4,288,565
California		23,442	4,920,656	494,584	687,131	28,119	6,153,932	10,317,531
Colorado		10,880	1,980,282	50,929	329,654	9,860	2,381,605	3,967,347
Connecticut		23,300	370,176	31,450	467,650		892,576	1,268,187
Delaware			207,664	25,446			233,110	449,740
Florida		155,464	1,138,771	299,168	219,718		1,813,121	2,952,508
Georgia		514,977	1,752,493	311,542	690,043	18,346	3,287,401	5,039,925
Idaho		44,982	1,207,499	46,379	252,800	6,271	1,557,931	2,372,659
Illinois		74,400	5,595,352	163,010	1,417,740	39,675	7,290,177	12,875,607
Indiana		61,728	3,127,183	206,433	546,929	99,300	4,041,573	7,168,875
Iowa			2,721,851	96,865	493,615		3,312,331	6,626,311
Kansas			2,965,067	188,654	701,466		3,855,187	6,873,453
Kentucky		19,313	1,457,756	193,525	537,374		2,207,968	3,765,977
Louisiana		44,459	1,625,860	332,074	1,180,936		3,183,329	11,862,095
Maine		800	829,433	69,152	359,883	5,287	1,264,555	2,094,579
Maryland			825,679	423,061	46,599	7,800	1,303,139	2,128,884
Massachusetts			2,254,006	813,690	498,041	15,710	3,581,447	6,226,225
Michigan		96,788	2,804,591	94,521	716,677		3,712,577	6,518,418
Minnesota		107,572	1,741,386	87,563	316,940	20,142	2,273,603	4,041,457
Mississippi		215,841	1,842,565	220,414	1,028,731		3,307,551	5,150,654
Missouri		120,393	4,547,564	122,484	1,463,977	22,930	6,277,348	11,314,346
Montana		7,599	2,068,684	48,463	183,319		2,308,065	3,928,458
Nebraska			2,392,298	125,713	147,912		2,665,923	5,019,496
Nevada		6,682	1,684,345	33,646	13,308		1,737,981	2,010,307
New Hampshire			180,794	46,296	100,726		327,816	512,961
New Jersey		364,695	950,684		46,880		1,361,959	2,824,242
New Mexico			2,069,478	43,071	25,879		2,138,428	3,351,240
New York		135,730	8,411,379	107,155	2,753,420		11,407,684	21,233,159
North Carolina		357,646	2,930,424	511,086	640,542		4,439,698	7,709,497
North Dakota		249,262	1,515,578	188,209	606,978		2,560,227	2,580,527
Ohio		208,475	3,919,692	945,302	2,486,343	32,120	7,591,932	11,744,568
Oklahoma	\$215,209	16,154	2,297,204	142,060	537,190		3,207,817	5,709,667
Oregon		15,000	2,789,107	425,883	305,558	100,123	3,635,671	5,545,588
Pennsylvania		308,879	5,920,315	1,065,124	3,335,868		10,630,186	17,038,575
Rhode Island		2,478	754,129	3,837	12,567		773,011	1,532,061
South Carolina		111,975	2,179,723	40,530	778,749		3,110,977	6,166,174
South Dakota		88,361	1,186,440	294,337	1,079,208		2,648,346	3,582,742
Tennessee			1,039,208	464,203	414,510		1,917,921	2,957,129
Texas	52,968	153,797	7,034,766	351,313	532,398		8,125,242	15,387,949
Utah			865,061	73,933	267,435		1,206,429	1,584,297
Vermont			546,664	15,770	147,924	6,390	716,748	2,384,592
Virginia		167,466	1,542,412	63,032	344,411		2,117,321	3,776,623
Washington		25,000	1,255,312	45,393	48,790	25,610	1,400,105	2,544,604
West Virginia		187,228	949,358	336,277	899,327		2,372,190	3,387,547
Wisconsin		34,774	3,737,932	240,977	572,080	118,500	4,704,263	9,573,886
Wyoming			1,807,596	91,192	111,168		2,009,956	3,157,619
Hawaii		342,210	472,960	58,907	158,371		1,032,448	1,615,266
Total	268,177	4,432,001	109,985,097	10,294,044	29,018,714	571,410	154,569,443	267,526,324

TABLE 8.—Funds allotted to projects under contract on June 30, 1937—Continued

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total Federal funds	Estimated total cost
			Highways	Grade crossings			
Alabama	\$353, 477	\$11, 300		\$587, 846		\$952, 623	\$963, 923
Arizona		16, 086		3, 645		19, 731	28, 173
Arkansas	31, 616	16, 865	\$275, 605	542, 392		866, 475	869, 481
California	22, 214	149, 757	216, 200			388, 171	557, 432
Colorado		80	8, 200			8, 280	8, 348
Connecticut	36, 690		60, 930			97, 620	97, 620
Delaware	7, 100		195, 870			202, 970	206, 760
Florida	134, 300	167, 070	72, 423	257, 312		631, 105	798, 518
Georgia	325, 038	113, 110	38, 510	184, 390		661, 048	774, 157
Idaho	11, 428	17, 114	6, 218	230, 986		265, 746	277, 637
Illinois	884, 007	741, 505	200	2, 513, 865		4, 139, 577	5, 050, 118
Indiana		306, 903	364, 738	1, 379, 278		2, 050, 919	2, 357, 823
Iowa	197, 432	172, 501	380, 624	1, 743, 415		2, 493, 972	2, 771, 685
Kansas		529, 724	103, 991	1, 733, 828		2, 367, 543	2, 971, 702
Kentucky	35, 261	315, 852	131, 839	524, 475		1, 007, 427	1, 372, 431
Louisiana			254, 657	289, 184		543, 841	543, 870
Maine	8, 645	34, 520	9, 000	2, 210		54, 375	88, 895
Maryland	30, 570		154, 193	3, 000		187, 763	187, 763
Massachusetts		1, 253	908, 130	440, 820		1, 350, 203	1, 351, 456
Michigan		723, 840		723, 031		1, 446, 871	2, 241, 180
Minnesota	362, 161	285, 978	52, 691	569, 269		1, 270, 099	1, 671, 256
Mississippi	7, 808	611, 065	353, 518	338, 621		1, 311, 012	1, 923, 228
Missouri	700, 723	173, 531	951, 654	1, 298, 269		3, 124, 177	3, 446, 407
Montana	40, 949	25, 032	69, 231			135, 212	154, 687
Nebraska	60, 567	67, 050	40, 466	975, 363		1, 143, 446	1, 210, 496
Nevada				3, 630		3, 630	3, 630
New Hampshire				103, 581		103, 581	103, 581
New Jersey	86, 385	10, 440	1, 595, 169	279, 000		1, 970, 994	2, 068, 999
New Mexico	1, 623		11, 239	536, 173		543, 035	546, 492
New York	593, 310	170, 930	508, 800	2, 221, 910		3, 494, 950	3, 971, 064
North Carolina	27, 324	91, 112	299, 445	384, 069		801, 950	906, 013
North Dakota	268, 311	75, 242	160, 940	2, 380, 404		78, 297	799, 353
Ohio	33, 000		545, 780	1, 537, 245		2, 116, 025	2, 197, 370
Oklahoma	512	43, 922	153, 046	528, 818		726, 298	768, 616
Oregon	55, 000	39, 880	458, 122	695, 935	\$40, 024	1, 288, 961	1, 677, 054
Pennsylvania	467, 543	147, 808	667, 640	2, 845, 450		4, 128, 441	4, 532, 685
South Carolina	63, 561	134, 370	373, 174	334, 028		905, 133	1, 149, 116
South Dakota	84, 810	15, 150	266, 940	380, 303		747, 203	766, 093
Tennessee		68, 483	231, 640	240, 920		541, 043	609, 526
Texas		104, 975		675, 764		780, 739	898, 760
Utah			56, 518	128, 441		184, 959	184, 959
Vermont			15, 110	39, 150		54, 260	63, 357
Virginia	9, 260		106, 990	646, 148		762, 308	763, 002
Washington	11, 596	67, 887		273, 855		353, 338	414, 820
West Virginia	71, 631	40, 800	151, 923	421, 932		686, 266	728, 196
Wisconsin	5, 220	379, 104	21, 900	8, 675		414, 899	846, 527
Wyoming	11, 100	6, 446	18, 609	319, 100		355, 255	359, 244
Total	5, 040, 172	5, 876, 685	10, 291, 873	27, 233, 130	40, 024	48, 481, 884	56, 283, 503

TABLE 8.—Funds allotted to projects under contract on June 30, 1937—Continued  
ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program		Federal aid, grade cross- ings	Total Federal funds	Estimated total cost
	Highways	Grade crossings			
Alabama.....	\$37,300	\$285,100		\$322,400	\$322,400
Arizona.....		6,095		6,095	6,095
Arkansas.....	25,606	672,788		698,394	699,369
California.....	337,937	1,083,354		1,421,291	1,519,538
Colorado.....		645,814		645,814	645,815
Connecticut.....		350,000		350,000	371,361
Delaware.....	742			742	742
Florida.....	27,540	73,500		101,040	101,040
Georgia.....	457,570	209,060		666,630	666,630
Idaho.....		192,218		192,218	192,331
Illinois.....	350,800	324,496		705,296	705,296
Indiana.....	243,625	972,814		1,216,439	1,216,439
Iowa.....	3,651	72,510		76,161	76,307
Kansas.....	21,583			21,583	21,583
Kentucky.....	130,745	947,119		1,077,864	1,318,444
Louisiana.....	289,260	338,466		627,726	660,725
Maine.....	63,722			63,722	63,722
Maryland.....	85,000	86,300		171,300	171,300
Michigan.....		586,600		586,600	586,600
Minnesota.....	332,056	576,720		908,776	1,075,642
Mississippi.....	33,469	51,900		85,369	85,369
Missouri.....	169,700	2,361,596		2,531,296	2,548,946
Montana.....	187,018			187,018	187,018
Nebraska.....	237,483	138,313		375,796	375,796
Nevada.....	41,428	180,124		221,562	254,788
New Hampshire.....	65,870	168,326		234,196	234,876
New Jersey.....	273,300	1,722,974		1,996,274	1,996,274
New Mexico.....		114,347		114,347	114,347
New York.....	160,400	2,601,630		2,762,030	2,762,030
North Carolina.....	204,228	690,250		894,478	909,978
North Dakota.....	13,500	824,804		838,304	838,304
Ohio.....	828,158	761,653		1,589,811	1,679,351
Oklahoma.....	262,994	260,076		523,070	523,070
Pennsylvania.....	1,923,921	773,914		2,697,835	3,009,424
Rhode Island.....		36,240		36,240	36,240
South Carolina.....	89,055	98,277		187,332	187,332
South Dakota.....	13,370	267,440		280,810	280,810
Tennessee.....	193,620	1,656,350		1,849,970	1,849,970
Texas.....	60,475	1,336,660		1,397,135	1,412,725
Utah.....	27,918	386,423		414,341	445,705
Virginia.....		74,881		74,881	74,881
Washington.....	142,921	402,861	\$66,593	612,375	661,917
West Virginia.....		520,490		520,490	520,490
Wisconsin.....	9,391	1,371,406		1,380,797	1,381,311
Wyoming.....		265,400		265,400	265,400
Total.....	7,385,366	24,489,289	66,593	31,941,248	33,057,731

TABLE 8.—Funds allotted to projects under contract on June 30, 1937—Continued  
ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public works, 1934-35 <sup>1</sup>	Works Program		Federal aid, secondary or feeder	Total Federal funds	Estimated total cost
		Highways	Grade crossings			
Alabama.....		\$516,350	\$136,750		\$653,100	\$653,100
Arizona.....	\$19,573	30,137	85,665		135,375	205,881
Arkansas.....	44,763	96,405	143,932		285,100	285,617
California.....	64,220	344,459	179,996		588,075	700,990
Colorado.....		38,667		\$7,008	45,675	52,684
Connecticut.....		433,340	156,370		589,710	606,311
Delaware.....		50,926			50,926	50,926
Florida.....		129,600	213,100		342,700	342,700
Georgia.....	243,625	627,900	322,810		1,194,335	1,194,335
Idaho.....	1,886		8,410	4,712	15,008	18,170
Illinois.....	100,455	325,626	187,861	15,716	629,658	718,854
Indiana.....	49,340	1,044,257	371,128		1,464,725	1,522,947
Iowa.....		708,507	351,987		1,060,494	1,086,534
Kansas.....	43,698	338,564			382,262	450,702
Kentucky.....	14,079	206,440	106,565		327,084	327,084
Louisiana.....	191,500	294,637	84,485		570,622	790,256
Maine.....	15,800	231,388	171,454	3,368	422,010	425,378
Maryland.....	123,151	85,317	387,079	3,132	598,679	601,810
Massachusetts.....		1,185,063	1,733,863	2,650	2,921,576	3,449,099
Michigan.....		202,000	171,150		373,150	374,265
Minnesota.....		123,628	212,071		335,699	380,866
Mississippi.....	157,472	300,373	137,079		594,924	608,952
Missouri.....	253,560	177,950	166,845	263,520	861,875	1,270,186
Montana.....	7,968	111,176			119,174	160,513
Nebraska.....	78,727	219,378	199,087		497,192	504,707
Nevada.....	15,297	11,110			26,407	26,407
New Hampshire.....		240,817	91,270		332,087	340,534
New Jersey.....	312,630	313,865	500,600		1,127,095	1,140,862
New Mexico.....	6,231	473,338			479,569	479,569
New York.....		622,260	581,740		1,204,000	1,204,000
North Carolina.....	23,682	622,541	352,270		998,493	1,036,293
North Dakota.....		53,820	79,830		133,650	133,650
Ohio.....	94,379	1,485,522	963,048	13,920	2,556,869	2,647,386
Oklahoma.....	215,996	235,858	373,907		825,761	825,761
Oregon.....	49,222	89,274	87,722	38,377	264,595	291,960
Pennsylvania.....	149,962	2,584,722	1,513,094		4,247,778	4,408,558
Rhode Island.....		2,313			2,313	2,710
South Carolina.....	76,476	474,118	139,716		690,310	702,522
South Dakota.....	14,590	187,360	174,901		376,851	376,851
Tennessee.....	92,741	514,344	396,190		1,003,275	1,010,418
Texas.....	184,531	287,262	511,112		982,905	1,005,417
Utah.....		254,810	91,622		346,432	346,832
Vermont.....		28,400	56,569		84,969	109,322
Virginia.....	83,980	170,063	229,009		483,052	499,340
Washington.....	10,000		162,141	6,008	178,149	183,961
West Virginia.....	142,751	748,530	98,320		989,601	1,092,600
Wisconsin.....		57,851	526,143	9,300	593,294	613,906
Wyoming.....		44,000		38,790	82,790	106,780
Hawaii.....	14,000	244,690	124,944		383,634	407,704
Total.....	2,896,315	17,568,956	12,581,235	406,501	33,453,007	35,776,210

<sup>1</sup> Includes some secondary roads within municipalities.

TABLE 8.—Funds allotted to projects under contract on June 30, 1937—Continued

State	TOTAL				
	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-33	Works Program	
				Highways	Grade crossings
Alabama.....		\$440, 017	\$754, 801	\$690, 450	\$1, 070, 215
Arizona.....		25, 957	1, 075, 489	71, 615	153, 783
Arkansas.....		117, 706	3, 781, 681	480, 729	1, 752, 464
California.....		109, 877	5, 070, 413	1, 393, 180	1, 949, 880
Colorado.....		10, 880	1, 980, 362	97, 796	975, 468
Connecticut.....		59, 990	370, 176	525, 720	974, 020
Delaware.....		7, 100	207, 664	272, 934	-----
Florida.....		289, 764	1, 305, 841	528, 731	763, 630
Georgia.....		1, 083, 640	1, 865, 603	1, 435, 522	1, 406, 303
Idaho.....		58, 296	1, 224, 613	52, 597	684, 414
Illinois.....		1, 058, 862	6, 336, 857	809, 636	4, 443, 962
Indiana.....		111, 063	3, 434, 086	1, 859, 053	3, 270, 149
Iowa.....		197, 432	2, 894, 352	1, 189, 647	2, 661, 527
Kansas.....		43, 698	3, 494, 790	652, 793	2, 435, 294
Kentucky.....		68, 652	1, 773, 609	602, 549	2, 115, 533
Louisiana.....		235, 959	1, 625, 860	1, 170, 628	1, 893, 071
Maine.....		25, 244	863, 953	373, 262	533, 548
Maryland.....		153, 721	825, 679	747, 571	522, 978
Massachusetts.....		-----	2, 255, 259	2, 906, 883	2, 672, 724
Michigan.....		96, 788	3, 528, 431	296, 521	2, 197, 458
Minnesota.....		469, 733	2, 027, 364	595, 938	1, 675, 000
Mississippi.....		381, 120	2, 453, 630	907, 775	1, 556, 331
Missouri.....		1, 074, 675	4, 721, 095	1, 421, 788	5, 290, 688
Montana.....		56, 546	2, 093, 716	415, 888	183, 319
Nebraska.....		139, 295	2, 459, 348	623, 040	1, 460, 674
Nevada.....		21, 979	1, 684, 345	86, 194	197, 062
New Hampshire.....		-----	180, 794	352, 983	463, 903
New Jersey.....		763, 710	961, 124	2, 182, 334	2, 549, 154
New Mexico.....		7, 854	2, 069, 477	527, 648	670, 400
New York.....		729, 041	8, 582, 308	1, 398, 615	8, 158, 700
North Carolina.....		408, 651	3, 021, 537	1, 637, 300	2, 067, 131
North Dakota.....		517, 574	1, 590, 820	416, 469	1, 805, 415
Ohio.....		335, 854	3, 919, 692	3, 814, 762	5, 748, 289
Oklahoma.....	\$215, 209	232, 663	2, 341, 125	793, 958	1, 699, 991
Oregon.....		119, 222	2, 828, 987	973, 279	1, 089, 215
Pennsylvania.....		926, 384	6, 068, 123	6, 241, 407	8, 468, 326
Rhode Island.....		2, 478	754, 129	6, 150	48, 807
South Carolina.....		252, 012	2, 314, 093	976, 877	1, 350, 770
South Dakota.....		187, 761	1, 201, 590	762, 007	1, 901, 852
Tennessee.....		92, 740	1, 107, 691	1, 403, 808	2, 707, 970
Texas.....	52, 968	338, 328	7, 139, 741	699, 049	3, 055, 935
Utah.....		-----	865, 051	413, 179	873, 921
Vermont.....		-----	546, 664	59, 279	243, 644
Virginia.....		260, 706	1, 542, 412	340, 086	1, 294, 448
Washington.....		46, 596	1, 323, 200	188, 313	887, 647
West Virginia.....		401, 611	990, 158	1, 236, 729	1, 940, 009
Wisconsin.....		39, 994	4, 117, 036	330, 119	2, 478, 304
Wyoming.....		11, 100	1, 814, 042	153, 801	695, 668
Hawaii.....		356, 210	472, 961	303, 597	283, 314
Total.....	263, 177	12, 368, 488	115, 861, 782	45, 540, 239	93, 322, 368



TABLE 8.—Funds allotted to projects under contract on June 30, 1937—Continued

TOTAL—Continued

State	Federal aid, secondary or feeder	Federal aid, grade cross- ings	Total Federal funds	Estimated total cost
Alabama		\$15,227	\$2,970,710	\$3,725,511
Arizona			1,326,844	1,858,368
Arkansas			6,132,580	6,143,032
California		28,119	8,551,469	13,095,491
Colorado	\$7,008	9,860	3,081,374	4,674,194
Connecticut			1,929,906	2,343,479
Delaware			487,748	708,168
Florida			2,887,966	4,194,766
Georgia		18,346	5,809,414	7,675,047
Idaho	4,712	6,271	2,030,903	2,860,797
Illinois	15,716	39,675	12,764,708	19,349,875
Indiana		99,300	8,773,656	12,266,084
Iowa			6,942,958	10,560,727
Kansas			6,626,575	10,317,440
Kentucky			4,620,343	6,783,936
Louisiana			4,925,518	13,856,946
Maine	3,368	5,287	1,804,662	2,672,574
Maryland	3,132	7,800	2,230,881	3,089,757
Massachusetts	2,650	15,710	7,853,226	11,026,780
Michigan			6,119,198	9,720,463
Minnesota		20,142	4,788,177	7,169,221
Mississippi			5,298,856	7,768,203
Missouri	263,520	22,930	12,794,696	18,579,885
Montana			2,749,469	4,430,676
Nebraska			4,682,357	7,110,495
Nevada			1,989,580	2,295,132
New Hampshire			997,680	1,191,952
New Jersey			6,456,322	8,030,377
New Mexico			3,275,379	4,491,648
New York			18,868,664	29,170,253
North Carolina			7,134,619	10,561,781
North Dakota			4,330,278	4,351,844
Ohio	13,920	32,120	13,864,637	18,268,675
Oklahoma			5,282,946	7,827,114
Oregon	38,377	140,147	5,189,227	7,514,602
Pennsylvania			21,704,240	28,989,242
Rhode Island			811,564	1,571,011
South Carolina			4,893,752	8,205,144
South Dakota			4,053,210	5,006,496
Tennessee			5,312,209	6,427,043
Texas			11,236,021	18,704,851
Utah			2,152,161	2,521,793
Vermont		6,390	855,977	2,557,271
Virginia			3,437,652	5,113,846
Washington	6,008	92,203	2,543,967	3,805,302
West Virginia			4,568,567	5,728,833
Wisconsin	9,300	118,500	7,093,253	12,415,630
Wyoming	38,790		2,713,401	3,889,043
Hawaii			1,416,082	2,022,970
Total	406,501	678,027	268,445,582	392,643,768

TABLE 9.—Funds allotted to projects approved but not under contract on June 30, 1937

## ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total Federal funds	Estimated total cost
			Highways	Grade crossings			
Alabama.....		\$1,802,550				\$1,802,550	\$3,605,100
Arizona.....		207,931				207,931	497,075
Arkansas.....		71,694				71,694	72,022
California.....		480,555				480,555	892,993
Colorado.....		51,102				51,102	92,912
Connecticut.....	\$108,613	54,743	\$9,750			173,106	439,490
Delaware.....		159,648	3,705	\$277,993	\$79,118	520,464	684,156
Florida.....		58,000				58,000	116,000
Georgia.....		618,226	259,590	173,210		1,051,026	1,669,251
Idaho.....		204,250				204,250	343,441
Illinois.....		1,047,096				1,047,096	2,094,193
Indiana.....		595,136				595,136	1,190,272
Iowa.....		297,300	28,300			325,600	646,114
Kansas.....		461,177				461,177	922,361
Kentucky.....		594,577				594,577	1,188,934
Louisiana.....		200,455		114,180		314,635	578,274
Maine.....		296,205		19,688		315,893	659,771
Maryland.....	21,000	233,000	44,106	384,535		682,641	915,642
Massachusetts.....		240,420	58,370			298,790	586,280
Michigan.....		996,572				996,572	1,993,145
Minnesota.....		85,689				85,689	205,332
Mississippi.....		380,100				380,100	761,000
Missouri.....		966,717				966,717	2,432,325
Montana.....		558,186	8,462			566,648	1,110,943
Nebraska.....		783,722	5,420	66,218		855,360	1,701,118
Nevada.....		541,595				541,595	624,534
New Hampshire.....		100,369				100,369	203,068
New Jersey.....		9,275	4,720	145,895		159,890	211,560
New Mexico.....	45,034	157,936		11,202		214,172	375,858
New York.....		1,602,175	3,478	72,000		1,677,653	3,327,028
North Carolina.....	11,170	223,641				234,811	501,043
North Dakota.....		183,572	14,700			198,272	198,272
Ohio.....		1,235,890				1,235,890	2,471,780
Oklahoma.....		344,189		171,000		515,189	865,222
Oregon.....		21,129			22,618	43,747	90,829
Pennsylvania.....		1,049,598	11,000	495,410		1,556,008	2,632,969
Rhode Island.....		53,823				53,823	107,790
South Carolina.....		225,200		76,360		301,560	736,860
South Dakota.....		85,990				85,990	149,987
Tennessee.....		140,140				140,140	280,280
Texas.....		197,453				197,453	395,480
Utah.....		98,500				98,500	150,830
Vermont.....		264,064				264,064	646,048
Virginia.....		217,156		56,860		274,016	491,172
Washington.....		299,400				299,400	579,034
West Virginia.....		203,690		114,783	10,075	328,548	539,937
Wisconsin.....		256,500				256,500	583,068
Wyoming.....		132,060				132,060	214,320
Hawaii.....	26,049	129,665				155,714	294,390
Total.....	211,866	19,218,061	451,601	2,179,334	111,811	22,172,673	42,069,503

TABLE 9.—Funds allotted to projects approved but not under contract on June 30, 1937—Continued

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total Federal funds	Estimated total cost
			Highways	Grade crossings			
Alabama.....		\$134,925				\$134,925	\$269,860
Arizona.....		35,364				35,364	4,911
California.....		111,892			\$311,709	423,601	522,749
Connecticut.....		34,850	\$124,660			159,540	194,430
Delaware.....		8,689				8,689	17,378
Georgia.....	\$84,072	91,690	373,364	2,710		551,836	643,526
Idaho.....	13,188					13,188	38,731
Illinois.....		46,471				46,471	92,942
Indiana.....		51,634				51,634	103,268
Iowa.....		97,350	36,900	65,090		199,340	316,911
Kansas.....		36,669				36,669	73,338
Kentucky.....		37,987	53,722	274,086		365,795	403,782
Louisiana.....				103,980		103,980	288,180
Maine.....		9,187				9,187	18,374
Maryland.....	209,600					209,600	213,950
Massachusetts.....	91,944		1,880	249,991		343,815	343,815
Michigan.....	40,000	287,753	39,582	43,500		410,835	752,206
Minnesota.....		13,241				13,241	106,148
Mississippi.....	7,083	25,000	8,900			40,983	66,183
Missouri.....		70,027				70,027	155,715
Montana.....		17,823				17,823	31,691
Nebraska.....		13,908	251,596			265,504	279,412
Nevada.....		64,056				64,056	73,869
New Jersey.....	88,802	234,090	4,560			327,452	1,024,329
New York.....	11,400	272,520				283,920	556,440
North Carolina.....	26,400	6,545				32,945	39,490
North Dakota.....		3,970	236,331			240,301	240,301
Ohio.....		17,940		246,124		264,064	287,819
Oklahoma.....		63,573	5,000	230,000		298,573	379,780
Oregon.....		5,189			\$65,873	71,062	74,376
Pennsylvania.....			115,080			115,080	199,126
South Carolina.....	55,613	17,900				73,513	123,523
South Dakota.....			7,548			7,548	7,548
Tennessee.....		13,400		71,400		84,800	169,200
Texas.....	1,951	12,470	68,041			82,462	169,480
Utah.....		76,000				76,000	113,970
Virginia.....	26,444	144,755	23,636	318,590		513,425	659,381
Washington.....		168,500				168,500	319,712
West Virginia.....		24,865		277,600		302,465	327,330
Wisconsin.....		139,100				139,100	281,933
Total.....	656,497	2,389,363	1,350,800	2,194,780	65,873	6,657,313	9,958,307

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total Federal funds	Estimated total cost
	Highways	Grade crossings				
Georgia.....	\$125,740	\$131,350			\$257,090	\$257,090
Idaho.....			\$11,028		11,028	22,057
Illinois.....	3,500				3,500	3,500
Indiana.....				\$117,790	117,790	117,790
Kentucky.....	20,052	157,000			177,052	190,644
Louisiana.....		128,059			128,059	128,964
Missouri.....			3,280		3,280	7,640
Montana.....		80,744			80,744	134,423
New Jersey.....		44,730			44,730	44,730
Ohio.....	71,000	1,588,876			1,659,876	1,962,551
Oklahoma.....	35,690	120,000			155,690	175,740
Pennsylvania.....	409,089	313,301			722,390	902,469
South Carolina.....		26,000			26,000	26,000
South Dakota.....		9,260			9,260	9,260
Tennessee.....	16,980				16,980	16,980
Virginia.....	29,620				29,620	29,620
West Virginia.....		184,540			184,540	184,540
Total.....	711,671	2,783,860	14,308	117,790	3,627,629	4,203,998

TABLE 9.—Funds allotted to projects approved but not under contract on June 30, 1937—Continued

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35 <sup>1</sup>	Works Program		Federal aid, secondary or feeder	Total Federal funds	Estimated total cost
		Highways	Grade crossings			
Alabama	\$2,184		\$83,900		\$86,084	\$86,183
Colorado			24,765		24,765	55,910
Connecticut		\$118,039	280,190		398,229	488,170
Georgia	66,900	466,322	108,930	\$9,699	651,851	661,550
Idaho			55,933	47,198	103,131	150,327
Illinois	39,700	12,500			52,200	58,300
Kansas		35,840			35,840	35,840
Kentucky			18,570	126,792	145,362	350,191
Louisiana			195,606		195,606	213,410
Maryland	69,000	115,196	454,000		638,196	773,195
Minnesota				10,485	10,485	20,970
Missouri				121,200	121,200	323,340
Montana	7,598				7,598	74,988
Nebraska	3,321	660			3,981	31,126
New Jersey			350,790		350,790	371,190
New York				167,500	167,500	335,000
North Carolina	3,967				3,967	5,540
North Dakota		85,790			85,790	85,790
Ohio	45,000	72,220			117,220	129,470
Oklahoma		24,000	50,000		74,000	193,600
Oregon			51,387	13,380	64,767	73,310
Pennsylvania		156,282			156,282	170,922
South Carolina	217				217	33,200
South Dakota	3,862	19,090	201,133		224,085	284,440
Tennessee	10,431	123,510			133,941	136,427
Texas	500	37,587			38,087	97,094
Utah		59,400			59,400	59,400
Virginia			78,310		78,310	78,310
West Virginia		40,197			40,197	43,200
Wyoming	15,669				15,669	33,500
Total	268,349	1,366,633	1,953,514	496,254	4,084,750	5,453,893

<sup>1</sup> Includes some secondary roads within municipalities.

## TOTAL

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total Federal funds	Estimated total cost
			Highways	Grade crossings				
Alabama	\$2,184	\$1,937,475		\$83,900			\$2,023,559	\$3,961,143
Arizona		243,295					243,295	546,186
Arkansas		71,694					71,694	72,022
California		592,447		311,709			904,156	1,415,742
Colorado		51,102		24,765			75,867	148,822
Connecticut	108,613	89,623	\$252,449	280,190			730,875	1,122,090
Delaware		168,337	3,705	277,993		\$79,118	529,153	701,534
Florida		58,000					58,000	116,000
Georgia	150,972	769,916	1,225,016	416,290	\$9,699		2,511,803	3,231,417
Idaho	13,188	204,250		55,933	58,226		331,597	554,556
Illinois	39,700	1,093,567	16,000				1,149,267	2,248,935
Indiana		646,770				117,790	764,560	1,411,330
Iowa		394,650	65,200	65,090			524,940	963,025
Kansas		497,846	35,840				533,686	1,031,539
Kentucky		632,564	73,774	449,656	126,792		1,282,786	2,133,551
Louisiana		200,455		541,825			742,280	1,208,828
Maine		305,392		19,688			325,080	678,145
Maryland	299,600	233,000	159,302	838,535			1,530,437	1,902,787
Massachusetts	91,944	240,420	60,250	249,991			642,605	930,095
Michigan	40,000	1,284,325	39,582	43,500			1,407,407	2,745,351
Minnesota		98,930				10,485	109,415	332,450
Mississippi	7,083	405,100	8,900				421,083	827,183
Missouri		1,036,744			124,480		1,161,224	2,910,020
Montana	7,598	576,069	8,462	80,744			672,813	1,352,045
Nebraska	3,321	797,630	257,676	66,218			1,124,845	2,011,656
Nevada		605,651					605,651	698,403
New Hampshire		100,369					100,369	203,068
New Jersey	88,801	243,365	9,280	541,416			882,862	1,651,809
New Mexico	45,034	157,936		11,202			214,172	375,858

TABLE 9.—Funds allotted to projects approved but not under contract on June 30, 1937—Continued

TOTAL—Continued

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total Federal funds	Estimated total cost
			Highways	Grade crossings				
New York.....	\$11,400	\$1,874,695	\$3,478	\$72,000	\$167,500		\$2,129,073	\$4,218,468
North Carolina.....	41,537	230,186					271,723	546,073
North Dakota.....		187,542	336,821				524,363	524,363
Ohio.....	45,000	1,253,830	143,220	1,835,000			3,277,050	4,841,620
Oklahoma.....		407,762	64,690	571,000			1,043,452	1,614,342
Oregon.....		26,318		51,387	13,380	\$88,491	179,576	238,515
Pennsylvania.....		1,049,598	691,451	808,711			2,549,760	3,905,486
Rhode Island.....		53,823					53,823	107,790
South Carolina.....	55,830	243,100		102,360			401,290	919,583
South Dakota.....	3,863	85,990	26,638	210,392			326,883	451,235
Tennessee.....	10,431	153,540	140,490	71,400			375,861	531,887
Texas.....	2,451	29,923	105,628				318,002	662,054
Utah.....		174,500	59,400				233,900	324,200
Vermont.....		264,064					264,064	646,048
Virginia.....	26,444	361,911	53,256	453,760			895,371	1,258,483
Washington.....		467,900					467,900	898,746
West Virginia.....		228,555	40,197	576,923		10,075	855,750	1,095,007
Wisconsin.....		395,600					395,600	865,001
Wyoming.....	15,669	132,060					147,729	247,820
Hawaii.....	26,049	129,655					155,714	294,390
Total.....	1,136,712	21,607,424	3,880,705	9,111,488	510,562	295,474	36,542,365	61,685,701

TABLE 10.—Unobligated balances of funds available for allotment to new projects on June 30, 1937

State	Public Works authorizations for 1934-35	Federal aid authorizations for 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
			Highways	Grade crossings			
Alabama.....	\$80,362	\$5,154,905	\$130,810	\$111,662	\$532,939	\$999,943	\$7,010,621
Arizona.....	19,217	1,965,754	80,678	11,892	365,990	314,594	2,758,125
Arkansas.....	8,802	2,545,277	41,761	22,287	437,550	893,403	3,949,080
California.....	81,075	3,231,610	6,144	123	971,644	1,846,537	6,137,133
Colorado.....	10,087	2,331,756	1,472,138	339,301	460,203	647,497	5,260,982
Connecticut.....	37,718	1,845,126	50,208	316,775	161,085	426,784	2,537,696
Delaware.....	429	1,107,687	43,436	10,246	125,000	170,882	1,457,680
Florida.....	13,459	3,047,060	53,881	309,062	340,953	712,816	4,477,231
Georgia.....	1,158,809	5,893,503	1,388,909	2,981,861	636,957	1,204,753	13,264,792
Idaho.....	17,508	1,536,983	22,169	27,076	251,199	411,844	2,266,779
Illinois.....	148,473	3,419,284	118,672	189,825	1,032,044	2,605,305	7,513,603
Indiana.....	130,112	2,265,198	6,745	21,694	629,802	1,091,023	4,144,574
Iowa.....		2,805,349	1,449	264	658,264	1,410,787	4,876,113
Kansas.....	21,806	3,483,904	27,476	36,841	674,825	1,307,669	5,552,521
Kentucky.....	32,192	3,134,737	53,315	29,406	343,071	919,174	4,511,895
Louisiana.....	105,720	2,465,995	31,912	228,428	365,898	799,226	3,997,179
Maine.....	6,191	1,109,373	196	24,288	221,166	347,181	1,708,395
Maryland.....	336,983	2,036,129	374,460	337,323	205,655	512,193	3,802,743
Massachusetts.....	165,515	2,592,653	71,525	56,490	351,337	1,031,790	4,269,310
Michigan.....	19,526	1,881,877	22,949	113	778,706	1,664,807	4,367,978
Minnesota.....	177,239	3,895,364		4,560	688,551	1,322,667	6,088,381
Mississippi.....	88,422	3,774,294	87,417	478,754	449,542	806,707	5,685,136
Missouri.....	145,371	3,011,058	107,598	28,585	387,578	1,505,990	5,186,180
Montana.....	64,179	2,759,860	9,002	153	524,346	671,204	4,028,744
Nebraska.....	19,396	2,860,787	12,326	120,345	528,285	892,976	4,434,115
Nevada.....	9,979	1,079,398	250	7,561	326,477	250,000	1,673,665
New Hampshire.....	19,140	1,151,286	4,766	16,833	125,000	250,000	1,567,025
New Jersey.....	100,007	2,513,349	27,445		340,365	997,689	3,978,855
New Mexico.....	15,893	1,235,969	33,517	5,367	408,137	432,291	2,131,174
New York.....	202,480	3,271,785	380,818	177,683	1,084,271	3,424,399	8,541,486
North Carolina.....	38,469	3,798,638	52,532	812,335	599,674	1,244,662	6,546,310
North Dakota.....	270,783	3,943,871	14,420		399,283	803,068	5,431,425
Ohio.....	78,816	6,889,338	116,861	440,925	914,149	2,109,584	10,549,673
Oklahoma.....	25,005	3,921,459	5,925	18,010	599,124	1,156,175	5,725,698
Oregon.....	78,082	1,389,605	11,771	5,693	366,717	359,739	2,211,607
Pennsylvania.....	44,086	5,579,729	344,306	102,505	1,086,871	2,905,671	10,663,170
Rhode Island.....		896,455		2,439	125,000	250,000	1,273,894
South Carolina.....	70,992	2,299,432	51,563	503,145	344,438	752,928	4,202,498
South Dakota.....	50,070	4,088,801	13,638	5,356	416,820	694,096	5,268,781

TABLE 10.—Unobligated balances of funds available for allotment to new projects on June 30, 1937—Continued

State	Public Works authorizations for 1934-35	Federal-aid authorizations for 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
			Highways	Grade crossings			
Tennessee.....	\$1,856	\$5,254,798	\$151,146	\$357,561	\$536,222	\$958,753	\$7,260,336
Texas.....	62,621	8,950,567	45,429	383,402	1,591,522	2,724,825	13,758,366
Utah.....	121	1,516,191	34,149	14,444	289,556	322,885	2,207,225
Vermont.....	121	395,960	4,858	.....	125,000	243,610	769,549
Virginia.....	210,759	2,922,542	198,414	82,903	465,674	941,656	4,821,948
Washington.....	43,325	1,634,336	30,836	10,476	394,566	675,788	2,789,327
West Virginia.....	212,238	2,457,002	.....	81,492	278,089	661,637	3,680,457
Wisconsin.....	45,094	2,350,186	8,210	44	612,111	1,134,371	4,150,016
Wyoming.....	73,115	605,318	2,937	.....	281,280	344,961	1,307,611
District of Columbia.....	.....	.....	.....	14,000	.....	250,000	264,000
Hawaii.....	28,498	1,226,583	12,535	.....	125,000	250,000	1,642,616
Puerto Rico.....	.....	625,000	.....	.....	125,000	369,959	1,119,959
Total.....	4,570,020	139,883,121	5,761,504	8,729,528	24,082,936	49,026,499	232,053,608

TABLE 11.—Mileage of projects completed during the fiscal year 1937  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total
				Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama.....	.....	22.6	9.0	57.0	1.6	90.2
Arizona.....	.....	.....	80.1	54.3	11.5	145.9
Arkansas.....	.....	8.8	2.0	75.5	29.8	116.1
California.....	.....	1.1	262.4	29.9	5.6	299.0
Colorado.....	.....	.....	120.1	.....	11.4	131.5
Connecticut.....	.....	.....	13.2	.3	.6	14.1
Delaware.....	.....	.....	33.0	9.9	.....	42.9
Florida.....	6.5	.9	22.4	7.5	5.9	43.2
Georgia.....	.....	49.8	122.6	.3	.2	172.9
Idaho.....	2.5	1.0	237.5	34.8	8.4	284.2
Illinois.....	9.6	9.0	107.7	87.1	7.7	221.1
Indiana.....	5.3	25.9	139.9	15.5	3.5	190.1
Iowa.....	.....	.....	371.4	37.0	18.8	427.2
Kansas.....	.....	2.7	655.2	154.2	15.7	827.8
Kentucky.....	.....	6.0	96.6	10.5	1.8	114.9
Louisiana.....	.4	18.9	58.2	1.0	1.2	79.7
Maine.....	.....	.4	48.0	2.7	4.9	56.0
Maryland.....	.....	15.0	.....	1.6	.....	16.6
Massachusetts.....	.....	2.1	3.1	.5	1.0	6.7
Michigan.....	.....	31.6	274.6	127.6	26.2	460.0
Minnesota.....	.....	6.0	456.7	40.9	40.7	544.3
Mississippi.....	.....	32.9	.....	67.0	36.0	135.9
Missouri.....	.....	10.6	250.4	4.9	4.0	269.9
Montana.....	.....	10.6	280.6	68.6	16.3	376.1
Nebraska.....	.....	20.0	177.5	135.6	80.5	413.6
Nevada.....	.....	.....	151.3	.....	.8	152.1
New Hampshire.....	.....	.....	22.8	1.8	1.0	25.6
New Jersey.....	.....	4.0	37.9	7.5	1.0	50.4
New Mexico.....	.....	6.0	271.6	30.5	13.9	322.0
New York.....	.....	11.0	190.0	11.6	4.7	217.3
North Carolina.....	.....	17.9	341.1	32.7	3.6	395.3
North Dakota.....	.....	54.4	.4	119.5	30.1	204.4
Ohio.....	.....	5.4	54.9	6.3	.....	66.6
Oklahoma.....	.....	2.2	136.2	100.5	21.1	260.0
Oregon.....	.....	4.9	106.6	13.5	1.3	126.3
Pennsylvania.....	.....	8.8	114.3	8.4	7.4	138.9
Rhode Island.....	.....	.....	3.7	5.9	.8	10.4
South Carolina.....	.....	7.6	53.3	48.9	3.9	113.7
South Dakota.....	.....	38.5	188.7	125.8	33.3	386.3
Tennessee.....	.....	3.1	97.2	30.4	5.7	136.4
Texas.....	.....	5.6	602.8	224.5	50.3	883.2
Utah.....	.....	.3	137.9	47.7	.3	186.2
Vermont.....	.....	1.7	59.7	4.2	1.2	66.8
Virginia.....	.....	6.3	180.1	10.9	7.8	205.1
Washington.....	.....	.3	154.1	50.1	7.2	211.7
West Virginia.....	.....	4.6	39.3	11.8	.....	55.7
Wisconsin.....	.....	8.6	164.5	59.2	5.7	238.0
Wyoming.....	.....	1.2	262.6	48.6	3.1	315.5
Hawaii.....	.....	2.3	.8	5.4	.5	9.0
Total.....	24.3	470.6	7,194.0	2,029.9	538.0	10,256.8

TABLE 11.—Mileage of projects completed during the fiscal year 1937—Con.

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total
			Highways	Grade crossings	
	Miles	Miles	Miles	Miles	Miles
Alabama	5.4		12.6	3.9	21.9
Arizona	.6	0.9	9.7	.5	11.7
Arkansas	2.0		20.6	2.8	25.4
California	.9		3.7	1.1	5.7
Colorado			18.0	.4	18.4
Connecticut	2.7	1.0	.2		3.9
Delaware	.6			.3	.9
Florida	1.6		9.5	1.1	12.2
Georgia	10.5		1.0		11.5
Idaho	.6		28.0	.7	29.3
Illinois	3.3	19.8	21.5	2.5	47.1
Indiana	13.8	10.8	24.3	1.1	50.0
Iowa	.5	21.9	14.9	3.5	40.8
Kansas	1.2	10.5	8.8	2.3	22.8
Kentucky	3.8	4.2	8.3	1.6	17.9
Louisiana	.8				.8
Maine		2.2	3.8	.1	6.1
Maryland	1.1		3.1	.1	4.3
Massachusetts	1.0			.3	1.3
Michigan	1.2	12.3	38.3	1.1	52.9
Minnesota	3.2	39.3	16.1	8.7	67.3
Mississippi	6.0		23.8	4.7	34.5
Missouri	2.6	3.6	7.1	.4	13.7
Montana	.1		6.1	.2	6.4
Nebraska	2.8	.1	50.9	6.4	60.2
Nevada	.7		.2		.9
New Hampshire	.6		2.5		3.1
New Jersey	3.4	.4	2.2		6.0
New Mexico	.9		37.4	.5	38.8
New York	3.1		21.6	1.0	25.7
North Carolina	.3	.4	8.9	3.1	12.7
North Dakota	9.7		20.3	1.8	31.8
Ohio	3.8	.3	9.1	.1	13.3
Oklahoma	1.2		3.9	.7	5.8
Oregon	.2	4.3	12.9	.3	17.7
Pennsylvania	2.0		.8	.4	3.2
Rhode Island	1.1	.3	.9	.2	2.5
South Carolina	2.0	.5	8.7	1.3	12.5
South Dakota	21.0	1.7	74.0	1.8	98.5
Tennessee	1.6		10.7	.7	13.0
Texas	5.0	1.8	113.8	6.4	127.0
Utah			16.4		16.4
Vermont	1.4	.7	1.6		3.7
Virginia			9.4	1.7	11.1
Washington	.3	2.6	2.7	.3	5.9
West Virginia	3.7		3.6		7.3
Wisconsin		8.2	24.3	.9	33.4
Wyoming	.2	.5	27.0	.6	28.3
Hawaii			3.5	.2	3.7
District of Columbia	1.6		2.4		4.0
Total	130.1	148.3	749.1	65.8	1,093.3

TABLE 11.—Mileage of projects completed during the fiscal year 1937—Continued  
ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program			Total	State	Works Program			Total
	Highways	Grade crossings				Highways	Grade crossings		
	Miles	Miles	Miles			Miles	Miles	Miles	
Alabama	1.3	3.0	4.3	Nevada	9.4	0.3	9.7		
Arizona	14.4	.4	14.8	New Hampshire	2.1		2.1		
Arkansas	10.3	.8	11.1	New Jersey		.2	.2		
California	39.9	1.7	41.6	New Mexico	16.7	.3	17.0		
Colorado	1.5		1.5	New York	6.0	1.3	7.3		
Connecticut	2.1		2.1	North Carolina	9.1	1.1	10.2		
Delaware	1.8		1.8	North Dakota	9.2	.8	10.0		
Florida	1.2	.9	2.1	Ohio	6.9		6.9		
Georgia	17.0	.1	17.1	Oklahoma	41.2	1.1	42.3		
Idaho	27.5	.4	27.9	Oregon	13.2		13.2		
Illinois	18.3	2.7	21.0	Pennsylvania	9.8	1.1	10.9		
Indiana	2.3	.9	3.2	Rhode Island	1.9		1.9		
Iowa	10.6	2.3	12.9	South Carolina	12.5		12.5		
Kansas	7.9		7.9	South Dakota	.9	.1	1.0		
Kentucky	4.7		4.7	Tennessee	6.6		6.6		
Louisiana	7.8		7.8	Texas	35.7	4.4	40.1		
Maine	9.3		9.3	Utah	37.4	.4	37.8		
Maryland		.1	.1	Vermont	.8	.3	1.1		
Massachusetts	.6	.2	.8	Virginia	7.9		7.9		
Michigan	16.7	.7	17.4	Washington	13.3	1.6	14.9		
Minnesota	45.3	3.6	48.9	West Virginia	2.9		2.9		
Mississippi	1.7	1.4	3.1	Wisconsin	36.1	1.7	37.8		
Missouri	3.0	.4	3.4	Wyoming	.2		.2		
Montana	7.8	.6	8.4	District of Columbia	1.2	.2	1.4		
Nebraska	1.4	.2	1.6						
				Total	535.4	35.3	570.7		

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works 1934-35 <sup>1</sup>	Works Program			Total	State	Public Works 1934-35 <sup>1</sup>	Works Program			Total
		Highways	Grade crossings					Highways	Grade crossings		
		Miles	Miles	Miles				Miles	Miles	Miles	
Alabama	6.4	40.5	1.8	48.7	New Hampshire		19.0	0.7	19.7		
Arizona		45.7	1.5	47.2	New Jersey		6.4	1.1	7.5		
Arkansas	5.0	168.8	5.5	179.3	New Mexico	3.6	20.8	1.1	25.5		
California	3.1	104.1	1.5	108.7	New York	7.9	104.3	1.7	113.9		
Colorado		32.8	1.3	34.1	North Carolina	3.8	144.8	3.7	152.3		
Connecticut	2.0	2.1		4.1	North Dakota	58.3	135.0	.4	193.7		
Delaware		37.2		37.2	Ohio	26.0	128.6	.6	155.2		
Florida	8.0	57.0	1.2	66.2	Oklahoma	8.3	198.0	4.8	211.1		
Georgia	33.6	35.3	.4	69.3	Oregon	.4	115.0	3.5	118.9		
Idaho	3.1	86.7	2.0	91.8	Pennsylvania	51.7	81.5	4.4	137.6		
Illinois	67.9	273.5	2.6	344.0	Rhode Island	26.0	10.1	.9	37.0		
Indiana	15.5	93.0	8.7	117.2	South Carolina	26.0	108.5	3.5	138.0		
Iowa	6.4	324.4	18.0	348.8	South Dakota	38.9	77.2	9.8	125.9		
Kansas	22.7	113.0	1.0	136.7	Tennessee	13.4	52.0	4.0	69.4		
Kentucky	11.4	263.6	.5	275.5	Texas	18.5	508.3	22.7	549.5		
Louisiana	8.9	121.0	1.3	131.2	Utah	4.1	50.9	.5	55.5		
Maine	.5	39.0	2.5	42.0	Vermont	.3	11.2	1.1	12.6		
Maryland	17.8	12.9	1.8	32.5	Virginia	35.4	639.9	2.8	678.1		
Massachusetts		1.6	2.1	3.7	Washington		63.5	5.1	68.6		
Michigan	46.6	79.6	.7	126.9	West Virginia	15.0	25.3	.3	40.6		
Minnesota	1.8	593.8	33.7	629.3	Wisconsin	.4	197.0	3.1	200.5		
Mississippi	19.1	78.4	4.7	102.2	Wyoming	2.8	44.1		46.9		
Missouri	7.0	394.4	1.1	402.5	Hawaii	1.9			1.9		
Montana	18.1	78.4	1.0	97.5							
Nebraska	23.2	131.4	3.3	157.9	Total	661.0	6,012.1	174.2	6,847.3		
Nevada	16.2	62.5	.2	78.9							

<sup>1</sup> Includes some secondary roads within municipalities.



TABLE 11.—Mileage of projects completed during the fiscal year 1937—Continued

State	TOTAL					
	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Total
				High- ways	Grade cross- ings	
Miles	Miles	Miles	Miles	Miles	Miles	
Alabama.....		34.4	9.0	111.5	10.2	165.1
Arizona.....		6	81.0	124.1	13.9	219.6
Arkansas.....		15.8	2.0	275.2	38.9	331.9
California.....		5.1	262.5	177.6	9.8	455.0
Colorado.....			120.1	52.3	13.1	185.5
Connecticut.....		4.8	14.2	4.6	.6	24.2
Delaware.....		6	33.0	48.9	.3	82.8
Florida.....	6.5	10.6	22.4	75.2	9.0	123.7
Georgia.....		93.9	122.7	53.5	.7	270.8
Idaho.....	2.5	4.7	237.6	176.9	11.5	433.2
Illinois.....	9.6	80.2	127.6	400.2	15.6	633.2
Indiana.....	5.3	55.2	150.6	135.1	14.3	360.5
Iowa.....		6.9	393.4	386.8	42.6	829.7
Kansas.....		26.7	665.7	283.8	19.0	995.2
Kentucky.....		21.2	100.8	287.1	3.9	413.0
Louisiana.....	.4	28.6	58.2	129.8	2.5	219.5
Maine.....		1.0	50.2	54.7	7.5	113.4
Maryland.....		33.9		17.6	2.0	53.5
Massachusetts.....		3.1	3.1	2.7	3.6	12.5
Michigan.....		79.5	286.9	262.2	28.6	657.2
Minnesota.....		11.0	495.9	696.2	86.7	1,289.8
Mississippi.....		58.1		170.9	46.7	275.7
Missouri.....		20.2	254.0	409.4	5.9	689.5
Montana.....		28.8	280.5	160.8	18.3	488.4
Nebraska.....		46.0	177.6	319.3	90.4	633.3
Nevada.....		16.9	151.3	72.1	1.3	241.6
New Hampshire.....		.5	22.8	25.5	1.7	50.5
New Jersey.....		7.4	38.2	16.2	2.3	64.1
New Mexico.....		10.4	271.6	105.5	15.8	403.3
New York.....		21.9	190.0	143.5	8.8	364.2
North Carolina.....		22.0	341.5	195.5	11.5	570.5
North Dakota.....		122.3	.4	284.0	33.2	439.9
Ohio.....		35.2	55.2	150.9	.7	242.0
Oklahoma.....		11.7	136.2	343.6	27.7	519.2
Oregon.....		5.6	110.8	154.6	5.1	276.1
Pennsylvania.....		62.5	114.4	100.5	13.2	290.6
Rhode Island.....		1.1	4.0	18.8	1.9	25.8
South Carolina.....		35.6	53.8	178.6	8.7	276.7
South Dakota.....		98.4	190.4	278.0	44.9	611.7
Tennessee.....		18.1	97.2	99.7	10.4	225.4
Texas.....		29.0	604.6	882.4	83.8	1,599.8
Utah.....		4.3	138.0	152.3	1.3	295.9
Vermont.....		3.4	60.3	17.9	2.6	84.2
Virginia.....		41.6	180.1	668.2	12.3	902.2
Washington.....		.6	156.6	129.7	14.2	301.1
West Virginia.....		23.3	39.3	43.6	.3	106.5
Wisconsin.....		9.0	172.7	316.5	11.5	509.7
Wyoming.....		4.3	263.1	119.9	3.6	390.9
Hawaii.....		4.2	.8	8.9	.7	14.6
District of Columbia.....		1.5		3.7	.2	5.4
Total.....	24.3	1,261.7	7,342.3	9,326.5	813.3	18,768.1

TABLE 12.—Mileage of projects under contract on June 30, 1937  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total
				Highways	Grade crossings		
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Alabama.....		3.4	65.8	1.3			70.5
Arizona.....		.1	47.0		0.7		47.8
Arkansas.....		.6	224.4	1.2	10.7		236.9
California.....			183.8	5.8	3.0		192.6
Colorado.....			119.5		1.6		121.1
Connecticut.....			8.7		1.9		10.6
Delaware.....			12.3	.2			12.5
Florida.....		2.3	61.7	4.0	1.3		69.3
Georgia.....		30.0	186.9	26.1	5.1		248.1
Idaho.....			142.2	.5	1.2		143.9
Illinois.....			348.0		2.0		350.0
Indiana.....			170.1	8.5	1.6	0.2	180.4
Iowa.....			182.6		2.8		185.4
Kansas.....			287.4	14.5	8.0		309.9
Kentucky.....			85.4	3.6	3.0		92.0
Louisiana.....			55.2	13.6	6.5		75.3
Maine.....			46.5	1.4	1.0		48.9
Maryland.....			23.8	9.1			32.9
Massachusetts.....			20.3	1.0	1.0		22.3
Michigan.....			154.6		1.3		155.9
Minnesota.....		3.7	164.9		1.5		170.1
Mississippi.....		13.9	176.3	9.6	33.8		233.6
Missouri.....		4.9	375.4		8.5		388.8
Montana.....			255.3		.8		256.1
Nebraska.....			537.2	2.7	.4		540.3
Nevada.....			91.8				91.8
New Hampshire.....			5.0	.5	.3		5.8
New Jersey.....		6.9	20.3				27.2
New Mexico.....			216.1				216.1
New York.....		.5	296.8	.6	7.1		305.0
North Carolina.....		15.4	354.2	13.0	9.9		397.5
North Dakota.....		36.2	262.8	9.0	28.7		336.7
Ohio.....		1.4	84.6	13.2	5.2		104.4
Oklahoma.....	23.1		165.2	4.8	2.4		195.5
Oregon.....			181.6	2.6	1.0	1.8	187.0
Pennsylvania.....		6.4	166.2	21.1	14.4		208.1
Rhode Island.....			18.1				18.1
South Carolina.....		1.4	343.4		17.6		362.4
South Dakota.....		17.4	225.8	26.7	63.5		333.4
Tennessee.....			73.8	13.8	1.8		89.4
Texas.....	8.1		874.9	.3	1.7		885.0
Utah.....			104.3		1.9		106.2
Vermont.....			34.0		1.5		35.5
Virginia.....		10.7	114.3		1.6		126.6
Washington.....			72.8				72.8
West Virginia.....		.7	53.7	6.3	4.3		65.0
Wisconsin.....			248.8	2.7	6.4	.5	258.4
Wyoming.....			288.3	.1	.6		289.0
Hawaii.....		2.2	17.9	1.5	1.2		22.8
Total.....	31.2	158.1	8,250.0	224.3	268.8	2.5	8,934.9

TABLE 12.—*Mileage of projects under contract on June 30, 1937*—Continued  
ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-35	Works Program		Federal aid, grade cross-ings	Total
			Highways	Grade cross-ings		
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama	3.9	1.4		1.2		6.5
Arizona		1.1				.1
Arkansas	.8	1.4	17.4	1.7		21.3
California		3.0	3.1			6.1
Connecticut	.3		.8			1.1
Delaware			6.0			6.0
Florida	.5	4.0	2.1	1.1		7.7
Georgia	7.7	7.0	1.5	.8		17.0
Idaho		2.0		.7		2.7
Illinois	1.3	22.9		2.9		27.1
Indiana		14.7	1.9	2.7		19.3
Iowa	6.0	9.9	.3	3.6		18.8
Kansas		5.5	.8	2.4		8.7
Kentucky	.8	4.8	1.2	2.7		9.5
Louisiana			3.4	.9		4.3
Maine		2.2	.1			2.3
Maryland			1.7			1.7
Massachusetts			5.0	.7		5.7
Michigan		22.2		.5		22.7
Minnesota	2.5	23.0	2.1	1.7		29.3
Mississippi	.3	56.5	20.7	2.0		79.5
Missouri	.9	16.8	4.7	2.0		24.4
Montana		1.7				1.7
Nebraska	.5	9.9	1.0	1.9		13.3
New Hampshire				.2		.2
New Jersey	.6		4.7	.4		5.7
New Mexico				.4		.4
New York	1.1	3.2	3.8	1.2		9.3
North Carolina	.2	5.2	1.4	1.3		8.1
North Dakota	2.8	7.3	9.9	2.4		22.4
Ohio	.7		1.5	1.7		3.9
Oklahoma		1.6	2.5	1.1		5.2
Oregon	.7	2.6	3.8	1.2	0.7	9.0
Pennsylvania	4.2	4.0	4.9	6.0		19.1
South Carolina	1.2	10.7	10.9	3.2		26.0
South Dakota	2.5	3.6	24.6	4.6		35.3
Tennessee		1.3	1.6	.5		3.4
Texas		7.9		1.4		9.3
Utah			2.5	.5		3.0
Vermont			.4	.1		.5
Virginia	.3		1.6	1.3		3.2
Washington		2.0		.3		2.3
West Virginia	1.3	2.2	2.9	1.2		7.6
Wisconsin		12.4	.3			12.7
Wyoming	.3	.3		.7		1.3
Total	40.4	273.3	151.1	59.2	.7	524.7

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program		Federal aid, grade cross-ings	Total	State	Works Program		Federal aid, grade cross-ings	Total
	Highways	Grade cross-ings				Highways	Grade cross-ings		
	Miles	Miles	Miles	Miles		Miles	Miles	Miles	Miles
Alabama	1.3	0.7		2.0	Nevada	0.3	0.2		0.5
Arkansas	1.2	1.2		2.4	New Hampshire	2.8	.1		2.9
California	5.8	1.2		7.0	New Jersey	1.9	2.7		4.6
Colorado	.8	.8		.8	New Mexico		.1		.1
Connecticut		.3		.3	New York	.5	1.6		2.1
Delaware	.2			.2	North Carolina	5.9	1.6		7.5
Florida	2.8	.6		3.4	North Dakota		1.1		1.1
Georgia	8.8	.6		9.4	Ohio	6.8	.7		7.5
Idaho		.3		.3	Oklahoma	8.4	.9		9.3
Illinois	1.0	.6		1.6	Pennsylvania	32.4	2.1		34.5
Indiana	6.0	1.2		7.2	Rhode Island		.2		.2
Iowa	1.3	.6		1.9	South Carolina	9.6	.1		9.7
Kansas		.6		.7	South Dakota	.8	1.0		1.8
Kentucky	.7	.3		.9	Tennessee	2.6	2.8		5.4
Louisiana	2.8	.5		3.3	Texas	6.0	2.5		8.5
Maine	1.9			1.9	Utah	7.0	1.0		8.0
Maryland		.4		.4	Virginia		.1		.1
Michigan		.4		.4	Washington	1.3	1.2	0.1	2.6
Minnesota	11.0	.9		11.9	West Virginia		1.3		1.3
Mississippi	1.5	.1		1.6	Wisconsin	.7	1.5		2.2
Missouri	2.0	1.1		3.1	Wyoming		.4		.4
Montana	1.1			1.1	Total	141.6	36.1	.1	177.8
Nebraska	4.6	1.1		5.7					

TABLE 12.—Mileage of projects under contract on June 30, 1937—Continued  
ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35 <sup>1</sup>	Works Program		Federal aid, secondary or feeder	Total
		Highways	Grade crossings		
	Miles	Miles	Miles	Miles	Miles
Alabama		24.1	1.0		25.1
Arizona		7.3	.5		7.8
Arkansas	11.2	23.4	.4		35.0
California		11.1	.6		11.7
Colorado		6.0			6.0
Connecticut		14.9	.4		15.3
Delaware		11.5			11.5
Florida		9.5	10.4		19.9
Georgia	21.3	48.3	3.6		73.2
Illinois	12.3	25.1	.7		38.1
Indiana		84.0	1.6		85.6
Iowa		75.0	4.8		79.8
Kansas	1.3	15.1			16.4
Kentucky		14.8	.6		15.4
Louisiana	18.4	28.5	.2		47.1
Maine	.9	10.3	1.6		12.8
Maryland	1.3	6.6	2.2		10.1
Massachusetts		10.1	4.2		14.3
Michigan		4.8	.6		5.4
Minnesota		39.6	4.8		44.4
Mississippi	6.7	26.7	9.1		42.5
Missouri	3	12.9	.7	128.4	142.3
Montana		9.0			9.0
Nebraska	9.9	36.8	1.0		47.7
Nevada		5.0			5.0
New Hampshire		10.2	1.0		11.2
New Jersey	1.1	13.3	.8		15.2
New Mexico	.2	32.3			32.5
New York		17.6	2.1		19.7
North Carolina		48.3	1.8		50.1
North Dakota		23.3	.2		23.5
Ohio	4.0	116.4	6.7		127.1
Oklahoma	.4	27.9	2.2		30.5
Oregon	.7	3.6	.5	18.2	23.0
Pennsylvania	5.2	106.7	3.1		115.0
South Carolina	8.1	43.4	1.6		53.1
South Dakota	13.0	30.7	7.1		50.8
Tennessee	9.4	20.9	6.5		36.8
Texas	.4	19.6	1.5		21.5
Utah		21.0	.8		21.8
Vermont		1.3	.2		1.5
Virginia	11.5	81.5	1.1		94.1
Washington			.9		.9
West Virginia	7.6	42.4	.5		50.5
Wisconsin		7.4	1.4		8.8
Wyoming		12.5		7.2	19.7
Hawaii		7.0	.7		7.7
Total	145.2	1,247.7	89.7	153.8	1,636.4

<sup>1</sup> Includes some secondary roads in municipalities.

TOTAL

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
				Highways	Grade crossings			
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Alabama		7.3	67.1	26.8	2.9			104.1
Arizona		.1	47.1	7.3	1.2			55.7
Arkansas		12.6	225.8	43.3	13.9			295.6
California			186.9	25.7	4.8			217.4
Colorado			119.5	6.0	2.4			127.9
Connecticut		.3	8.7	15.7	2.6			27.3
Delaware			12.3	17.9				30.2
Florida		2.9	65.7	18.3	13.4			100.3
Georgia		58.9	194.0	84.6	10.2			347.7
Idaho			144.1	.6	2.2			146.9
Illinois		13.7	370.9	26.1	6.1			416.8
Indiana			184.8	100.4	7.1		0.2	292.5

TABLE 12.—Mileage of projects under contract on June 30, 1937—Continued

TOTAL—Continued

State	Federal aid, 1917-33	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
				Highways	Grade crossings			
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Iowa		5.0	192.5	76.5	11.9			285.9
Kansas		1.3	292.9	31.1	10.4			335.7
Kentucky		.8	90.2	20.3	6.5			117.8
Louisiana		18.4	55.2	48.2	8.2			130.0
Maine		1.0	48.6	13.7	2.6			65.9
Maryland		1.3	23.8	17.4	2.6			45.1
Massachusetts			20.3	16.2	5.8			42.3
Michigan			176.7	4.8	2.9			184.4
Minnesota		6.2	187.9	52.6	9.0			255.7
Mississippi		20.9	232.8	58.5	45.0			357.2
Missouri		6.0	392.3	19.6	12.3	128.4		558.6
Montana			257.0	10.1	.8			267.9
Nebraska		10.4	547.1	45.0	4.5			607.0
Nevada			91.8	5.3	.2			97.3
New Hampshire			5.1	13.5	1.5			20.1
New Jersey		8.6	20.3	19.9	3.9			52.7
New Mexico		.2	216.1	32.3	.5			249.1
New York		1.6	300.1	22.5	11.9			336.1
North Carolina		15.6	359.5	73.6	14.5			463.2
North Dakota		39.0	270.1	42.1	32.5			383.7
Ohio		6.0	84.6	137.8	14.5			242.9
Oklahoma	23.1	.4	166.8	43.6	6.6			240.5
Oregon		1.5	184.2	10.0	2.6	18.2	2.5	219.0
Pennsylvania		15.9	170.1	165.1	25.6			376.7
Rhode Island			18.1		.2			18.3
South Carolina		10.6	354.1	64.0	22.5			451.2
South Dakota		32.8	229.4	82.9	76.2			421.3
Tennessee		9.4	75.1	39.0	11.5			135.0
Texas	8.1	.4	882.8	25.9	7.1			924.3
Utah			104.3	30.6	4.1			139.0
Vermont			34.0	1.7	1.8			37.5
Virginia		22.5	114.3	83.2	4.0			224.0
Washington			74.8	1.2	2.5		.1	78.6
West Virginia		9.6	55.8	51.7	7.3			124.4
Wisconsin			261.2	11.1	9.3		.5	282.1
Wyoming		.3	288.6	12.5	1.8	7.2		310.4
Hawaii		2.2	17.9	8.5	1.9			30.5
Total	31.2	343.7	8,523.3	1,764.7	453.8	153.8	3.3	11,273.8

TABLE 13.—Mileage of projects approved but not under contract on June 30, 1937 ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total
			Highways	Grade crossings		
	Miles	Miles	Miles	Miles	Miles	Miles
Alabama		159.4				159.4
Arizona		11.8				11.8
Arkansas		23.1				23.1
California		24.6				24.6
Colorado		3.3				3.3
Connecticut	1.2	.6				1.8
Delaware		21.3			0.2	21.6
Florida		1.8				1.8
Georgia		34.3	1.40	1.5		49.8
Idaho		15.9				15.9
Illinois		72.9				72.9
Indiana		18.9				18.9
Iowa		19.6				19.6
Kansas		70.6				70.6
Kentucky		60.8				60.8
Louisiana		19.6			.5	20.1
Maine		15.1			.4	15.5
Maryland		.3	7.4	1.2	.5	9.4
Massachusetts			2.3	.3		2.6
Michigan			54.5			54.5
Minnesota			10.6			10.6
Mississippi			38.7			38.7
Missouri			150.1			150.1

TABLE 13.—*Mileage of projects approved but not under contract on June 30, 1937—*  
Continued

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

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, grade crossings	Total
			Highways	Grade crossings		
	Miles	Miles	Miles	Miles	Miles	Miles
Montana.....		58.9				58.9
Nebraska.....		81.9	0.5	5.6		88.0
Nevada.....		24.5				24.5
New Hampshire.....		2.7				2.7
New Jersey.....				.4		.4
New Mexico.....	1.2	18.2		.6		20.0
New York.....		51.2				51.2
North Carolina.....	.3	34.1				34.4
North Dakota.....		29.8	3.7			33.5
Ohio.....		36.5				36.5
Oklahoma.....		37.9		1.2		39.1
Oregon.....		1.2				1.2
Pennsylvania.....		32.5	.3	3.1		35.9
Rhode Island.....		1.2				1.2
South Carolina.....		15.4		.9		16.3
South Dakota.....		11.6				11.6
Tennessee.....		12.9				12.9
Texas.....		25.5				25.5
Utah.....		17.0				17.0
Vermont.....		14.9				14.9
Virginia.....		12.1		.1		12.2
Washington.....		16.8				16.8
West Virginia.....		11.1		.1		11.2
Wisconsin.....		20.9				20.9
Wyoming.....		34.3				34.3
Hawaii.....		4.7				4.7
Total.....	3.0	1,445.0	20.0	15.1	0.1	1,483.2

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

Alabama.....		9.3				9.3
Arizona.....		.4				.4
California.....		6.5		0.5		7.0
Connecticut.....		.7	0.8			1.5
Delaware.....		.7				.7
Georgia.....	1.2	8.7	6.8			16.7
Idaho.....	1.9					1.9
Illinois.....		2.4				2.4
Indiana.....		1.2				1.2
Iowa.....		3.1	.7	.4		4.2
Kansas.....		2.3				2.3
Kentucky.....		1.8	.5	.4		2.7
Louisiana.....				5.6		5.6
Maine.....		.7				.7
Maryland.....	1.4					1.4
Massachusetts.....	.1			.4		.5
Michigan.....	.5	5.2	.3	.1		6.1
Minnesota.....		1.1				1.1
Mississippi.....	.2	1.8	.6			2.6
Missouri.....		6.4				6.4
Montana.....		1.9				1.9
Nebraska.....		.6	3.0			3.6
Nevada.....		1.6				1.6
New Jersey.....	.4	1.9				2.3
New York.....		7.4				7.4
North Carolina.....	.7	.9				1.6
North Dakota.....		.5	30.0			30.5
Ohio.....		.7		.2		.9
Oklahoma.....		1.2	.2	.3		1.7
Oregon.....		.1			0.1	.2
Pennsylvania.....			.9			.9
South Carolina.....	.8	1.7				2.5
Tennessee.....		.7		.4		1.1
Texas.....		1.0	4.1			5.1
Utah.....		13.7				13.7
Virginia.....	.5	6.8	.3	.5		8.1
Washington.....		.6				.6
West Virginia.....		.2		.2		.4
Wisconsin.....		2.4				2.4
Total.....	7.7	96.2	48.2	9.0	.1	161.2

TABLE 13.—*Mileage of projects approved but not under contract on June 30, 1937—*  
Continued

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

State	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
	Highways	Grade crossings			
	Miles	Miles	Miles	Miles	Miles
Georgia.....	7.3	1.2			8.5
Idaho.....			4.5		4.5
Illinois.....	1.2				1.2
Indiana.....				0.5	.5
Kentucky.....	1.3	.1			1.4
Louisiana.....		.5			.5
Missouri.....			2.0		2.0
Montana.....		.1			.1
New Jersey.....		.1			.1
Ohio.....	.2	.8			1.0
Oklahoma.....	2.8	.2			3.0
Pennsylvania.....	6.7	.3			7.0
South Dakota.....		.4			.4
Tennessee.....	.5				.5
Virginia.....	.4				.4
West Virginia.....		.1			.1
Total.....	20.4	3.8	6.5	.5	31.2

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

State	Public Works, 1934-35 <sup>1</sup>	Works Program		Federal aid secondary or feeder	Total
		Highways	Grade crossings		
	Miles	Miles	Miles	Miles	Miles
Alabama.....			0.1		0.1
Colorado.....			.2		.2
Connecticut.....		1.3	.6		1.9
Georgia.....	4.9	42.3	3.7		50.9
Idaho.....			.5	9.1	9.6
Illinois.....	13.1	4.4			17.5
Kansas.....		13.9			13.9
Kentucky.....				75.3	75.3
Louisiana.....			7.7		7.7
Maryland.....	4.8	5.3	1.8		11.9
Missouri.....				74.1	74.1
Montana.....	.2				.2
Nebraska.....	3.7				3.7
New Jersey.....			1.1		1.1
New York.....				19.6	19.6
North Carolina.....	.6				.6
North Dakota.....		24.2			24.2
Ohio.....	1.5	5.5			7.0
Oklahoma.....		3.7	.2		3.9
Oregon.....			.3	12.4	12.7
Pennsylvania.....		6.1			6.1
South Carolina.....	.6				.6
South Dakota.....	6.2	2.8	17.4		26.4
Tennessee.....	2.0	6.0			8.0
Texas.....	7.1	2.9			10.0
Utah.....		.1			.1
Virginia.....			.5		.5
West Virginia.....		4.9			4.9
Wyoming.....	5.6				5.6
Total.....	50.3	123.4	34.1	190.5	398.3

<sup>1</sup> Includes some secondary roads within municipalities.

TABLE 13.—Mileage of projects approved but not under contract on June 30, 1937—  
Continued

## TOTAL

State	Public Works, 1934-35	Federal aid, 1936-38	Works Program		Federal aid, secondary or feeder	Federal aid, grade crossings	Total
			Highways	Grade crossings			
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Alabama		168.7		0.1			168.8
Arizona		12.2					12.2
Arkansas		23.1					23.1
California		31.1		.5			31.6
Colorado		3.3		.2			3.5
Connecticut	1.1	1.3	2.2	.6			5.2
Delaware		22.0		.2		0.1	22.3
Florida		1.8					1.8
Georgia	6.0	43.1	70.4	6.4			125.9
Idaho	1.9	15.9		.5	13.6		31.9
Illinois	13.1	75.3	5.6				94.0
Indiana		20.1		.7		5	20.6
Iowa		22.7	7	.4			23.8
Kansas		72.9	13.9				86.8
Kentucky		62.6	1.8	.5	75.3		140.2
Louisiana		19.6		14.3			33.9
Maine		15.8		.4			16.2
Maryland	6.6	7.4	6.4	2.3			22.7
Massachusetts	.1	2.3	.3	.4			3.1
Michigan	.4	59.8	.3	.1			60.6
Minnesota		11.7					11.7
Mississippi	.2	40.5	.6				41.3
Missouri		156.5			76.1		232.6
Montana	.2	60.8		.1			61.1
Nebraska	3.7	82.5	3.5	5.6			95.3
Nevada		26.1					26.1
New Hampshire		2.7					2.7
New Jersey	.5	1.9		1.5			3.9
New Mexico	1.2	18.2		.6			20.0
New York		58.6			19.6		78.2
North Carolina	1.7	34.9					36.6
North Dakota		30.2	58.0				88.2
Ohio	1.5	37.1	5.7	1.1			45.4
Oklahoma		39.1	6.6	2.0			47.7
Oregon		1.3		.3	12.4	.1	14.1
Pennsylvania		32.5	14.0	3.4			49.9
Rhode Island		1.2					1.2
South Carolina	1.4	17.1		.9			19.4
South Dakota	6.2	11.6	2.8	17.8			38.4
Tennessee	2.0	13.6	6.5	.4			22.5
Texas	7.1	26.6	6.9				40.6
Utah		30.7	.1				30.8
Vermont		14.9					14.9
Virginia	.5	18.9	.8	1.0			21.2
Washington		17.4					17.4
West Virginia		11.3	4.9	.4			16.6
Wisconsin		23.3					23.3
Wyoming	5.6	34.3					39.9
Hawaii		4.7					4.7
Total	61.0	1,541.2	212.0	62.0	197.0	.7	2,073.9



TABLE 14.—*Status of grade-crossing elimination and protection projects on June 30, 1937*

COMPLETED DURING FISCAL YEAR

State	Crossings eliminated					Separation structures reconstructed	Crossings protected		
	Public Works, 1934-35	Federal aid for 1936-38	Works Program		Total		Public Works, 1934-35	Works Program, grade crossings	Total
			Highways	Grade crossings					
	Number	Number	Number	Number	Number	Number	Number	Number	
Alabama			1	38	39	1		12	12
Arizona				12	12				
Arkansas	1			30	31	5		2	2
California	1	1		28	30	6			
Colorado		1		20	21	1			
Connecticut	1				1	1			
Delaware	1			1	2				
Florida				18	18	4			
Georgia				3	3	2	8		8
Idaho	2			14	16	1		7	7
Illinois	6			50	56	3	203		203
Indiana	2			22	24	11	8		8
Iowa				71	71	6		5	5
Kansas	1			44	45		1	5	6
Kentucky				13	13	3			
Louisiana				7	7				
Maine				15	15			2	2
Maryland				3	3	3		2	2
Massachusetts	1			10	11	2	1		1
Michigan		1		35	36	4	2		2
Minnesota	2			68	70	11	1	35	36
Mississippi	2			33	35	3	2	1	3
Missouri	3			15	18				
Montana			1	33	34	7			
Nebraska				64	64	2		8	8
Nevada			1	3	4	3	2		2
New Hampshire			1	3	4	3			
New Jersey	4	1		7	12	2		1	1
New Mexico				8	8	1			
New York	3	1	1	22	27	22			
North Carolina	2			25	27	13	84		84
North Dakota	1			25	26	2			
Ohio	2			3	5	1		2	2
Oklahoma	3			39	42	4		2	2
Oregon	1	1		10	12	5	9	2	11
Pennsylvania				35	35	9		9	9
Rhode Island				4	4	2			
South Carolina				22	22	6	4	3	7
South Dakota				27	27	3		25	25
Tennessee	1		1	15	17	2		19	19
Texas	2			97	99	13		37	37
Utah	1			3	4			1	1
Vermont	1			4	5	3		15	15
Virginia	2			29	31	12	1	9	10
Washington				19	19	10	2	8	10
West Virginia				1	1			4	4
Wisconsin		1	2	26	29	4	30		30
Wyoming	1			7	8				
District of Columbia				3	3				
Hawaii	1			2	3				
Total	48	7	8	1,086	1,149	196	358	216	574

TABLE 14.—*Status of grade-crossing elimination and protection projects on June 30, 1937—Continued*

## UNDER CONTRACT

State	Crossings eliminated					Total
	Public Works, 1934-35	Federal aid for 1936-38	Works Program		Federal aid, grade crossings 1938	
			Highways	Grade crossings		
	Number	Number	Number	Number	Number	Number
Alabama				9		9
Arizona				2		2
Arkansas				18		18
California				15		15
Colorado				9		9
Connecticut				7		7
Florida				12		13
Georgia	1			24		25
Idaho				8		8
Illinois	2			23		25
Indiana		3		20	2	25
Iowa				36		36
Kansas				14		14
Kentucky				11		11
Louisiana		2		17		19
Maine				6		6
Maryland	1			3		4
Massachusetts		2	1	16		19
Michigan				6		6
Minnesota				15		15
Mississippi				23		23
Missouri			1	34		35
Montana				1		1
Nebraska				15		15
Nevada				1		1
New Hampshire				6		6
New Jersey	1			15		16
New Mexico				5		5
New York	4	1	1	25		31
North Carolina				24		24
North Dakota				26		26
Ohio				39		39
Oklahoma		1		17		18
Oregon				6	2	8
Pennsylvania		1		45		46
Rhode Island						
South Carolina	1			21		22
South Dakota				37		37
Tennessee				30		30
Texas		1		26		27
Utah				14		14
Vermont				3		3
Virginia				13		13
Washington		1		3		4
West Virginia				20		20
Wisconsin		3		10	1	14
Wyoming				5		5
Hawaii				3		3
Total	11	15	3	738	5	772

TABLE 14.—*Status of grade-crossing elimination and protection projects on June 30, 1937—Continued*

## UNDER CONTRACT—Continued

State	Separation structures reconstructed	Crossings protected				Total
		Public Works, 1934-35	Works Program		Federal aid, grade crossings 1938	
			Highways	Grade crossings		
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Arizona.....				3		3
Arkansas.....	1			30		30
California.....		62				62
Connecticut.....				1		1
Florida.....	1					
Georgia.....	5	1		52		53
Idaho.....	1			14		14
Illinois.....	5	63				63
Indiana.....	1	44		163		207
Iowa.....	2			3		3
Kansas.....	1					
Kentucky.....	3	9				9
Louisiana.....	2					
Maine.....	1			2		2
Maryland.....				20		20
Massachusetts.....	2					
Michigan.....	2					
Minnesota.....	2			14		14
Mississippi.....	3	2		14		16
Missouri.....	1			2		2
Montana.....	1					
Nebraska.....	1			16		16
Nevada.....	1			5		5
New Hampshire.....	1			7		7
New Jersey.....	5					
New Mexico.....		2				2
New York.....	26					
North Carolina.....	3			108		108
North Dakota.....	2					
Ohio.....	7			1		1
Oklahoma.....	6			39		39
Oregon.....	1					
Pennsylvania.....	11					
Rhode Island.....	1					
South Carolina.....	3			45		45
South Dakota.....	3					28
Tennessee.....	1			18		18
Texas.....	2			121		121
Vermont.....	2			5	2	7
Virginia.....	5	2		13		15
Washington.....	3		1	3		4
West Virginia.....	3			1		1
Wisconsin.....	3	1		5		6
Total.....	133	186	1	733	2	922

TABLE 14.—*Status of grade-crossing elimination and protection projects on June 30, 1937—Continued*

## APPROVED BUT NOT UNDER CONTRACT

State	Crossings eliminated				Separation structures reconstructed
	Federal aid for 1936-38	Works Program, grade crossings	Federal aid, grade crossings 1938	Total	
	Number	Number	Number	Number	Number
Alabama.....		1		1	
California.....		6		6	
Colorado.....		1		1	
Connecticut.....		1		1	
Delaware.....		2		2	
Georgia.....	1	12		13	3
Idaho.....		1		1	
Illinois.....	1			1	
Indiana.....			1		
Kentucky.....		3		3	1
Louisiana.....		7		7	1
Maine.....		1		1	
Maryland.....		4		4	2
Massachusetts.....		1		1	1
Michigan.....	3			3	1
Montana.....		1		1	
Nebraska.....		4		4	
New Jersey.....		2		2	3
New Mexico.....		1		1	
Ohio.....		14		14	
Oklahoma.....		4		4	2
Oregon.....		1		1	
Pennsylvania.....		9		9	
South Carolina.....					2
South Dakota.....		11		11	
Tennessee.....		1		1	
Virginia.....		3		3	2
Washington.....	1			1	
West Virginia.....		5		5	1
Wisconsin.....	1			1	
Total.....	7	96	1	104	18

TABLE 15.—Mileage, by types of construction, of projects completed during the fiscal year 1937

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Grade separations		Total
	Miles		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Miles	Miles	
Alabama.....	4.1		34.5		67.0	19.2	9.2		12.5	2.1	10.2	0.9		0.9	1.3	165.1	
Arizona.....	11.7		76.3	24.5	231.0	8.8	1.9		98.3	.4	7.7	1.2		1.2	1.3	219.6	
Arkansas.....	12.3		221.0	8.8	22.2	88.3	.1		63.7	1.1	21.3	2.0		2.0	7.8	331.9	
California.....	39.8		170.2		170.2				135.2	4.0	101.0	1.3		1.3	1.2	455.0	
Colorado.....	12.7															185.5	
Connecticut.....																24.2	
Delaware.....	5.6		35.1		35.1		2.3	0.5	2.0	.6	16.3	1.1		1.1	1.1	82.8	
Florida.....	28.4		15.5		32.8	41.9			21.3	1.7	18.9	3.3		3.3	6.6	123.7	
Georgia.....	18.1	.3	27.4		195.1				4.2	11.7	61.7	1.5		1.5	1.1	270.8	
Idaho.....	50.3								186.2						6.6	433.2	
Illinois.....	323.4				79.8	14.5	27.3		7.3	14.3	115.4	4.6		4.6	1.9	633.2	
Indiana.....	107.4				341.8	29.4			28.7	14.3	121.7	1.9		1.9	1.5	360.5	
Iowa.....	132.8				335.5				92.3		296.9	2.6		2.6	3.0	829.7	
Kansas.....	190.6				139.2				370.1	1.0	40.9	2.8		2.8	2.2	905.2	
Kentucky.....	180.0								42.7	4.8	43.8	1.1		1.1	1.6	413.0	
Louisiana.....	13.2				55.1	10.4	.5		8.3	18.3	74.8	1.8		1.8	.5	219.5	
Maine.....	9.9	1.0	21.4		21.4	22.6	2.6			14.3	3.4			3.4	2.2	113.4	
Maryland.....									1.4	9.1	3.7			3.7	1.1	53.5	
Massachusetts.....	202.4				45.1					3.0	2.1			2.1	1.8	12.5	
Michigan.....	564.6				504.4	6.5			100.8	5.3	294.5	1.5		1.5	8.8	657.2	
Minnesota.....	96.8		18.7		126.7	16.2	8.1		19.7	21.3	158.6	2.2		2.2	.5	280.8	
Mississippi.....	88.1		10.4		352.8	40.4				9.5	7.0			7.0		1,275.7	
Missouri.....	88.1				148.5	157.5			64.7	9.5	190.0	2.2		2.2	1.6	475.7	
Montana.....	88.1								88.8	3.3	1.8			1.8		483.4	
Nebraska.....	325.1		111.3		106.9				100.0		90.6	4.0		4.0	1.9	633.3	
Nevada.....	.2								130.0	1.5	3.7	.2		.2	.8	241.9	
New Hampshire.....	3.9				5.1	3	7.0	33.8	2.4	2.0	3.7			3.7		60.9	
New Jersey.....	39.4				172.0	56.1			128.4	4.3	49.7	2.2		2.2	1.1	401.3	
New Mexico.....	9.0				31.2	59.9			21.5	58.3	168.3	5.0		5.0	3.8	364.2	
New York.....	18.2		108.0		345.1	111.2			33.2	10.9	79.9	1.1		1.1	.8	570.5	
North Carolina.....	54.5								65.0						1.1	433.9	
North Dakota.....	4.4									.1	31.7			31.7	2.1	242.0	
Ohio.....	4.4		17.7		336.3	7.1	13.1	8.2	1.5	19.0	90.3	3.5		3.5	1.6	519.2	
Oregon.....	24.0				49.7	106.0	2.2	1.5	32.3	26.9	14.1	19.8		19.8	1.0	276.1	
Pennsylvania.....	43.4				10.1	4.9	4.2	32.5	7.5	61.7	119.0	.6		.6	1.0	290.0	
Rhode Island.....						3.4			23.8	1.7	2.7			2.7	.3	33.5	
South Carolina.....	32.3		43.9		6.1	6.1	1.9		7.5	4.6	9.0			.5	.5	276.7	

TABLE 15.—*Mileage, by types of construction, of projects completed during the fiscal year 1937—Continued*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Grade separations		Total
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Rail-road and high-ways	Be-tween and high-ways	
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
South Dakota	152.2		234.0	12.4			192.4	0.2	19.6	0.3	19.6		0.6			611.7
Tennessee	89.7		89.7			3.7	4.0	31.0	94.8	0.4	94.8		1.4			225.4
Texas	398.5	5.4	434.4	428.5	2.2	16.4	16.0	111.3	179.6	1.0	179.6		6.3	0.1		1,599.8
Utah	18.2		110.5	2.2			95.7	54.4	14.6		14.6		0.3			285.9
Vermont			4.5	6.2			56.9	1.4	6.6	1.7	6.6		0.5			84.2
Virginia	30.5	39.9	526.9	58.4		4	182.5	1.6	20.1	0.3	20.1		3.9			902.2
Washington	4.5		139.7	56.2			9.0	6.2	54.3		54.3		1.2			301.1
West Virginia	14.0		8.1	13.3			28.1	27.3	13.5		13.5		0.9	2.0		106.5
Wisconsin	144.9		282.9	16.3			26.4	2.9	13.5		13.5		1.1			590.7
Wyoming	174.5		75.7	30.4			108.2	.1	78.8		78.8		1.4	1.5		390.9
Hawaii	1.4					.7	1.3	2					1.4	.6		14.6
District of Columbia								10.4			.9		2	.2		5.4
Total	3,708.1	471.7	379.2	6,185.6	1,445.7	174.7	482.2	187.1	643.5	2,593.5	28.3	69.6	53.0	1.5		18,768.1

TABLE 16.—*Mileage, by types of construction, of projects under contract on June 30, 1937*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Grade separations		Total
		Un-treated	Treated	Un-treated	Treated	Rail-road and high-ways	Be-tween and high-ways									
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Alabama	16.2	4.3	34.0	8.3	38.1				2.3	0.6	2.3		0.6			104.1
Arizona	3.2		6	6	35.3			4.0	53.2	4.0	53.2		1.1			155.7
Arkansas	39.5		33.0	1.9	22.0	7.9	185.9	2.5	45.3	.6	45.3		1.2			295.6
California	20.3		106.3	22.0	94.3			1.1	33.9	1.4	33.9		0.9			217.4
Colorado					3			4.2	14.7	.1	14.7		1.2			127.9
Connecticut					16.2			9.1	.6	.1	.6		1.1			27.3

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Delaware.....	73.6	11.7	10.9	10.3	8.2	0.8	0.9	4	30.2
Florida.....	13.9	93.5	73.6	.1	13.9	1.7	1.7	1.0	100.3
Georgia.....	11.3	17.1	108.4	4.1	39.9	3.2	3.1	.6	347.7
Idaho.....	18.4	18.4	3.6	.3	5.7	106.0	1.1	1.1	146.9
Illinois.....	29.0	21.7	2.2	36.5	1.1	136.6	1.2	2.3	416.8
Indiana.....	83.6	5.1	49.9	14.8	194.4	1.9	2.4	1.7	292.5
Iowa.....	166.4	13.1	16.3	51.3	73.0	58.3	.9	.3	333.7
Kansas.....	42.3	1.0	13.2	7.1	51.3	1.6	2.4	.2	117.8
Kentucky.....	14.1	14.6	.9	23.8	37.1	3.2	.1	3.2	130.0
Louisiana.....	48.0	7.0	1.3	23.8	2.2	4.4	.1	.6	63.9
Maine.....	1.6	15.5	53.2	2.7	163.3	.3	.3	.6	43.1
Maryland.....	74.7	43.6	28.2	2.4	2.4	42.5	.8	.3	184.4
Massachusetts.....	142.0	50.3	4.9	9.1	139.4	2.1	2.1	.5	255.7
Michigan.....	100.3	200.3	23.1	17.0	163.0	2.2	2.2	.2	357.2
Minnesota.....	53.0	78.4	119.0	4.9	25.0	1.5	1.5	1.5	558.6
Missouri.....	53.0	78.4	422.0	77.6	97.3	7.5	7.5	1.5	267.9
Montana.....	42.2	14.6	16.5	3.2	1.1	3.2	.2	.2	607.0
Nebraska.....	49.7	59.1	4.4	4.4	4.9	1.1	.2	.1	97.3
Nevada.....	10.1	9	104.6	2.6	33.5	1.1	1.1	1.0	20.1
New Hampshire.....	60.3	68.9	9.5	61.0	187.7	.3	1.1	.1	52.7
New Jersey.....	13.7	5.9	4.7	7.4	86.8	3	1.3	.1	249.1
New Mexico.....	19.5	5.3	23.7	7.4	1.1	1.1	1.3	2.9	336.1
New York.....	9.5	61.8	47.8	4.3	3.3	4.3	4.3	.3	463.2
North Carolina.....	113.4	113.7	107.4	21.3	1.1	1.1	3.6	.6	383.7
North Dakota.....	18.6	106.7	8.7	42.5	34.9	4.6	4.6	1.1	242.9
Ohio.....	107.5	7.9	5.1	13.3	103.3	1.9	1.9	1.3	240.5
Oklahoma.....	7.7	50.5	27.7	43.2	14.1	16.1	1.4	1.1	219.0
Oregon.....	47.1	71.7	11.2	39.5	197.5	5.3	1.4	1.1	376.7
Pennsylvania.....	4.6	31.6	23.6	9.3	9.5	7.7	1.5	.7	18.3
Rhode Island.....	49.9	316.8	65.3	13.6	33.9	3.0	1.5	.6	451.2
South Carolina.....	134.7	80.2	106.1	23.0	36.8	2.0	1.0	1.0	421.3
South Dakota.....	2.9	37.1	5.3	206.0	206.0	3.0	7.4	.5	135.0
Tennessee.....	263.7	140.0	10.9	6.9	1.9	1.9	1.1	.4	924.3
Texas.....	2.2	33.3	85.3	8.4	8.4	8.4	1.1	.4	139.0
Utah.....	2.2	8.9	17.1	4.5	12.6	1.9	.9	.4	37.5
Vermont.....	5.9	73.9	86.1	7.7	19.4	7.7	1.1	.8	224.0
Virginia.....	3.0	53.0	5	10.2	30.4	3.4	.5	.8	78.6
Washington.....	42.2	9.1	3.4	11.6	11.6	232.8	1.0	.7	124.4
West Virginia.....	80.6	62.0	22.8	7.8	126.2	7.8	1.0	.7	282.1
Wisconsin.....	25.4	43.3	19.3	7.0	55.3	63.2	.5	.1	310.4
Wyoming.....	2.0	1.6	185.7	402.1	2,583.7	37.3	.6	.6	30.5
Hawaii.....	1,681.0	182.2	583.7	2,018.8	1,228.1	83.6	282.7	1,885.8	11,273.8
Total.....	1,681.0	182.2	583.7	2,018.8	1,228.1	83.6	282.7	1,885.8	11,273.8

TABLE 17.—*Mileage, by types of construction, of projects approved but not under contract on June 30, 1937*

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, rail-road and highway	Total
	Miles	Treated	Miles	Treated	Miles	Treated	Miles	Treated								
Alabama.....	109.4		58.1						0.1					1.2		168.8
Arizona.....			9.5						2.0					.2		12.2
Arkansas.....									23.1							23.1
California.....									3.3							31.0
Colorado.....			3.5								26.7					3.5
Connecticut.....										0.7					0.2	3.2
Delaware.....			1.2													22.3
Florida.....																1.8
Georgia.....	3.8															125.9
Illinois.....	5.1	7.0	32.4													31.9
Idaho.....			17.4						14.0							94.0
Indiana.....			13.1													20.6
Iowa.....																23.8
Kansas.....			79.6													86.8
Kentucky.....	2.9		87.5						4							140.2
Louisiana.....	23.1								23.3							33.9
Maine.....					3.0											16.2
Maryland.....			6.6													22.7
Massachusetts.....																3.1
Michigan.....																60.6
Minnesota.....									10.4							11.7
Mississippi.....																41.3
Missouri.....	12.3								4.7							232.6
Montana.....	25.3		82.8	94.0					13.1							61.1
Nebraska.....	7.9		39.9						16.9							95.3
Nevada.....	33.3	1.5	7.9						20.4							26.1
New Hampshire.....					4.9											2.7
New Jersey.....									1.5							1.1
New Mexico.....			1.2													3.9
New York.....			14.1						18.1							20.0
North Carolina.....	7.8		17.9						4.2							78.2
North Dakota.....	31.7	14.1	22.8	19.4					14.3							36.6
Ohio.....			8.0													88.2
Oklahoma.....	9.9		16.8													45.4
Oregon.....									1.7							47.7
Pennsylvania.....			3.7	13.3												14.1
Rhode Island.....																49.9
South Carolina.....	4.7															1.2
South Dakota.....	17.6	11.6	9.0													19.4
Tennessee.....			12.2													38.4
									11.6							22.5
									2.1							8.1



Texas.....	6.1									3.9		.1		40.6
Utah.....		14.1		12.9							3.5			30.8
Vermont.....		10.2		5.7										14.9
Virginia.....				8.3										21.2
Washington.....		3.1												17.4
West Virginia.....		10.1			.1			4.2			6.3			.2
Wisconsin.....	2.0													16.6
Wyoming.....	18.9													23.3
Hawaii.....	7.1			27.1				4.7						39.9
														4.7
Total.....	254.7	468.4	150.0	335.8	13.7	44.7	222.4	20.0	101.8	431.6	9.5	9.4	5.3	2,073.9

### CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Throughout the West there are sparsely populated lands still held by the United States in public ownership, across which there is need for the construction of new roads and for the improvement of existing roads, mainly to serve the ever-increasing tourist traffic. In 14 States such areas, including unappropriated public lands, nontaxable Indian lands, and other Federal reservations exclusive of forest and park reservations, amount to more than 5 percent of the area of the State.

Special authorizations for the construction of roads in public lands have been made by six congressional acts, passed up to the end of the fiscal year 1937. Funds totaling \$17,500,000 have been made available for the fiscal years 1931-38, excepting the fiscal years 1932 and 1937. The authorization for the fiscal year 1939 is \$2,500,000.

These public-lands funds may be expended, within Federal reservations, either on the Federal-aid system or on other main roads. Cooperative funds from the States may be used in conjunction with Federal funds, but contributions from the States are not required. Construction may be planned and supervised by the State highway departments, as in Federal-aid work, or may be handled directly by the Federal authority.

The public-lands projects consist generally of the grading of new roads, the reconstruction of old roads to higher standards of grade and alinement, and the subsequent improvement of these roads by addition of gravel and bituminous-mix surfacing. The large mileage of improvement required has necessitated low types of initial construction that are to be further improved as traffic requires.

During the year 246 miles of road were completed, consisting of new construction and the betterment of earlier improvements. This brings the total of completed Federal lands roads to 1,337 miles. Of the 1,337 miles, 7 percent consists of grading, 31 percent of gravel surfacing, and 59 percent bituminous-mix surfacing, miscellaneous improvements constituting about 3 percent.

Table 18 shows the cost and mileage of roads completed during the year and table 21 shows the types of road completed to the end of the fiscal year.

TABLE 18.—*Public-lands funds allotted to projects completed during the fiscal year 1937*

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona.....	\$277,451	\$287,220	33.7	North Dakota.....	\$27,219	\$27,219	6.0
California.....	111,822	143,954	7.7	Oregon.....	72,726	88,763	7.7
Colorado.....	115,245	117,867	4.3	Utah.....	220,081	240,862	14.1
Montana.....	123,409	123,983	6.7	Wyoming.....	161,275	161,309	39.3
Nevada.....	546,440	559,163	106.2	Total.....	2,031,228	2,126,603	245.8
New Mexico.....	375,560	376,023	20.1				

At the end of the year, the public-lands projects under contract and in large part under construction involved 91.5 miles as shown in table 19. Table 20 shows the mileage and funds involved in projects approved but not yet under contract and funds available for new work.

TABLE 19.—*Public-lands funds allotted to projects under contract and under construction, June 30, 1937*

State	Public-lands funds	Estimated total cost	Miles	State	Public-lands funds	Estimated total cost	Miles
Arizona.....	\$73,396	\$73,396	0.3	Oregon.....	\$132,297	\$132,297	9.6
California.....	275,666	336,143	13.8	South Dakota.....	36,892	54,942	7.0
Idaho.....	139,586	159,294	8.9	Wyoming.....	35,520	61,850	4.1
Nevada.....	350,008	363,624	31.1	Total.....	1,143,150	1,278,831	91.5
New Mexico.....	95,885	95,885	.....				
North Dakota.....	4,400	4,400	16.7				

TABLE 20.—Public-lands funds allotted to projects approved but not under contract and balance available for new projects, June 30, 1937

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.....	\$9,550	\$9,550	-----	\$378,862	Oklahoma.....	-----	-----	-----	\$52,097
California.....	2,500	2,500	-----	242,518	Oregon.....	\$30,000	\$61,989	5.9	11,744
Colorado.....	-----	-----	-----	88,688	South Dakota.....	21,070	21,070	1.1	76,103
Idaho.....	-----	-----	-----	36,000	Utah.....	-----	-----	-----	258,693
Montana.....	-----	-----	-----	159,129	Washington.....	-----	-----	-----	38,349
Nevada.....	-----	-----	-----	225,551	Wyoming.....	-----	-----	-----	165,824
New Mexico.....	-----	-----	-----	110,959	Total.....	63,120	95,109	7.0	1,913,134
North Dakota.....	-----	-----	-----	68,617					

The fiscal year 1937 saw considerable advance made in the construction of the Colorado River bridge, near Parker, Ariz., and upon the following routes, important from the viewpoint of continuous Federal lands construction: The Ely-Tonopah Highway, in Nevada, and the Kingman-Boulder Dam Highway, in Arizona.

The Colorado River bridge near Parker, Ariz.—often called the Parker Bridge—crosses the Colorado River from Arizona to California. Construction was begun during the year, and at the close of the year was practically complete. It will provide the only means of crossing the Colorado River in that vicinity.

The Ely-Tonopah Highway, 102 miles in length, is a link in U. S. Route 6, that carries traffic directly across the State. During the year, three public-lands projects on this route were completed. Two sections were improved with bituminous surfacing for a total distance of 27 miles, while the third project consisted of grading and gravel surfacing 29 miles. Further improvements are in progress on 37 miles of the route.

TABLE 21.—Mileage of Federal-lands roads, by types of construction, completed as of June 30, 1937

State	Graded and drained	Gravel	Bituminous treatment	Bituminous mixture	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Arizona.....	22.9	20.9	-----	63.5	-----	-----	-----	0.4	107.7
California.....	-----	13.8	-----	60.2	-----	-----	-----	.3	74.3
Colorado.....	-----	14.9	-----	7.9	-----	-----	-----	.1	22.9
Idaho.....	1.8	31.7	-----	31.5	-----	-----	-----	-----	65.0
Montana.....	-----	37.2	-----	18.2	-----	-----	-----	.2	55.6
Nevada.....	-----	103.9	-----	355.8	-----	-----	-----	.1	459.8
New Mexico.....	-----	24.6	10.8	18.5	-----	-----	6.0	.2	60.1
North Dakota.....	9.4	16.0	-----	-----	-----	-----	-----	.1	25.5
Oklahoma.....	-----	-----	-----	5.6	-----	1.8	2.5	-----	9.9
Oregon.....	39.6	84.0	3.9	-----	-----	-----	-----	.1	127.6
South Dakota.....	10.4	2.8	-----	-----	-----	-----	-----	.1	13.3
Utah.....	-----	39.6	-----	119.6	-----	6.8	-----	.1	166.1
Washington.....	.3	14.3	-----	-----	2.6	-----	3.7	.1	21.0
Wyoming.....	4.1	7.0	15.6	101.1	-----	-----	-----	.3	128.1
Total.....	88.5	410.7	30.3	781.9	2.6	8.6	12.2	2.1	1,336.9

The Kingman-Boulder Dam Highway project is 25 miles in length. It forms part of an important through route crossing the Colorado River, and permits easy access to the world-famous Boulder Dam. In the past year 14.5 miles of gravel road was given a mixed bituminous surface and work is nearly completed on 11 miles of similar surfacing.

#### RESTORATION OF FLOOD-DAMAGED ROADS

The work of reconstructing flood-damaged roads in 11 States, with funds authorized in the years 1928-31, has been nearly completed.

At the beginning of the year all authorized funds had been absorbed in completed work in Florida, New Hampshire, South Carolina, and Vermont. All work planned in Alabama, Arkansas, Georgia, Louisiana, and Mississippi had been completed.

During the year 23 miles of flood-relief construction was completed, and 22 miles was under contract at the end of the year, as shown in table 22. Work under contract at the end of the year absorbed all of the available funds in Missouri, and Kentucky had an unobligated balance of \$300,177.

TABLE 22.—*Flood-relief funds allotted to projects completed during the fiscal year and under contract at close of fiscal year 1937*

COMPLETED DURING YEAR			
State	Flood-relief funds	Estimated total cost	Miles
Kentucky.....	\$86,048	\$194,868	11.2
Louisiana.....	65,921	167,654	10.5
Missouri.....	46,256	93,009	1.4
Total.....	112,177	260,663	11.9
Grand total.....	198,225	455,531	23.1

  

UNDER CONTRACT AT END OF YEAR			
State	Flood-relief funds	Estimated total cost	Miles
Kentucky.....	\$113,660	\$240,275	18.8
Missouri.....	496	14,660	3.4
Total.....	114,156	254,935	22.2

The Bureau has also furnished engineering supervision on a number of flood-relief projects at the request of the Works Progress Administration. These projects are financed by the Works Progress Administration and the States and, in some cases, partially with Works Program funds. The work consists of the reconstruction of flood-damaged bridges and bridge approaches, for the most part on secondary roads. This work is done by the contract method, and the Bureau cooperates closely with the State highway departments much the same as on Federal-aid construction.

Completed work of this class has aggregated 6.4 miles of bridges and approaches costing \$1,440,266, and work is under contract or approved for contract on 32 miles estimated to cost \$11,602,186. Details by States are shown in table 23.

TABLE 23.—*Funds allotted for reconstruction of flood-damaged bridges by the Works Progress Administration during the fiscal year 1937 to be supervised by the Bureau of Public Roads*

COMPLETED							
State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>	State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>
Connecticut.....	\$19,250	\$48,666	0.1	Virginia.....	\$9,150	\$12,200	-----
Maine.....	359,800	449,500	1.4	Total.....	1,214,273	1,440,266	6.4
New Hampshire.....	79,293	105,724	.3				
Pennsylvania.....	746,780	824,176	4.6				

  

UNDER CONTRACT							
State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>	State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>
Connecticut.....	\$121,075	\$194,380	0.6	Vermont.....	\$82,879	\$162,924	0.6
Maine.....	1,581,900	1,867,400	3.0	West Virginia.....	142,500	235,000	1.5
Massachusetts.....	1,880,492	3,140,176	4.4	Total.....	7,309,400	9,869,637	26.3
New Hampshire.....	624,032	837,301	1.5				
Pennsylvania.....	2,876,522	3,382,456	14.7				

  

APPROVED							
State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>	State	Works Progress flood-reconstruction funds	Estimated total cost	Miles <sup>1</sup>
Connecticut.....	\$63,200	\$175,770	0.2	West Virginia.....	\$68,500	\$274,000	0.2
Massachusetts.....	629,866	871,220	1.9	Total.....	1,127,557	1,732,549	5.6
Pennsylvania.....	365,991	411,559	3.3				

<sup>1</sup> Bridges and bridge approaches.

Section 3 of the Hayden-Cartwright Act of June 18, 1934, authorized the Secretary of Agriculture to use an amount not to exceed \$10,000,000, from any funds available for expenditure under the Federal Highway Act, in the repair and reconstruction of flood-damaged highways and bridges on the Federal-aid system, and authorized future appropriation of funds expended for such purposes. This provision has made possible the taking of immediate steps to repair damage caused by destructive floods that occurred in Eastern States in the spring of 1936 without waiting for specific authorization of funds. The States are required to match these flood-relief funds in the same manner as regular Federal-aid funds.

During the year work was completed in eight States, costing \$2,247,522, of which \$1,096,078 was supplied by the Federal Government, and work estimated to cost \$2,591,569 and involving \$1,265,284 of Federal funds was under contract or approved at the close of the year, as shown in table 24. Flood-damage funds paid to States during the year amounted to \$1,048,751, and brought the total paid to States under the Hayden-Cartwright Act to \$1,522,363. Funds paid to States during the fiscal year were as follows:

State:	Amount	State—Continued.	Amount
Colorado.....	\$104,518	New York.....	\$311,712
Kansas.....	317,492	Oklahoma.....	3,441
Maine.....	56,563	Texas.....	96,994
Nebraska.....	104,817		
New Hampshire.....	53,214	Total.....	1,048,751

TABLE 24.—Flood-damage funds, available under section 3 of the Hayden-Cartwright Act, allotted to projects during the fiscal year 1937

COMPLETED

State	Emergency-relief funds	Estimated total cost	Miles	State	Emergency-relief funds	Estimated total cost	Miles
Colorado.....	\$206,607	\$384,112	0.5	New York.....	\$347,665	\$775,073	0.4
Kansas.....	102,424	204,920	.4	Oklahoma.....	3,441	6,974	.4
Maine.....	66,546	133,091	.1	Texas.....	148,546	298,960	1.2
Nebraska.....	188,422	379,538	.6				
New Hampshire.....	32,427	64,854	.1	Total.....	1,096,078	2,247,522	3.7

UNDER CONTRACT

Kansas.....	\$295,945	\$591,891	0.6	Texas.....	\$119,930	\$239,860	0.2
Maryland.....	105,319	210,639	.2	Vermont.....	47,550	95,100	2.4
New Hampshire.....	48,949	97,899	.1				
New York.....	134,450	315,100	.2	Total.....	881,057	1,808,316	26.3
Ohio.....	128,914	257,827	22.6				

APPROVED

Kansas.....	\$110,000	\$220,000	0.2	Vermont.....	\$45,983	\$106,766	2.2
Kentucky.....	17,688	35,376	.7	Virginia.....	77,181	154,361	.2
Maryland.....	68,500	137,000	.1				
Ohio.....	64,875	129,750	1.3	Total.....	384,227	783,253	4.7

Including work completed in the previous fiscal year the total obligations to the end of the fiscal year total \$5,870,000, leaving a balance of \$4,130,000 for new projects.

## WORK-RELIEF HIGHWAY PROJECTS

Work-relief highway projects, begun in the fall of 1933, to relieve distress in particular areas stricken by drought and a scourge of grasshoppers, have been continued since in areas needing special relief. Road work has been carried on by an arrangement under which the Public Works Administration has granted funds needed to pay materials and equipment costs, limited to not more than 30 percent of the total expenditure, 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.

Under this arrangement the Bureau of Public Roads, cooperating with the respective State highway departments, has assumed the responsibility of supervising the road work.

During the year 1,426 miles of work of this kind was completed, bringing the total to date to 5,969 miles, and at the close of the year work was under contract on 1,532 miles, as shown in table 25.

TABLE 25.—*Status of National-Recovery work relief projects*

State	Completed during year			State	Under contract at end of year		
	Federal funds	Total cost	Miles		Federal funds	Total cost	Miles
Kansas.....	\$316,886	\$1,169,642	274.8	Kansas.....	\$45,513	\$151,710	48.5
Minnesota.....	22,247	82,844	22.6	Minnesota.....	801,813	3,923,065	68.0
North Dakota.....	98,971	424,246	150.8	Oklahoma.....	570,000	1,900,000	442.7
South Dakota.....	681,330	2,964,642	977.6	Texas.....	1,664,935	5,575,618	972.8
Total.....	1,119,434	4,641,374	1,425.8	Total.....	3,082,261	11,550,393	1,532.0

## LOAN-AND-GRANT HIGHWAY PROJECTS

The Public Works Administration has continued the policy of financing or 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 Public Works Administration and, after agreement has been reached and funds allotted, are turned over to this Bureau for detailed administration of construction.

Work of this kind was begun in 1934 under the National Industrial Recovery Act and has been continued during the past 2 fiscal years with funds allocated under the authorization in the Emergency Relief Appropriation Act of 1935. By the close of the year, loans and grants of \$51,637,887 had been made for specific projects 9,040 miles in length and estimated to cost \$113,778,761. This represents a net increase during the year of 1,415 miles involving \$12,436,906 of loan and grant funds and estimated to cost \$31,321,178. Table 26 shows details by States.

TABLE 26.—Status on June 30, 1937, 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		Miles	Estimated total cost	Funds assigned		
	Tentative allotment by special board for Public Works				Grant	Loan	Other
	Grant	Loan					
Alabama.....	\$70,247.99	\$49,630.71	6.7	\$70,247.99	\$20,617.28	\$49,630.71	
California.....	1,310,863.65	1,310,863.65	16.4	4,587,135.59	1,310,863.65		\$3,276,271.94
Connecticut.....	1,207,595.74	1,207,595.74	68.7	4,825,941.10	1,207,595.74		3,618,345.36
Illinois.....	2,427,234.19	2,427,234.19	97.6	8,169,818.51	2,385,536.78		5,784,281.73
Indiana.....	200,662.04	200,662.04	34.5	765,293.83	200,662.04		564,631.79
Iowa.....	307,586.75	307,586.75	823.6	1,061,690.12	307,586.75		754,103.37
Kansas.....	5,119,129.85	3,825,000.00	413.7	5,828,223.97	1,294,129.85	3,825,000.00	709,094.12
Louisiana.....	5,269,258.33	88,258.33	47.3	300,515.08	88,258.33		31,256.75
Maryland.....	5,411,866.00	1,411,866.00	72.2	5,090,357.16	1,408,168.25	3,541,100.08	141,088.83
Massachusetts.....	1,702,395.00	4,000,000.00	105.1	5,449,602.94	1,616,939.64		3,832,663.30
Michigan.....	10,000.00	10,000.00	29.0	39,818.00	10,000.00		29,818.00
Minnesota.....	1,368,671.72	385,000.00	477.0	2,874,823.53	841,377.91	301,280.40	1,732,165.22
Mississippi.....	169,286.00	400,000.00	80.1	498,232.11	149,469.62		2,757,762.36
Missouri.....	1,026,000.00	1,026,000.00	50.7	3,780,944.30	1,023,181.94		2,757,762.36
Montana.....	1,829,000.00	1,579,000.00	697.8	1,955,462.56	579,000.00	1,250,000.00	126,462.56
Nebraska.....	11,500.00	1,250,000.00	59.5	40,120.22	11,500.00		28,620.22
New York.....	736,814.48	375,033.67	30.9	1,282,140.00	375,033.67	361,780.81	545,325.52
Ohio.....	793,179.87	139,877.63	27.2	495,847.75	139,877.63	153,302.94	202,667.88
South Carolina.....	76,082.97	21,283.31	28.1	76,082.97	21,283.31		54,799.66
Texas.....	1,476,020.71	931,420.71	238.3	3,254,907.27	931,420.71	539,000.00	1,783,886.56
Washington.....	2,982,447.21	2,282,447.21	1,275.1	6,139,409.56	2,273,293.68		5,866,115.88
West Virginia.....	2,000,000.00	2,000,000.00	447.4	6,698,307.64	1,973,037.39		4,665,270.25
Wisconsin.....	454,300.00	146,271.62	86.4	526,176.96	146,271.62	308,028.38	71,876.96
Total.....	30,655,142.50	18,647,000.70	5,213.3	65,721,099.16	18,315,105.79	10,914,284.77	36,491,708.60

TABLE 26.—Status on June 30, 1937, 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 EMERGENCY RELIEF APPROPRIATION ACT OF 1935

State	Funds allotted by Public Works Administration		Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments	Funds assigned			
	Tentative allotment by special board for Public Works			Estimated total cost	Grant	Loan	Other
	Grant	Loan	Miles				
California.....	\$58,854.00	-----	0.4	\$130,787.00	\$58,854.00	-----	\$71,933.00
Colorado.....	3,000,000.00	-----	120.7	4,001,210.02	1,799,601.00	-----	2,201,609.02
Florida.....	72,424.00	-----	.0	145,230.00	65,357.50	-----	79,881.44
Illinois.....	694,490.23	594,490.23	114.1	1,402,023.69	594,490.23	-----	807,533.46
Iowa.....	402,732.74	402,732.74	735.6	739,595.49	330,188.02	-----	429,407.47
Kansas.....	14,463.00	-----	.6	30,832.00	13,374.40	-----	16,957.60
Maryland.....	1,000,000.00	1,000,000.00	27.2	1,930,211.27	868,395.06	-----	1,061,616.21
Michigan.....	119,435.00	-----	16.5	305,823.11	119,435.00	-----	186,388.11
Minnesota.....	158,823.00	-----	69.3	347,395.34	153,309.21	-----	194,086.13
Mississippi.....	23,739,850.14	15,089,850.14	1,306.0	28,223,316.07	12,693,643.64	-----	15,529,672.43
Missouri.....	396,699.54	-----	364.5	881,689.86	396,699.54	-----	484,990.32
Nebraska.....	6,611.95	-----	18.0	14,914.82	6,611.95	-----	8,302.87
New Jersey.....	31,779.00	-----	3.0	76,620.00	31,779.00	-----	38,841.00
New York.....	212,994.48	-----	28.7	518,703.11	212,994.48	-----	305,708.63
Ohio.....	754,045.79	360,599.04	229.5	808,134.90	356,924.59	-----	62,255.10
Pennsylvania.....	425,552.00	393,446.75	2.7	739,808.00	332,913.00	-----	406,894.40
South Carolina.....	714,690.00	-----	217.0	950,827.90	426,170.03	-----	218,955.88
Texas.....	2,848,838.00	481,090.00	341.9	4,838,376.76	2,086,311.42	-----	305,671.99
Utah.....	45,900.00	-----	29.1	113,237.37	45,900.00	-----	2,202,059.34
Washington.....	735,592.14	-----	201.5	1,844,920.20	716,902.75	-----	67,337.37
Total.....	35,331,175.01	9,766,446.75	3,826.9	48,057,691.91	21,310,555.48	1,097,941.09	25,649,165.34



## NATIONAL FOREST ROAD CONSTRUCTION

The national forests in several States are very extensive. They are interposed between centers of population. The State routes, and the Federal-aid and United States highways superimposed on them, must traverse forest areas and are coincident with a large part of the forest-highway system. The approved forest-highway system includes over 20,000 miles, of which 37 percent are on the Federal-aid system and over 38 percent are parts of State routes not included in the Federal-aid system, leaving only about 25 percent of the highways not included in general-use road systems.

Forest-highway development has closely paralleled that of State highways in the States in which the national forests are located. Early activities consisted primarily of grading, draining, and surfacing with local materials such as clay-bound gravel and crushed stone or gravel. Constant increase in traffic has required the placing of more and more crushed-stone surfacing. Dusty surfaces are no longer tolerated by motorists and both new and old surfaces have been given some form of bituminous treatment.

Construction of forest roads has been followed by recreational use and traffic generated by the development of resources in and adjacent to the forests to a much greater extent than was anticipated when the work was begun. The resulting benefits have been clearly demonstrated and the system has been considerably expanded—3,000 miles in the last year. Much of this expansion has been in newly acquired forest areas, particularly in the Eastern States.

The broad, smooth-surfaced forest highways that now accommodate transcontinental and inter-State traffic in the Western States and millions of tourists seeking recreation among scenic surroundings in both Eastern and Western States are as superior to the pioneer roads that first penetrated forest areas as present-day motor vehicles are to those of the earlier day. Forest roads are being located and built so as to preserve the scenic beauties of the forests, construction scars are removed by sodding, seeding, and placing checks on washes. Methods are being developed to control erosion on slopes. Aesthetic features are preserved and emphasized as a part of construction operations. For the convenience of traffic, mountain passes on transcontinental routes through the forests are kept free of snow.

The two principal classes of forest roads are designated, respectively, forest highways and forest-development roads. The latter, as the name implies, serve primarily for the development of the forests; the former are roads of a higher order of traffic importance, generally those joining sections of the Federal-aid or State highway systems outside of the forests, or important community-service roads requiring improvement generally more expensive than that required on forest-development roads.

In the main, the work supervised by the Bureau is limited to the construction of forest highways; forest-development road work is generally administered by the Forest Service. But, while this definition of the work of the two Bureaus is approximately correct, the exact line of separation is drawn between what are termed major and minor projects. Major projects, administered by the Bureau, include all projects in 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. Those forest-development road projects of estimated average cost greater than \$5,000 per mile and those requiring technical services are also classed as major projects.

Forest-road work has been carried on in recent years under authorizations of \$10,000,000 for each of the fiscal years 1935-37 and \$14,000,000 has been authorized for each of the fiscal years 1938-39.

Highways costing \$7,014,890 were completed during the year and projects estimated to cost \$7,715,691 were placed under construction. At the close of the year \$6,208,594 was involved in work under construction, \$3,074,158 in maintenance and surveys, \$9,087,439 was available for new projects, and \$411,850 for miscellaneous items.

Near the end of the year the Agricultural Appropriation Act appropriated \$5,500,000, this being the unappropriated balance of the authorization for the fiscal year 1937, and also \$7,000,000 of the \$14,000,000 authorized for the fiscal year 1938.

In accordance with requirements of the governing rules and regulations a system of forest highways has been designated by concurrent action of the several State highway departments, the Forest Service, and this Bureau and approved by the Secretary of Agriculture. Also, as required by the rules and regulations, the highways constituting this system have been classified as follows:

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

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

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

The roads which, according to these definitions, had been classified as forest highways had an aggregate length on June 30, 1937, of 20,255 miles, classified as shown in table 27.

TABLE 27.—Classification of the mileage of the forest-highway system at end of fiscal year 1937

	Class 1	Class 2	Class 3	Total		Class 1	Class 2	Class 3	Total
Western:	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	Eastern—Cont.	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alaska.....			378.8	378.8	Maine.....			11.0	11.0
Arizona.....	323.5	288.2	448.3	1,060.0	Michigan.....	466.7	283.8	274.4	1,024.9
California.....	617.9	1,302.0	528.2	2,448.1	Minnesota.....	179.4	217.8	207.4	604.6
Colorado.....	533.0	1,163.0	94.0	1,790.0	Mississippi.....	32.0	13.0	69.7	114.7
Idaho.....	721.2	165.3	191.5	1,078.0	Missouri.....	426.2	160.1	247.3	833.6
Montana.....	666.0	286.8	231.0	1,183.8	Nebraska.....			28.8	28.8
Nevada.....	104.7	282.4	73.4	460.5	New Hamp- shire.....	40.9	92.1	41.7	174.7
New Mexico.....	164.0	518.0		682.0	North Carolina.....	102.0	105.3	48.3	255.6
Oregon.....	718.5	344.8	304.4	1,367.7	Oklahoma.....	31.5		70.5	102.0
South Dakota.....	227.0		86.0	313.0	Pennsylvania.....	134.0	250.9	39.0	423.9
Utah.....	191.4	471.4	67.2	730.0	Puerto Rico.....			21.0	21.0
Washington.....	401.8	123.1	246.8	771.7	South Carolina.....		26.0	27.0	53.0
Wyoming.....	387.3	37.0	217.7	642.0	Tennessee.....	131.6	133.6	80.2	345.4
Total.....	5,056.3	4,982.0	2,867.3	12,905.6	Texas.....			35.0	35.0
Eastern:					Vermont.....	32.7	43.2	58.6	134.5
Alabama.....	4.0		31.0	35.0	Virginia.....	79.0	127.9	210.0	416.9
Arkansas.....	274.6	310.3	44.6	629.5	West Virginia.....	137.0	182.0	62.0	381.0
Florida.....	39.7	134.9	36.3	210.9	Wisconsin.....	85.7	177.0	206.9	469.6
Georgia.....	92.0	54.8	58.5	205.3	Total.....	2,588.8	2,767.6	1,992.8	7,349.2
Illinois.....	192.7	27.5	48.7	268.9	Grand total.....	7,645.1	7,749.6	4,860.1	20,254.8
Kentucky.....	41.0	58.0	13.0	112.0					
Louisiana.....	66.1	369.4	21.9	457.4					

During the year improvements were completed on 139 miles of the forest-highway system, exclusive of work done in further improving surfaces previously placed, bringing the total mileage improved to date with Federal funds to 6,592.7 miles. Of the mileage improved during the year, 108.6 miles were in the Western States and Alaska, and the remaining 30.4 miles were in the forests of 19 Eastern States. Of the total mileage improved to date, 5,983.2 miles are in the West and 609.5 miles are in the East.

The mileage of forest highways completed during the year and to date, by States, is shown in table 28.

TABLE 28.—Mileage of forest highways completed during the fiscal year and total completed to June 30, 1937

State	During 1937	Total to June 30, 1937	State	During 1937	Total to June 30, 1937
Western:	<i>Miles</i>	<i>Miles</i>	Eastern—Continued	<i>Miles</i>	<i>Miles</i>
Alaska.....		240.9	Georgia.....		21.0
Arizona.....	10.0	570.4	Illinois.....	3.2	4.7
California.....	12.2	784.1	Kentucky.....	.1	.1
Colorado.....	15.0	532.2	Michigan.....	7.2	50.5
Idaho.....	18.0	687.9	Minnesota.....		113.0
Montana.....		595.0	Missouri.....		8.1
Nevada.....	16.1	173.8	Nebraska.....		8.7
New Mexico.....		304.8	New Hampshire.....	12.0	25.2
Oregon.....	19.1	999.3	North Carolina.....		50.9
South Dakota.....		61.2	Oklahoma.....		16.1
Utah.....	5.5	352.2	Pennsylvania.....	2.1	9.2
Washington.....	6.8	322.8	South Carolina.....		17.6
Wyoming.....	5.9	358.6	Tennessee.....	2.3	45.4
Total.....	108.6	5,983.2	Virginia.....		22.9
Eastern:			West Virginia.....	2.5	8.7
Alabama.....		5.1	Wisconsin.....	1.0	15.7
Arkansas.....		125.0	Total.....	30.4	609.5
Florida.....		61.6	Grand total.....	139.0	16,592.7

<sup>1</sup> Changes in forest highway system resulted in dropping from the system 12.7 miles of highway previously surfaced.

Tables 29 and 30 show the mileage of highways under construction and completed at the close of the fiscal year, segregated by types of construction and by States.

TABLE 29.—Mileage of forest highways under construction, June 30, 1937

State	Graded and drained	Traffic-bound surfaces of miscellaneous materials	Water-bound macadam	Bituminous surface treated	Low-cost bituminous mix	Bituminous macadam	Portland cement concrete	Bridges	Total
Western States:	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Alaska.....	0.9	15.9						0.5	17.3
Arizona.....	26.9	11.1		13.3					51.3
California.....	39.7	11.1		21.1	14.3			( <sup>1</sup> )	86.2
Colorado.....		2.2						( <sup>1</sup> )	2.2
Idaho.....	27.0	12.1			23.2			.2	62.5
Montana.....	16.7			21.5				( <sup>1</sup> )	38.2
Nevada.....	7.5			16.1					23.6
New Mexico.....		3.3							3.3
Oregon.....	9.7	7.8		23.2	37.1		0.2		78.0
South Dakota.....					7.1				7.1
Utah.....		6.5							6.5
Washington.....	11.8	1.2					.1		13.1
Wyoming.....	2.6	12.5							15.1
Total.....	142.8	83.7		95.2	81.7		.3	.7	404.4
Eastern States:									
Arkansas.....	.2	2.5						.1	2.8
Florida.....								.1	.1
Georgia.....								( <sup>1</sup> )	( <sup>1</sup> )
Kentucky.....								( <sup>1</sup> )	( <sup>1</sup> )
Michigan.....		6.3							6.3
Minnesota.....	11.8	3.0			6.8				21.6
Nebraska.....	6.5								6.5
New Hampshire.....			2.8					( <sup>1</sup> )	2.8
North Carolina.....		3.2							3.2
Oklahoma.....		.3							.3
Pennsylvania.....						1.5			1.5
South Carolina.....				.4					.4
Wisconsin.....	2.8								2.8
Total.....	21.3	15.3	2.8	.4	6.8	1.5		.2	48.3
Grand total.....	164.1	99.0	2.8	95.6	88.5	1.5	.3	.9	452.7

<sup>1</sup> Less than 0.1 mile.

TABLE 30.—Completed forest highways by types, by States as of June 30, 1937

State	Graded and drained	Sand-clay	Traffic-bound surfaces of miscellaneous material	Bituminous surface treated	Low-cost bituminous mix	Bituminous macadam	Portland-cement concrete	Bridges	Total
	Miles	Miles	Miles	Miles	Miles	Miles	Mues	Miles	Miles
Western States:									
Alaska	238.4							2.5	240.9
Arizona	216.1		290.3	24.6	15.4	23.3		.7	570.4
California	252.6		184.1	253.8	91.1			2.5	784.1
Colorado	153.6		229.0	32.8	116.6			.2	532.2
Idaho	297.3		289.6		98.8		.1	2.1	687.9
Montana	196.2		255.5	16.1	125.2			2.0	595.0
Nevada	44.3		51.4	16.1	61.9			1.1	173.8
New Mexico	45.8		202.3	3.3	53.3			.1	304.8
Oregon	179.5		632.0	134.1	35.1	14.6	.1	3.9	999.3
South Dakota			47.7	5.9	7.6				61.2
Utah	134.4		166.2	22.1	28.9			.6	352.2
Washington	320.7							2.1	322.8
Wyoming	42.5		249.9	66.1				.1	358.6
Total	2,121.4		2,598.0	574.9	633.9	37.9	.2	16.9	5,983.2
Eastern States:									
Alabama			5.1						5.1
Arkansas	98.3		26.1					.6	125.0
Florida		4.3		26.6	29.8			.9	61.6
Georgia	11.0		9.9					.1	21.0
Illinois			4.7						4.7
Kentucky								.1	.1
Michigan			50.5					(1)	50.5
Minnesota	34.7	3.4	53.1	12.6	9.1			.1	113.0
Missouri			8.1						8.1
Nebraska	8.7								8.7
New Hampshire				25.1				.1	25.2
North Carolina	14.2		6.6	30.1				(1)	50.9
Oklahoma	.8		15.3					(1)	16.1
Pennsylvania				1.8		7.4			9.2
South Carolina				15.6					15.6
Tennessee			47.4						47.4
Virginia	3.5		2.3	10.6		6.5		(1)	22.9
West Virginia	2.5		2.6	3.6				(1)	8.7
Wisconsin	1.5		14.2						15.7
Total	175.2	7.7	245.9	126.0	38.9	13.9		1.9	609.5
Grand total	2,296.6	7.7	2,843.9	700.9	672.8	51.8	.2	18.8	6,592.7

<sup>1</sup> Less than 0.1 mile.

Recent construction has closed gaps in important State and Federal-aid highways and provided access to additional recreational areas.

Forest highways now nearing completion that will be important traffic arteries are: In Montana, the Yellowstone Trail and the Clark Fork Highway; in Oregon, the Willamette, the North Santiam, and the Columbia River Highways; in Washington, the Stevens Pass and the Randle-Yakima Highway; in Arizona, the Oak Creek and the Globe-Showlow Highways; in California, the Placerville-Lake Tahoe Highway, the Sonora Pass, and the Mount Shasta-Mount Lassen Highway; in Nevada, the Owyhee River Highway; in South Dakota, the Deadwood-Custer-Hot Springs Highway; in Idaho, the North and South Highway; and in Utah, the Alpine Scenic Highway.

#### ROAD CONSTRUCTION IN NATIONAL PARKS AND MONUMENTS

Funds are available to the National Park Service for the improvement of roads within and approaching national parks and monuments and for parkways. The Park Service selects roads for improvement with these funds and otherwise controls expenditures. Under an agreement of several years' standing surveys are made and construction is supervised by the Bureau of Public Roads.

Systems of roads within and leading to national parks and monuments have been designated for improvement with Federal funds by the Secretary of the Interior. Parkways are being provided to give access to parks or monuments or to become parts of more extensive national parkways that it is expected will be developed. All parkways pass through localities of scenic beauty or historic interest and consist of a road built according to high standards with the adjacent area under Federal control and free of commercial activity except such as may be authorized to accommodate motorists. Lands for parkways have been transferred to Federal control by States and private individuals.

During the year construction was completed on 169 miles of roads of these classes, making a total of 1,293 miles thus far improved. This does not include a considerable mileage of so-called stage-construction work consisting of surfacing roads formerly graded or widening and betterment work.

The mileage completed during the year and the total mileage completed at the close of the year are shown in table 31.

TABLE 31.—Highways completed in or leading to national parks and monuments

Park, monument, or parkway	Completed during 1937	Total to June 30, 1937	Park, monument, or parkway	Completed during 1937	Total to June 30, 1937
	<i>Miles</i>	<i>Miles</i>		<i>Miles</i>	<i>Miles</i>
Acadia.....		12.1	Lassen.....		35.1
Blue Ridge Parkway.....	50.5	50.5	Meriwether Lewis.....		1.9
Bryce Canyon.....		21.7	Mesa Verde.....		20.6
Carlsbad Caverns.....		8.4	Morristown.....	0.9	2.6
Chalmette.....	.5	.5	Mount Rainier.....	8.6	84.0
Chickamauga-Chattanooga.....	7.2	17.6	National Capital Parks.....	.4	5.3
Colonial.....	1.5	12.4	Petersburg.....	1.5	7.3
Crater Lake.....	4.3	57.9	Petrified Forest.....		26.3
Devil's Tower.....		.3	Rocky Mountain.....	8.3	51.4
Fort Donelson.....	2.8	2.8	Scotts Bluff.....	1.0	1.6
Fredericksburg-Spotsylvania.....	6.8	23.2	Sequoia.....		46.1
General Grant.....		6.4	Shenandoah.....		71.6
George Washington Birth-place.....		2.6	Shiloh.....	10.3	10.3
Gettysburg.....	.2	3.1	Vicksburg.....		4.8
Glacier.....	2.3	58.0	Wind Cave.....		15.9
Grand Canyon.....		162.1	Yellowstone.....	37.0	287.8
Great Smoky Mountains.....	11.2	22.9	Yosemite.....	12.2	98.5
Hawaii.....		35.6	Zion.....		18.7
Hot Springs.....		3.5			
Kill Devil Hill.....	1.6	1.6	<b>Total.....</b>	<b>169.1</b>	<b>1,293.0</b>

Work on national-park roads during the year consisted of grading pioneer roads, construction of tunnels, and placing of surfaces ranging from low to the highest types. Much work was done in widening previously constructed surfaces to meet the requirements of increasing traffic. There has been a general increase in traffic on all park roads, the upward trend continuing steadily over a period of years.

Numerous types of bituminous surface are used on national-park roads. Nearly all roads that have been surfaced with crushed rock or crushed gravel have had a light application of bituminous material to settle the dust and hold the surfacing material on the road. This may be followed by a heavier surface treatment, carpet coat, or a bituminous surface that is mixed in place on the road. Still higher types of surfaces used are the bituminous macadam and premixed bituminous concrete.

In the eastern parks most of the surfaces are either bituminous concrete or portland-cement concrete. Table 32 shows the mileage of roads completed to the end of the year by types.

TABLE 32.—Highways completed in or leading to national parks and monuments at end of fiscal year 1937

Park	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.....			4.2		7.9				12.1
Blue Ridge Parkway.....		50.5							50.5
Bryce Canyon.....				21.7					21.7
Carlsbad Caverns.....				8.4					8.4
Chalmette.....							0.5		.5
Chickamauga-Chattanooga.....							7.2		17.6
Colonial.....	2.7		.7				8.8	0.2	12.4
Crater Lake.....	4.1	18.6	1.9	26.4	6.8				57.9
Devil's Tower.....								.3	.3
Fort Donelson.....				2.8					2.8
Fredericksburg-Spotsylvania.....			17.8	5.4					23.2
General Grant.....	6.4								6.4
George Washington Birthplace.....			2.6						2.6
Gettysburg.....				.8		2.3			3.1
Glacier.....	3.5	23.7	30.6					.2	58.0
Grand Canyon.....		.7	7.6	139.1	14.6			.1	162.1
Great Smoky Mountains.....	.2	3.4	15.3	4.0					22.9
Hawaii.....			10.6	9.0	16.0				35.6
Hot Springs.....			3.5						3.5
Kill Devil Hill.....				1.6					1.6
Lassen Volcanic.....			4.7	30.4					35.1
Meriwether Lewis.....				1.9					1.9
Mesa Verde.....				20.6					20.6
Morristown.....		2.6							2.6
Mount Rainier.....	27.1	23.8			27.8			.3	84.0
National Capital parks.....	1.2					4.0		.1	5.3
Petersburg.....	1.3		6.0						7.3
Petrified Forest.....				26.1				.2	26.3
Rocky Mountain.....		6.9	8.1	36.4					51.4
Scotts Bluff.....	1.6								1.6
Sequoia.....	6.3		14.3	25.4				.1	46.1
Shenandoah.....	6.2		12.6	52.8					71.6
Shiloh.....				3.7					3.7
Vicksburg.....		.1				.1	6.6		7.4
Wind Cave.....				15.9			4.6		20.5
Yellowstone.....		48.8	115.3	123.2				.5	287.8
Yosemite.....	25.6		26.3	16.1	14.0	10.0	6.2	.3	98.5
Zion.....				17.6			1.0	.1	18.7
Total.....	86.2	184.1	282.1	599.7	87.1	16.4	34.9	2.5	1,293.0

Bureau activities during the year were continuous in parks and monuments throughout the country. Such parks and monuments as Chalmette, Fort Donelson, Kill Devil Hill, and Shiloh, appear in the list of completed work for the first time. Road construction is also under way in several new parks and monuments.

Road construction in the western park areas has been concentrated on closing of gaps on important routes of the park systems. An outstanding example of this development is the Big Oak Flat Road in Yosemite National Park. Located on the north side of Yosemite Valley and opposite the famous Wawona tunnel and road, this road when completed, will afford a more direct route to the park to traffic coming from the San Francisco district. It leaves the Floor of Valley Road and winds up the side of the mountain to the top where it meets the Tioga Road at Crane Flat and thence leaves the park on U. S. 120 to San Francisco. The Big Oak Flat Road represents difficult mountain construction and excavation on this highway is mostly hard granite. Two short tunnels and one long tunnel are under construction at an estimated cost of approximately \$800,000.

Construction of the Tioga Road is progressing, but a large gap remains to be completed. It is a superb mountain highway through some of the most rugged of the high Sierras, crossing this mountain range at Tioga Pass, at an elevation of nearly 10,000 feet.

In Crater Lake National Park activities have been concentrated on completing the loop around the lake. About 30 miles of the Rim Road are complete and 5 miles are under construction. Funds are available for the completion of the remaining 4-mile gap.

Work is also progressing rapidly on the Stevens Canyon and East Side Highways in Mount Rainier National Park. When completed, these roads will connect Paradise Inn on the west side of the park with the White River area on the east side of the park. When these roads are completed it will be possible for the tourist to drive more than halfway around the famous mountain that gives the park its name.

In Glacier National Park work is progressing on the west side section of the Transmountain Highway. This work consists of widening and improving the road between Belton and Avalanche Creek to the standard of width and surface on the east side of Logan Pass which was completed some time ago.

Landscape work and roadside improvement to heal all construction scars and develop aesthetic features are a primary requirement on all national-park construction. An example of this work is the staining of cliffs on sections of the Walnut Canyon Road to make them more closely resemble the weathered sections which were not disturbed in the construction. The results obtained were highly satisfactory.

In the East the most important development is the rapid progress being made on the parkway program. During the past year about 50 miles of the Blue Ridge Parkway was completed, and about 85 miles was under construction at the end of the year. This parkway, approximately 480 miles in length, is an extension of the Skyline Drive in Shenandoah National Park and follows closely the crest of the Blue Ridge Mountains through Virginia and North Carolina to the Great Smoky Mountains National Park. The Skyline Drive in Shenandoah National Park has one uncompleted gap about 9 miles in length in its entire length of approximately 100 miles. Funds are expected to be provided in the 1938 program for completion of this gap.

Another eastern parkway is the Natchez Trace between Natchez, Miss., and Nashville, Tenn., through Mississippi, Alabama, and Tennessee. This old trail, approximately 460 miles in length, was laid out under a treaty with the Indians in 1801 and was used as a pioneer road between Natchez and Nashville. Just before the end of the year three contracts were let for a length of about 34 miles of this parkway in Mississippi. It is expected that rapid progress will be made on the parkway in the next fiscal year.

Table 33 shows the park and monument highways under construction at the close of the year segregated by types of construction. Most of this work consists of further improvement of roads previously improved.

TABLE 33.—Highways under construction in or leading to national parks and monuments at end of fiscal year 1937, by types

Park	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.....			2.9					0.1	3.0
Blue Ridge Parkway.....		83.4						.1	83.5
Crater Lake.....	5.3								5.3
Fort Matanzas.....				0.5					.5
Fort Pulaski.....								.3	.3
Fredericksburg-Spotsylvania.....						0.2			.2
General Grant.....	4.0								4.0
Gettysburg.....						3.8			3.8
Glacier.....	16.4		3.5	18.6				.1	38.6
Grand Canyon.....			31.9	8.6					40.5
Guilford Court House.....				2.6					2.6
Lassen.....				4.7					4.7
Mesa Verde.....				31.0					31.0
Mount Rainier.....	5.7	7.8		24.1				.1	37.7
Natchez Trace.....	34.1								34.1
National Capital parks.....			.4					.1	.5
Petrified Forest.....			4.8						4.8
Rocky Mountain.....				8.5					8.5
Scotts Bluff.....							1.6		1.6
Shenandoah.....		21.6							21.6
Vicksburg.....								.1	.1
Yellowstone.....	10.0	13.0	13.7	17.8				.1	54.6
Yosemite.....	7.7			11.6				.1	19.4
<b>Total.....</b>	<b>83.2</b>	<b>125.8</b>	<b>57.2</b>	<b>128.0</b>		<b>4.0</b>	<b>1.6</b>	<b>1.1</b>	<b>400.9</b>

The mileage of approach roads completed, under construction and approved for construction is reported in table 34.

TABLE 34.—Location and length of approach roads to national parks and monuments

Road	Park	Approved for construction	Completed	Under construction
		<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Fresno-General Grant.....	General Grant.....	3.6		3.9
Cameron-Desert View.....	Grand Canyon.....	28.1	28.1	
South Approach.....	do.....	52.3	52.3	
Jacobs Lake-North Rim.....	do.....	31.2		31.2
Mineral-Lassen.....	Lassen.....	8.8	14.1	4.7
Sequoia-General Grant.....	Sequoia-General Grant.....	13.5	13.5	
Custer-Wind Cave.....	Wind Cave.....	8.6	8.6	
Southwest Approach.....	Yellowstone.....	13.9	13.9	
Moran-Yellowstone.....	do.....	24.0	5.9	
Red Lodge-Cooke City.....	do.....	59.6	59.6	
East Approach.....	do.....	23.0		13.8
Zion-Bryce Canyon.....	Zion-Bryce Canyon.....	35.0		
Total.....		301.6	186.0	53.6

<sup>1</sup> Completed as a forest-highway project.

At the close of the year the total park-road work completed amounted to approximately \$50,800,000. Work under construction is estimated to cost approximately \$17,350,000. Additional construction is planned that is estimated to cost \$1,900,000.

### INTER-AMERICAN HIGHWAY

Work on the Inter-American Highway has continued with increased momentum during the year. Impassable gaps have been reduced to about 560 miles. The building of this highway through Central America to Panama City is important to the United States politically, socially, and economically. Politically, it cements the friendship between the United States, Mexico, the republics of Central America, and Panama, so important to the welfare of all. Socially, it will educate Americans in totally different ancient and tropical civilizations, and give them a new field for vacationing and touring.

But economically, the benefits are greatest of all; for efficient communication with Central America will bring us a new market for our manufactures and natural products and, at the same time, supply us with tropical products, such as bananas and other fruits, coffee, rice, sugar, drugs, oils, rubber, spices, and various useful plants, as well as with hardwoods, like mahogany, and minerals and semiprecious stones. Development of these resources and commerce awaits only transportation; and the present year has removed many of the worst obstacles on this highway and construction is proceeding rapidly on different important projects along the route.

Cooperation with the countries to the south in furtherance of the Inter-American Highway began under congressional authorization in 1928. The first substantial contribution by the United States toward a highway was the completion of a reconnaissance survey in 1933, made by the Bureau at the request of the Department of State. The report, issued in 1934, describes a feasible route extending from Nuevo Laredo on the Texas border to Mexico City and the southern border of Mexico, thence along the Pacific slope through Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, to Panama City in Panama. It passes through the capital of each country excepting Honduras, which has a connecting road to the capital.

During the year the United States has assisted in the construction of bridges that remove major obstacles to development of the route. This was made possible by the authorization of \$1,000,000 made in 1934 for cooperation in the survey and construction of the highway. Under cooperative agreements with three of the Central American republics, materials, machinery, and technical direction are being supplied for the construction of nine bridges and labor and local materials are being supplied by the countries concerned. Fabricated steel is being supplied for two additional bridges in Panama. The Government of Panama will build the necessary piers and abutments and erect the bridges.



In addition to these bridges there are being built or planned under the present appropriation, a 25-mile section of road between Cartago and San Marco in Costa Rica, a 15-mile section between Tipitapa and Las Maderas River in Nicaragua, and another 15-mile section between Asuncion Mita in Guatemala and the frontier of El Salvador. Equipment and materials for culverts are being furnished by the United States.

The three largest bridges being built, the Tamazulapa in Guatemala, the Chiriqui in Panama, and the Choluteca in Honduras, are practically completed. Contracts have been let for the Amatal and Tahuapa Bridges in Guatemala, the Platanar Bridge in Panama, and the Rio Grande, Esteli, and Maderas Bridges in Nicaragua, all of which are expected to be completed within a few months. The structural steel has been delivered from the United States to Panama and is in storage there for the Chirigaqua and San Cristobal Bridges, that are to be built by the Panama Government after the rainy season.

The Republic of Panama, in return for assistance in bridge construction has agreed to complete the route in that Republic in the immediate future. The Governments of Honduras, El Salvador, and Guatemala are making excellent progress on sections of the highway. The section of the highway from the Texas border to Mexico City, completed last year by Mexico, is already carrying a large volume of tourist and business traffic and is an indication of what may be expected when the entire route is completed.

The total length of the highway will be 3,250 miles. The present condition is as follows: 1,265 miles of all-weather roads, mostly paved or being paved (including 765 miles from Nuevo Laredo to Mexico City and 300 miles from Panama City to David, both important to the United States as contiguous to Texas and the Canal Zone); 1,425 miles of dry-season roads, mostly impassable during the rainy season; and 560 miles of trails, impassable to wheeled vehicles at any time.

## TRANSPORTATION, ECONOMIC, AND STATISTICAL INVESTIGATIONS

### HIGHWAY-PLANNING SURVEYS

By the Hayden-Cartwright Act of 1934 and subsequent legislation the Secretary of Agriculture is authorized to approve allotment of not to exceed 1½ percent of the amount of Federal highway funds apportioned for any year to be used for surveys, plans, and engineering and economic investigations of projects for future construction.

Realizing the need of facts of many kinds as a basis for the planning of future construction programs in all States, the Bureau in 1935, proposed that the expenditure thus authorized be devoted to the conduct of comprehensive fact-finding surveys. The proposal has since been adopted by one State after another and the State-wide, highway-planning surveys, as they are called, are now in progress in all States with the exception of Connecticut, Delaware, Mississippi, New Jersey, and New York.

The surveys consist of a number of related studies the object of which is to determine the present state of the whole rural highway system, to rate the service rendered by all parts of the system, and to make possible a selection of that part of the whole system which, by reason of its relative importance and absolute utility, merits inclusion in future improvement plans. The surveys also aim to assemble the facts necessary for an estimate of the ultimate cost of building and maintaining the economically necessary improved highway system; and finally to make possible the establishment of a definite, economically, and socially defensible, integrated highway-improvement program in all States.

In order that the facts shall be collected in the various States on a comparable basis, all the surveys follow a general plan developed by the Bureau, which has assigned to each State a representative to maintain contact between the Bureau and the State survey organization.

Field work on three phases of the surveys (road inventory, traffic surveys, and financial and road-use surveys) has been practically completed in most of the States. The field work of the road inventory, by means of which complete records of all existing roads will be obtained, together with a determination of their conditions and the property they serve, has been completed in 31 States in which there is an aggregate road mileage of 2,035,067. In 9 States, with an estimated road mileage of 598,151, the mileage inventoried up to June 30 was 468,962. County base-map tracings are being prepared as a basis for State maps which will for the first time give a complete picture of our road system. Of the county base

maps for the 40 States, 13.5 percent were complete, and an additional 20.5 percent were under way at the end of the year.

The States which have completed the field work on the traffic survey and the financial and road-use surveys are now tabulating and analyzing the great mass of data that has been collected. The traffic surveys have produced information as to the character and volume of traffic on each section of highway, from which the relative importance of each highway may be determined. In the financial and road-use surveys studies have been made of the sources of highway revenue, the purposes for which it is spent, the extent to which rural and urban residents contribute to the cost of each class of road, and the amount of benefit they derive by travel upon each class.

The surveys also include a determination of the life of surfaces, grades, and structures built on the State highway systems in the past, so far as the records permit, to the end that a more dependable estimate may be made of the average term over which future capital investments must be amortized.

At all grade crossings of highways and railroads the facts of physical condition and density of rail and highway traffic are being determined to facilitate establishment of a priority list of crossings to be abolished or protected. At selected places other studies are being made to determine the ability of motortrucks and tractor-trailer combinations to surmount grades of various steepness in order to ascertain what needs to be done to alter the present designs of highway or vehicles, or both, to prevent slow-moving freight vehicles from obstructing other traffic.

#### SAFETY RESEARCH

Under authority of the act approved June 23, 1936, a series of research projects in highway safety was conducted, in cooperation with the Highway Research Board of the National Research Council. Particular attention was given to three phases of the problem:

1. Uniformity of State motor-vehicle laws.
2. Improvement of basic data, particularly accident reporting needed for the study of accident causes and prevention.
3. The characteristics and habits of drivers, including the identification of dangerous drivers.

A preliminary report was made to Congress on March 23, 1937, and a final report was nearing completion at the close of the year. The report will recommend—

1. That appropriate steps be taken to effect greater uniformity of motor vehicle and traffic laws, especially in essential details. Diverse traffic regulations make the driver who has formed his driving habits in one locality a frequent though involuntary lawbreaker when he leaves his own community.
2. That uniform minimum standards be developed for methods of obtaining facts regarding the occurrence of accidents and the attendant circumstances, and for methods of analysis that will more exactly recognize and interpret the facts.
3. That a careful study be made of inspectional services as a means of assuring safe condition of cars in operation. Since many drivers do not know the limitations of their vehicles or of their own sensory reactions, it is of paramount importance that brakes and lights, at least, be kept in first-class condition.
4. That studies be made to determine whether and to what extent highway-patrol organizations may be expanded to advantage.
5. That further continued research be made in several lines related to highway safety.

The possibility of identifying applicants for drivers' licenses who are liable to come within the accident-prone class of drivers has been given limited study, and this highly important work should be continued.

#### MAINTENANCE COST STUDIES

Agreements with the State Highway Departments of Connecticut, New Hampshire, and Rhode Island for a study of highway-maintenance costs in relation to traffic volume were renewed for the third year. Traffic records were obtained for 31 sections of highway in Connecticut, 52 sections in New Hampshire, and 102 sections in Rhode Island. A detailed inventory of all these sections was nearly completed. Detailed maintenance costs on the same sections are being kept by the States.

The objective of this study is to determine highway costs for different types of road surface in relation to traffic carried. Due to certain nonperiodic or infrequent items of maintenance cost no conclusions can be attempted until the records have been kept for a period of at least 5 years.

**TRAFFIC-CAPACITY STUDIES**

Studies of the speed of vehicles in relation to traffic density and highway capacity were continued. Analysis of available traffic records raised many questions which require additional field data for their solution, and arrangements were made for securing these through the highway planning survey organization.

Typical questions are: Can we conceive of the absolute capacity of a highway or must capacity be defined in terms of speed? How are capacity and congestion related? What is congestion? How do individual vehicle-speed differences affect capacity?

**NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY**

The Bureau continued its cooperation with the executive committee of the National Conference on Street and Highway Safety. Copies of the Uniform Vehicle Code and other literature prepared by the conference were widely distributed to legislative promotional groups and others. The pamphlet Guides to Traffic Safety, originally prepared by the executive committee of the conference in 1934, was revised and reissued by the Bureau. Plans were made for a second printing of the Manual on Uniform Traffic Control Devices for Streets and Highways, prepared in 1935 by a joint committee representing the National Conference on Street and Highway Safety and the American Association of State Highway Officials.

**AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS**

The Bureau has actively cooperated in the work of the American Association of Motor Vehicle Administrators, which has undertaken an intensive research and educational program to advance uniformity in legislation, reciprocity, and highway safety. To the association belongs a fair share of the credit for the enactment in 1937 of what is probably the largest number of uniform traffic laws ever adopted by the States in a single year. Under an agreement with the association, a member of the Bureau staff is serving as its executive secretary.

**ESTIMATING HIGHWAY TRAFFIC VOLUME**

Further studies have been made toward a solution of the problem of traffic sampling. Estimates of highway traffic based on a variety of schedules of sample counts have previously been compared to determine the most efficient schedules, considering both cost and reliability of results. During the year attention has been given to hourly, daily, and seasonal variations, in relation to reliability of estimates. The results of the earlier studies were reported at the annual meeting of the Highway Research Board in November 1936.

**RAILROAD-LINE ABANDONMENT STUDIES**

During the year the records, since 1920, in the proceedings before the Interstate Commerce Commission for certificates of convenience and necessity permitting the abandonment of the whole or portions of railroads to the number of 1,088 were examined and statistical data abstracted from them. These cases included the abandonment of 16,734 miles of railroad. The statistical data abstracted consisted principally of the mileage involved in each case; the investment in property; population affected; passengers and commodities carried; high and low tonnage and operating deficits for the last 5 years of operation; the purpose for which the lines were originally constructed; causes leading to their abandonment; and other pertinent data. These data relate to cases in California, Kansas, Michigan, Pennsylvania, and Wisconsin.

The purpose of this study is first to develop the pattern of railroad abandonments in each State, especially in its relation to the pattern of heavy-duty rails or main lines; then to establish a significant series of surrounding characteristics like population density, traffic density (passenger and freight), operating income or deficit exhibited by the lines abandoned, particularly when highway competition has been a principal or contributing cause. With such a series of gages available, it will next be possible to examine the probable trend of future abandonments, and the extent to which highway planning must take account of the eventual substitution of highway transport for branch-line feeders of the railroads.

## HIGHWAY-MANAGEMENT AND PRODUCTION COST STUDIES

For a number of years the Bureau has conducted field studies of the efficiency of methods of highway construction. Detailed time studies were made of each operation in grading and in constructing the various types of surface. These data were analyzed to set up standards against which a contractor might compare his own operations and determine their efficiency.

While the Bureau was administering a greatly enlarged program of emergency highway construction the personnel engaged in efficiency studies was drawn upon to a considerable extent for special assignment on emergency work, particularly to collect data on highway employment and to analyze the data collected.

The production-cost studies thus interrupted were resumed during the year and on completion of current studies this work will be concluded.

### PHYSICAL RESEARCH

For a number of years the research work of the Bureau has been carried on principally at the research station of the Department at Arlington, Va. It has been known that the land occupied would eventually be taken for other Government use and this has precluded the construction of permanent laboratories or undertaking experiments requiring a fixed location for a period of years.

This situation is now to be corrected by the construction of a permanent research station at Abingdon, Va. on the Mount Vernon Memorial Highway, 2 miles from Washington. Plans have been completed for laboratories that will adequately house the testing and research work of the Bureau and there is ample space for outdoor testing work. Funds authorized in 1931 and in 1934 have been partly used for purchase of land and preparation of plans. Remaining funds with additional authorizations made during the last session of Congress are sufficient to complete the buildings. Bids will be called for and work begun early in the new fiscal year.

### SUBSURFACE EXPLORATION

Previous reports have described two methods developed by the Bureau of determining the distance from the ground surface to rock—an important matter in selecting locations for highways and bridges. In the seismic method the distance is determined by exploding blasting caps in the ground, measuring the time of travel through the ground of resulting sound waves, and making suitable calculations. In the resistivity method, measurements are made of the resistance to transmission of electrical currents through the ground. Since the electrical resistance of rock is different from that of soil its presence can be detected and the distance below the surface calculated.

Studies of the application of these methods to various highway problems have been continued. During the year a fairly comprehensive series of tests were made with the seismic method in Oregon, Washington, and California, on highway projects where heavy grading was in progress or contemplated. Excavations at locations where tests were made are yielding information concerning the accuracy and general value of such explorations. Considerable interest in these demonstrations was manifested by those who witnessed them. The data obtained demonstrate the practicability of the application of the seismic method to field problems. Data obtained with the electrical-resistivity method in the same tests give added information concerning the utility and limitations of this method.

At the request of the Department of the Interior a proposed dam site in Montana was explored by the seismic method and arrangements have been made to cooperate with the War Department on similar work in some of the Eastern States.

Improvements have been made in both the seismic and the resistivity instruments and in the operating technique and field procedure.

### MOTOR-VEHICLE IMPACT INVESTIGATIONS

Having established rather definitely the magnitude of the impact forces of vehicle wheels on pavements, all effort has been concentrated on the study of the elastic behavior of concrete when acted upon by comparable static and impact forces. The data furnished by the tests made provide fundamental information that is needed for the development of rational methods of pavement design. The work is necessarily slow and painstaking. With the special testing equipment designed and built for this research many thousands of observations have been made.

This research correlates with that which is being conducted to throw light on the design of both rigid and flexible road surfaces.

**MEASUREMENT OF ROAD-SURFACE ROUGHNESS**

Road smoothness is important to the comfort of every user of the highway and, because roughness creates impact, it has significance in the design and maintenance of surfaces. Many devices have been proposed for measuring in some way this important property. Probably the most widely used is one developed by the Bureau a number of years ago, a mechanical device attached to the front axle of an automobile and recording vertical movement in figures on a dial on the dashboard. In its present form the device has certain recognized weaknesses. The efforts toward its improvement, mentioned in last year's report, are being continued. A new model has been designed and will be built for study.

**INVESTIGATION OF CONCRETE-PAVEMENT DESIGN**

This comprehensive research into the structural action of concrete-pavement slabs has been described in preceding annual reports. During the year a fourth report has been published. This report concerns the structural action of joints. It has stimulated a widespread interest in the design of this important feature of concrete pavements, and, as a result, many new designs are being developed in an effort to apply the principles suggested by this research. The extent to which the information made available by these reports is being studied and put to practical use by those interested in better pavement design is most encouraging. The final major report on this investigation is nearing completion.

This research indicated the necessity for short slabs for the proper control of stresses in plain concrete pavements. Short slabs mean frequent transverse joints and because of the cost and difficulties of installation of such joints there is some reluctance to adopt short slabs as standard design. Through the proper use of steel reinforcement it may be possible to increase the distance between constructed joints and still maintain a control over pavement stresses and the Bureau has planned an experimental project, in cooperation with the Indiana Highway Commission, in which this possibility will be investigated. Arrangements are being made to place various amounts of steel in slabs of various lengths in a regular paving project. Observations of the structural behavior of these sections in service should indicate the extent to which it is desirable to increase slab lengths by this means.

**INVESTIGATION OF CORRUGATED-METAL CULVERTS**

The study of the erosion test for bituminous-coated corrugated-metal culvert pipe has been continued. The desirability of having a better abrasive for this test was mentioned in the last annual report. During the year experiments have been made with an abrasive charge made up of cubes of portland-cement mortar, fabricated and cured under careful control. The results thus far obtained indicate a marked improvement in the consistency of test results when the new abrasive is applied. A study of the effect of using various sands in making up the mortar cubes is being made.

**FLEXIBLE-PAVEMENT DESIGN**

The study of the general problem of the structural design of highway surfaces of the nonrigid type, such as gravel and macadam, has been continued and some progress has been made. A review of the reports resulting from researches, particularly those in foreign countries, has been completed. A study has been made of a dynamic method of testing developed and used in Germany, with particular reference to its possible use in this investigation. A report is being prepared that gives the status of present knowledge in this general field. The development of special apparatus for use in this investigation is being continued.

**INVESTIGATION OF SUPPORTING STRENGTH OF FLEXIBLE CULVERT PIPE IN EARTH EMBANKMENTS**

Pipe culverts of various types and materials are used extensively in highway construction. Until several years ago, the strengths of these culverts were specified arbitrarily without much reference to the load that they would have to carry in the embankment because methods of calculating this load were not known. As a result of cooperative study by the Bureau and the Engineering Experiment Station of Iowa State College, a method was developed for designing rigid culvert pipes, such as concrete and cast iron, that made it possible to design pipe so as to avoid breakage and expensive replacement.

Culvert pipe may be divided structurally into rigid and flexible types. The rigidity of the pipe has a controlling influence on its design. For a complete

solution of the problem, it is therefore necessary to devise methods of designing flexible pipes as well as rigid pipes.

The Bureau is now also engaged with that station in studying this phase of the problem. The behavior of pipes in actual fills is being studied in conjunction with laboratory and analytical studies for the purpose of producing a rational design procedure for flexible pipe.

#### INVESTIGATION OF BRIDGE FLOORS

Empirical rules are now used to a great extent in designing highway bridge floors because of the absence of accurate analyses of the problem. These rules are based upon meager experimental data and many questionable assumptions have to be made in applying them to the types of bridge floors generally used. The result is a serious lack of accurate knowledge of the behavior of bridge floors under traffic and much confusion among bridge engineers as to methods of design.

Several years ago the Bureau made a start in the rationalization of the design of bridge floors by mathematically analyzing the simplest case—that of a wide concrete slab on rigid supports subjected to truck-wheel loads. This has permitted more accurate design of floors of this type but the conditions in most bridge floors do not correspond closely to the ones assumed. To eliminate the present uncertainties in floor design, it is necessary to make theoretical analyses of the various types of floor in use and to verify these analyses by observing the performance under loads of actual floors of the same types.

Work of this character is being conducted cooperatively by the Bureau, the University of Illinois, and the Illinois Division of Highways. The cooperative work was started in 1936 and considerable progress has been made in mathematical analyses and preparing for the experimental part of the program.

The results of this investigation will have direct application to practically all modern highway bridges and will result in more accurately designed structures.

#### PORTLAND CEMENTS, AGGREGATES, AND CONCRETE

During the last few years it has become evident that chemicals such as calcium chloride and sodium chloride, when used for melting ice on concrete pavements, may cause severe scaling of the surface of the pavement. This has become a serious problem in certain of the Northern States where ice frequently forms on pavements and steps must be taken to prevent skidding. Experiments conducted in New York indicate that when a certain amount of portland cement is replaced by natural cement in making concrete, a surface considerably more resistant to this action is produced. During the year the Bureau has conducted a large number of laboratory tests to determine the effect of using this blended cement on the strength, elasticity, volume change, and other characteristics of concrete. Numerous tests on concrete containing portland cements of different chemical composition with and without a natural cement blend have been made to determine the comparative resistance to freezing and thawing in a solution of calcium chloride. These tests were made on samples of concrete taken from concrete roads constructed in New York during the last 3 years.

The results so far indicate that the resistance of the surface of the concrete to the action of calcium chloride and sodium chloride can be materially increased by the use of a blend consisting of about 85 percent of portland cement and 15 percent of natural cement by weight. They also indicate that, so far as may be determined from laboratory tests covering a period of 1 year, the strength and other properties of the concrete are not seriously affected by the use of the blend.

The Los Angeles abrasion test, to which reference was made last year, has been given further study, particularly to correlate results of the tests with service behavior.<sup>1</sup> The test is applicable to various types of aggregates, such as crushed stone, gravel, and blast-furnace slag; and a large number of determinations, covering a wide range in quality, have been made on each of these types. In this connection tests have been made to correlate the results of the Los Angeles abrasion test with an accelerated service test in the laboratory, in which the aggregate is subjected to the action of a roller in a manner similar to the action of a road roller in the field. The tests made indicate that the Los Angeles test measures the ability of an aggregate to resist crushing under a roller considerably better than do the tests that have previously been used for this purpose.

Work was continued during the year on an extensive series of tests to determine the relative efficiency of several methods of curing concrete. The various pro-

<sup>1</sup> The Los Angeles test is used to determine the suitability of rock, gravel, and slag for use in highway construction. A given weight of pieces of the material is placed in a metal drum, together with steel balls, and the drum revolved 500 times. The amount of material worn away from the pieces is an indication of quality.

cesses are evaluated on the basis of comparative strength and water retention of concrete specimens to which the curing agent has been applied. These tests are being conducted under controlled temperature and humidity conditions and include 22 different methods of curing. The work so far indicates the extreme importance of applying wet burlap or some similar material to the concrete immediately after placing, regardless of the curing agent used later.

A report giving the results of the Bureau's latest studies of high-frequency vibration in placing pavement concrete was published during the year. Tests indicate that present specifications for pavement concrete may be modified to utilize vibration to advantage either by adjusting the proportions to give a slump of about 1 inch with the same net water-cement ratio as used in standard construction, or by adjusting proportions to give the same cement content as is used in standard construction but with a slump of 1 inch instead of 2½ inches. The first alternate should result in a saving of approximately 10 percent in the amount of cement used without sacrificing quality. The second alternate should result in an increased strength of approximately 10 percent as compared with standard methods of construction.

#### BITUMINOUS ROAD MATERIALS

Research on bituminous materials and their uses in road construction has continued along the general lines followed in previous years. It has included the laboratory examination of bituminous road materials and aggregates, field studies of problems in bituminous construction, and cooperative work with the State highway departments and committees of technical organizations in the development of specifications and test methods.

Laboratory studies of the properties of asphalt cements, tars, emulsions, and other liquid asphaltic road materials, are being continued to provide additional information about their physical and chemical properties and to determine those properties that are indicative of quality and service in order that suitable requirements necessary for given conditions may be specified. Constant changes in refinery procedure, affecting as they do the character of the material produced, make continuation of this study necessary.

The cooperation with the Minnesota State Highway Department and the University of Minnesota in a laboratory study of the weathering properties of asphalt cements is being continued.

A field and laboratory investigation of sheet asphalt pavements is being conducted on two projects in the District of Columbia to determine the changes that occur in the asphalt during construction and upon aging in service.

To determine the present condition of asphalts in old pavements and to investigate the changes in various asphalts as they occur under known conditions, a cooperative study has been initiated in Ohio in cooperation with the State highway department. The first phase involves sampling pavements and recovering the bitumen from a number of pavements built since 1931. The second calls for construction of an experimental road in which asphalts from various sources will be used. The effect of exposure in service and of the various phases of construction procedure such as heating, mixing, and laying will be studied.

Laboratory studies of hot and cold bituminous mixtures are being continued to develop methods of testing that will produce uniform results and will be indicators of probable service behavior.

The absolute viscosity of all grades of bituminous materials is being determined as a step toward a more logical and rational classification of the consistency of these materials. The general adoption of absolute viscosity as a measure of consistency would make it unnecessary to follow the present unsatisfactory practice of using different arbitrary tests to measure the consistency of various kinds and grades of bituminous materials.

Several methods of extracting and recovering the bituminous binders from paving mixtures, designed to give residues unchanged by the recovery process, are being studied. The changes occurring in the original bituminous binders during the mixing process, construction, and service, may be successfully observed if these recovery processes are satisfactory. Apparatus with which both bituminous materials and bituminous mixes can be subjected to accelerated weathering is being installed.

A study of the affinity between bituminous materials and mineral aggregates is being made to determine the tendency of certain bituminous-coated aggregates to become uncoated in the presence of moisture.

A circular track, together with other laboratory equipment, is being utilized to investigate the stabilizing effect of various bituminous materials on base courses for bituminous surfaces.

The study of bituminous and nonbituminous joint-filling materials installed on a section of the Memorial Highway to Mount Vernon is being continued. Materials proving unsatisfactory in service are removed and new materials, untried but appearing to have promise, are being installed.

Cooperative experimental roads have been built in Alabama, North Carolina, and Tennessee, to study the use of cotton-fabric reinforcement in bituminous construction and a similar project is being planned in South Carolina. These experiments involve a soil survey of subgrade and base materials, observations of construction, and an accumulated record of maintenance costs and service behavior. On each project, sections identical in character except for the presence or absence of cotton fabric were constructed so that definite information can be obtained relative to the value and limitations of the fabric. Many sections of road have been built by a number of the States with cotton fabric furnished to them under the Department's cotton-diversion program. Reports of construction, maintenance required, and service behavior of all such sections, will be prepared by the States to be assembled later and presented in a symposium on the use of cotton fabric in bituminous construction.

#### SUBGRADE INVESTIGATIONS

A growing appreciation of the value of soil analyses to the designing engineer has caused a large increase in the number of soil samples tested in the Bureau's laboratory in connection with highway construction involving Federal funds. The number of State highway departments regularly using the soil tests advocated by the Bureau has increased and with it the demand for check samples, check tests, and instruction in the technique of soil testing. It is apparent that this service, combined with studies of routine test methods to ascertain the causes of discrepancies in test results obtained by different operators, will become increasingly important in the future. The Bureau will also continue its work in the development of specifications based on subgrade soil tests.

The first of a series of regularly scheduled courses of instruction in soil surveying, sampling, and testing, and in the practical utilization of the information obtained, was held during the year. Formerly these courses have been held as occasion arose and have been attended by representatives of foreign governments, Federal bureaus, State highway departments, universities, and commercial organizations. The increased demand for this instruction necessitated the establishment of scheduled courses for those interested in the study of soils for highway purposes.

Soil mechanics, as related to foundations for bridges and embankments and to the stability of large earth formations, has become more important with increasing knowledge of the subject. A report has been published during the year on the theory of soil consolidation and testing of foundation soils. This report presents as simply as possible the mathematical relationships for expressing stress distributions and, by means of examples, illustrates the practical application of compression-test data. Investigations now in progress with a shear test and a stabilometer for measuring lateral pressure in soils should furnish valuable information on shear slides, the design of safe slopes, and stability in general. A cooperative investigation with the Bureau of Yards and Docks, Navy Department, utilizing data from compression, shear, and stabilometer tests, was helpful in the design of the foundations for a drydock at Mare Island, Calif. Further work in cooperation with the Navy Department has been planned.

Laboratory investigations of the relation between moisture content and the density and stability of soils when compacted in a particular manner have been continued. These tests have a practical significance in the construction of highway embankments, and fills are now being built under specifications based on the method of control suggested by the Bureau. In order to investigate more fully the economic value of moisture control in fill construction, arrangements have been made for the construction of two experimental projects in each of which different methods of compaction will be used. Detailed records will be kept during construction and correlated with service behavior and maintenance cost. In addition, laboratory tests will be made on undisturbed samples of soil from locations where fill failures have occurred. The combined results of these investigations should furnish valuable information on the rational design of embankments.

Roadway drainage and its relation to subgrade stabilization and frost-heave prevention have received much attention in the past. The recent recognition of the existence in soil of water in both the film state and the free state, and the determination of the vastly different properties of water when in the different states have served to explain many observed phenomena of soil-water movement.



Tests have now been developed for measuring the capillary pressure exerted by soils at different temperatures, for measuring the amount of free or drainable water, and for measuring the rate of flow of water through soils to the drains.

Soil stabilization in general, and as applied to the low-cost roads in particular, is one of the most important problems occupying the attention of the Bureau's research staff. Two circular tracks, approximately 35 feet in circumference, have been in operation during the year as a part of the investigation of base-course materials for thin bituminous surface treatments. The track inside the laboratory has been used to determine the influence of grading and plasticity index on the action of sand-clays and sand-clay gravels when used as base courses. The track located outdoors has been used to investigate the value of water-retentive chemicals for maintaining base courses low in plasticity prior to surface treatment. The effect of the chemicals on the physical properties of the base-course materials has also been determined as well as their effect on the bituminous surfacing. Both tracks will be operated continuously during the next year in the study of base-course problems with special reference to chert gravels and quarry screenings and to insoluble binders such as bituminous materials and portland cement for the stabilization of fine-grained soils.

Experimental base courses have been constructed in Nebraska and Minnesota to determine the effect of base thickness as well as grading and plasticity index.

A light truck has been equipped as a field laboratory and is being used in a survey of low-cost stabilized roads. A large mileage of such roads in the east-central part of the United States has been surveyed and the laboratory and field data are being correlated. Field work is being continued to determine the efficiency of various chemicals in soil stabilization.

A study of the chemical properties of soils in cooperation with the State Highway Commission of Missouri and the Agricultural Experiment Station of the University of Missouri has been continued. A report has been published giving the results of tests performed on a series of homoionic soils. This report shows the marked effect of the kind of ion absorbed by the soil materials on the physical properties of different soils and furnishes fundamental data on the possibilities of chemical treatment. Progress has been made in the development of quantitative and microchemical methods of analyzing soil and ground water.

Cooperation with the State highway departments in the making of subgrade surveys, in the design of subgrade treatments and road surfaces, and in the establishment of subgrade-soil laboratories has continued as in past years.





