

the period of availability was later extended through the fiscal year 1934 by act approved March 3, 1933.

In the main, the work supervised by the Bureau of Public Roads is limited to the construction of forest highways, for which the combined sums authorized and appropriated for the fiscal year 1933 were \$14,500,000, as above noted. Forest-development road work generally is administered by the Forest Service. 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. Projects of the major class which, under the rules and regulations, are administered by the Bureau of Public Roads, include all projects on the forest-highway system, except those which do not require the technical services of a highway-engineering organization and those having an estimated average cost of less than \$2,000 per mile, and in addition, those forest-development road projects of estimated average cost in excess of \$5,000 per mile and those requiring the technical services of a highway-engineering organization.

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, 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, 1933, of 16,458.3 miles, classified as shown in table 28.

TABLE 28.—Classification of the mileage of the forest-highway system as revised to June 30, 1933

State	Mileage of forest-highway system			
	Class 1	Class 2	Class 3	Total
Western:				
Alaska.....			459.9	459.9
Arizona.....	320.6	245.0	495.9	1,061.5
California.....	578.4	785.8	962.8	2,327.0
Colorado.....	508.0	1,113.0	104.0	1,725.0
Idaho.....	687.2	144.0	212.7	1,043.9
Montana.....	628.3	335.8	238.0	1,202.1
Nevada.....	104.0	190.6	166.8	461.4
New Mexico.....	164.0	517.0		681.0
Oregon.....	524.7	411.7	435.1	1,371.5
South Dakota.....	227.0		86.0	313.0
Utah.....	58.6	539.3	139.2	737.1
Washington.....	386.5	135.4	247.9	769.8
Wyoming.....	387.3	37.0	217.7	642.0
Total.....	4,574.6	4,454.6	3,766.0	12,795.2
Eastern:				
Alabama.....	4.0		31.0	35.0
Arkansas.....	192.3	144.3	90.5	427.1
Florida.....	39.7	81.0	36.3	157.0
Georgia.....	41.8	37.5	68.7	148.0
Louisiana.....	36.3	105.7	12.0	154.0
Maine.....			11.0	11.0
Michigan.....	49.9	108.5	150.3	308.7
Minnesota.....	89.5		222.2	311.7
Mississippi.....	32.0	13.0	51.0	96.0
Nebraska.....			28.8	28.8
New Hampshire.....	41.5	60.5	49.0	151.0
North Carolina.....	102.0	105.3	48.3	255.6
Oklahoma.....	31.5		70.5	102.0
Pennsylvania.....	134.0	248.0	19.0	401.0
Puerto Rico.....			21.0	21.0
South Carolina.....		26.0	11.0	37.0
Tennessee.....	83.8	105.0	79.0	267.8
Vermont.....	7.0		12.0	19.0
Virginia.....	79.0	117.9	210.0	406.9
West Virginia.....	76.0	102.0	62.0	240.0
Wisconsin.....	5.0	48.5	31.0	84.5
Total.....	1,045.3	1,303.2	1,314.6	3,663.1
Grand total.....	5,619.9	5,757.8	5,080.6	16,458.3

TABLE 29.—Mileage of completed forest-highway projects, by States ¹

State	Mileage of forest-highway projects completed		State	Mileage of forest-highway projects completed	
	During 1933	Total to June 30, 1933		During 1933	Total to June 30, 1933
Western:			Eastern:		
Alaska.....	3.7	246.6	Alabama.....		5.1
Arizona.....	59.8	514.3	Arkansas.....	18.4	93.4
California.....	55.8	595.2	Florida.....	3.2	72.3
Colorado.....	29.7	445.9	Georgia.....		21.4
Idaho.....	36.2	626.9	Michigan.....	4.9	21.1
Montana.....	16.1	472.7	Minnesota.....	16.1	85.0
Nevada.....	1.1	143.7	New Hampshire.....		8.1
New Mexico.....	32.6	266.5	North Carolina.....		43.3
Oregon.....	47.6	855.6	Pennsylvania.....		1.8
South Dakota.....	4.1	51.9	South Carolina.....		15.6
Utah.....	2.2	356.5	Tennessee.....		37.4
Washington.....	19.5	259.5	Virginia.....	3.3	19.3
Wyoming.....	5.1	330.7	West Virginia.....		3.6
Total.....	313.5	5,166.0	Total.....	45.9	427.4
			Grand total.....	359.4	5,593.4

¹ A revision of the system in Florida omits 8.0 miles previously reported as improved, and corrections of previously reported figures total 0.2 mile.

During the past year improvements were constructed on 359.4 miles of the forest-highway system, bringing the total mileage improved to date with Federal funds to 5,593.4 miles. Of the mileage improved during the year, 313.5 miles were in the Western States and Alaska, and the remaining 45.9 miles were in the forests of 5 Eastern States. Of the total mileage improved to date, 5,166.0 miles are in the West and 427.4 in the East.

The mileage of forest-highway projects constructed during the year and to date by States is shown in table 29.

On June 30, 1933, work was in progress under the supervision of the Bureau of Public Roads on 1,067.4 miles of road at a total estimated cost of \$11,282,213.78. Work estimated to cost \$1,933,827 had been planned but not yet started; and there was a balance of authorized funds not yet obligated to definite projects amounting to \$1,722,113.70.

ROAD CONSTRUCTION IN THE NATIONAL PARKS

Road construction in the national parks by agreement with the National Park Service is supervised by the Bureau of Public Roads. During the fiscal year 1933, 174 miles of road were constructed, making a total of 674 miles thus far improved.

The mileage constructed during the fiscal year and to date in the several parks is shown in table 30.

The most important project constructed for the National Park Service under supervision of this bureau is the Wawona Tunnel in Yosemite National Park. This tunnel on the Wawona road connecting Yosemite Valley with the Mariposa Grove at Big Trees is 0.8 mile in length. It was completed during the past year. The great length of the tunnel made it necessary to provide lighting and ventilation.

An outstanding project of interest to the Eastern States which was completed during the year is the Skyline Drive along the ridge of the Blue Ridge Mountains in the proposed Shenandoah National Park in Virginia. The completed road is 40 miles in length and for 35 miles it runs along or near the crest of the Blue Ridge Mountains through a section that has been visited in the past only by mountain hikers. Near the beginning of the project at Panorama the road leads through Mary's Rock Tunnel, 600 feet in length. There is then presented a panorama of the foothills of the Blue Ridge Mountains and plains of Virginia extending as far as they eye can see. The entire completed section is a route of continuous scenic beauty. This section comprises about one third of the total improvement contemplated which will extend from Front Royal at the northern end of the park to near Waynesboro at the southern end.

TABLE 30.—Mileage of national-park roads improved under the supervision of the Bureau of Public Roads

National park or monument	Mileage completed under supervision of the Bureau		National park or monument	Mileage completed under supervision of the Bureau	
	During fiscal year 1933	Total to June 30, 1933		During fiscal year 1933	Total to June 30, 1933
Acadia.....	0.3	3.9	Petrified Forest National Monument.....	0.4	16.7
Bryce Canyon.....	14.4	14.4	Rocky Mountain.....	28.1	36.8
Colonial National Monument.....		10.0	Scotts Bluff National Monument.....	.6	.6
Crater Lake.....	14.8	38.1	Sequoia.....	4.1	32.8
Devils Tower National Monument.....		.3	Shenandoah.....	40.1	40.1
General Grant.....	2.4	6.4	Wind Cave.....	1.4	6.7
Glacier.....	10.4	47.3	Yellowstone.....	3.4	92.9
Grand Canyon.....	35.9	129.7	Yosemite.....	1.8	56.4
Hawaii.....	9.0	20.2	Zion.....	.6	15.5
Lassen Volcanic.....		130.4			
Mesa Verde.....	2.2	20.4	Total.....	174.4	674.4
Mount Rainier.....	4.5	54.8			

¹ Correction of previously reported figure.

The Fall River Highway in the Rocky Mountain National Park, Colo., 28 miles in length, was built at a cost of \$900,000. The road is located east of the Continental Divide on the main east-and-west road traversing the park. The entire project is located at a very high elevation. Some of the highest and most rugged peaks of the Rocky Mountains may be seen along this route.

Other park projects constructed during the past year include a parking area on the Cadillac Mountain Road in Acadia National Park, the Rim Road in Bryce Canyon National Park and a section of the Scotts Bluff Road in Scotts Bluff National Monument.

Two large bridges were constructed in Petrified Forest National Monument. These bridges are known as the Rio Puerco and Dry Creek Bridges and are located on the main north and south highway which was completed during the fiscal year 1932.

RESTORATION OF FLOOD-DAMAGED ROADS

During the last fiscal year there has been no addition to the appropriations previously made for relief of the States on account of damage to roads by floods.

Of the various appropriations, those made for Vermont and New Hampshire have been completely expended; of those made to Kentucky, Arkansas, Louisiana, Mississippi, Missouri, Alabama, and Georgia, various amounts remain unobligated, and that made to South Carolina is entirely obligated but in small part unpaid. Although less than the total sum appropriated for Florida has been paid to the State, the sum of \$77,296.48 actually paid is the whole payment that will be made.

The appropriations made for all of the States except Alabama, Georgia, and South Carolina had no definite term of availability. In the three exceptional cases the original appropriations were for the fiscal year 1931, but the terms of availability have been extended by subsequent legislation, the most recent being the act of July 7, 1932, extending availability until June 30, 1933 and that of March 3, 1933, further extending the term of each to June 30, 1934.

In the cases of Georgia and South Carolina, portions of the appropriations originally reserved to meet Federal administrative costs were unneeded for that purpose and released for payment to the States during the past year.

TABLE 31.—*Flood relief appropriated, amounts paid to States, and the unobligated balance of the appropriation on June 30, 1933*

State	Appropriated	Paid to the States to June 30, 1933	Unobligated balance
Vermont.....	\$2,654,000.00	\$2,654,000.00	-----
New Hampshire.....	653,300.00	653,300.00	-----
Kentucky.....	1,889,994.00	935,280.41	\$666,763.24
Total.....	5,197,294.00	4,242,580.41	666,763.24
Arkansas.....	1,800,000.00	1,477,693.56	322,306.44
Louisiana.....	967,582.00	786,271.13	181,310.87
Mississippi.....	628,000.00	345,266.57	282,733.43
Missouri.....	258,418.00	119,428.31	130,865.95
Total.....	3,654,000.00	2,728,659.57	917,216.69
Alabama.....	¹ 1,618,500.00	481,083.81	1,137,416.19
Georgia.....	¹ 505,167.50	433,687.63	19,152.05
South Carolina.....	¹ 801,361.00	770,682.05	-----
Florida.....	80,307.00	77,296.48	-----
Total.....	3,005,335.50	1,762,749.97	1,156,568.24
Grand total.....	11,856,629.50	8,733,989.95	2,740,548.17

¹ Does not include fund allowable for administration.

The mileage of road improved under the relief acts up to the end of the fiscal year and the corresponding total cost and Federal payment are given in table 32. Similar information for roads completed during the past year, including 6.3 miles on which final payment had not been made, is presented in table 33; and for roads under construction, including 1.9 miles in Georgia approved for construction, in table 34.

TABLE 32.—*Total cost, flood relief, and mileage improved to June 30, 1933*

State	Total cost	Flood relief	Miles
Vermont.....	\$5,651,965.83	\$2,654,000.00	61.2
New Hampshire.....	1,408,479.45	653,300.00	29.1
Kentucky.....	1,799,206.78	750,341.07	103.2
Total.....	8,859,652.06	4,057,641.07	193.5
Arkansas.....	843,914.04	405,711.21	49.8
Mississippi.....	11,433.59	3,563.66	.3
Total.....	855,347.63	409,274.87	50.1
Alabama.....	319,797.49	155,615.15	41.7
Georgia.....	362,649.69	176,502.53	4.4
South Carolina.....	1,230,791.05	559,721.98	18.1
Total.....	1,913,238.23	891,839.66	64.2
Grand total.....	11,628,237.92	5,358,755.60	307.8

TABLE 33.—*Total cost, flood relief and mileage of roads which were completed during the fiscal year 1933*

State	Estimated total cost	Flood relief allotted	Miles
Kentucky.....	\$387,202.26	\$162,125.66	35.8
Georgia.....	321,441.48	156,143.65	4.3
South Carolina.....	336,363.72	156,300.00	3.6
Total.....	657,805.20	312,443.65	7.9
Grand total.....	1,045,007.46	474,569.31	43.7

TABLE 34.—Total cost, flood relief, and mileage of roads under construction and approved for construction on June 30, 1933

State	Estimated total cost	Flood relief allotted	Miles
Georgia.....	\$129,601.70	\$56,304.01	2.2
Kentucky.....	1,090,138.05	472,889.69	108.3
South Carolina.....	533,541.46	241,639.02	4.2
Total.....	1,753,281.21	770,832.72	114.7

The mileage of the several surface types represented in flood-relief roads completed during the fiscal year 1933 is given in table 35, and the total mileages completed, and under construction and approved for construction are given in tables 36 and 37, respectively.

The amounts of the several appropriations (less sums reserved for Federal administration in the cases of Alabama, Georgia, and South Carolina), the amounts paid the States up to June 30, 1933, and the unobligated balances for each State are shown in table 31. Flood relief paid to the States during the fiscal year 1933 is given below:

Kentucky.....	\$267,528.92
Missouri.....	119,428.31
Georgia.....	15,479.62
South Carolina.....	36,659.82
Florida.....	1,243.65
Total.....	440,340.32

TABLE 35.—Mileage of the various types of flood-relief roads completed during the fiscal year 1933

State	Graded and drained	Macadam, treated	Portland cement concrete	Bridges and approaches	Total
Georgia.....		3.3	0.4	0.6	4.3
Kentucky.....	35.7			.1	35.8
South Carolina.....	.1		2.6	.9	3.6
Total.....	35.8	3.3	3.0	1.6	43.7

TABLE 36.—Mileage of the various types of flood-relief roads improved to June 30, 1933

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Gravel, surface treated	Macadam, surface treated	Bituminous macadam	Portland cement concrete	Bridges and approaches	Total
Vermont.....			7.0	9.2		6.1	32.5	6.4	61.2
New Hampshire.....				2.9	4.9	2.3	18.4	.6	29.1
Kentucky.....	102.2							1.0	103.2
Total.....	102.2		7.0	12.1	4.9	8.4	50.9	8.0	193.5
Arkansas.....	16.1		31.1				.3	2.3	49.8
Mississippi.....							.3		.3
Total.....	16.1		31.1				.6	2.3	50.1
Alabama.....	17.4	15.9	7.6					.8	41.7
Georgia.....					3.3		.4	.7	4.4
South Carolina.....	10.1						5.3	2.7	18.1
Total.....	27.5	15.9	7.6		3.3		5.7	4.2	64.2
Grand total.....	145.8	15.9	45.7	12.1	8.2	8.4	57.2	14.5	307.8

TABLE 37.—*Mileage of the various types of flood-relief roads under construction and approved for construction on June 30, 1933*

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Macadam, treated	Portland cement concrete	Bridges and approaches	Total
Georgia.....		0.4		0.3	1.2	0.3	2.2
Kentucky.....	103.2		4.6			.5	108.3
South Carolina.....	2.9	.3				1.0	4.2
Total.....	106.1	.7	4.6	.3	1.2	1.8	114.7

MOUNT VERNON MEMORIAL HIGHWAY

With the exception of a few finishing details the work of constructing the Mount Vernon Memorial Highway was completed during the fiscal year 1932. The remaining work was completed early in the last fiscal year, and the control of the highway was transferred to the Office of Public Buildings and Public Parks of the National Capital.

Ceremonies celebrating the formal opening of the road were held at the Mount Vernon terminus on November 15, 1932, attended by members of the American Association of State Highway Officials then in convention at Washington. Addresses were made by Secretary of Agriculture Arthur M. Hyde, Senator Simeon D. Fess, vice chairman of the United States Commission for the Celebration of the Two Hundredth Anniversary of the Birth of George Washington, Lt. Col. U. S. Grant, 3d, Director of the Office of Public Buildings and Public Parks of the National Capital, and Frederic E. Everett, president of the American Association of State Highway Officials and chief engineer of the State Highway Department of New Hampshire.

INTER-AMERICAN HIGHWAY

All field operations in connection with the reconnaissance survey of the proposed inter-American highway from Panama to the United States were completed before the end of the fiscal year. The Panama City office of the Bureau engineers who have been engaged in this work since 1930 was restored late in May to the Central Roads Board of Panama, by which it had been kindly loaned. It will be kept open in future by the Central Roads Board as a center of information on the proposed highway.

The reconnaissance operations included ground surveys through the Republics of Panama, Costa Rica, Nicaragua, Honduras, and Guatemala, in which the American engineers and representatives from the local governments covered approximately 900 miles afoot or on horseback. Aerial photographic surveys of the region along the route were also made by the United States Army Air Corps operating from its Panama base at France Field.

A comprehensive report of this important project is now being compiled. It will contain complete engineering details and in addition will outline the general and economic characteristics of the countries to be traversed by the proposed highway. From an engineering standpoint, the construction of an all-weather road 3,200 miles long, from Panama City, Republic of Panama, to Nuevo Laredo, Mexico, is entirely practicable; more than 1,200 miles of the total route, in fact, are already passable to motor vehicles in all seasons, and 1,000 miles more are passable in the dry season. Construction work is being actively pushed on a number of local stretches of road, particularly in Panama and Mexico.

As an instrument for developing the potential resources of and strengthening our commercial and social relations with the Central American Republics, it is believed that the construction of the inter-American highway is justifiable from an economic standpoint, and that the project does not contemplate expenditure of money and labor disproportionate to the benefits eventually to be realized by the United States and the republics concerned.

TRANSPORTATION AND ECONOMIC AND STATISTICAL INVESTIGATIONS

MICHIGAN TRAFFIC SURVEY

The report of the traffic survey conducted in Michigan in cooperation with the State highway department in 1930 and 1931 was published in the February 1933 issue of Public Roads. Among the more important results of the survey

was the determination of the relative utilization of the State highway system, the county and township highways, and city streets. The survey revealed that 50 percent of all Michigan traffic is carried by the streets of cities in the State, 5 percent by the township roads, 12 percent by county roads, and 33 percent by the State highway system.

On the 7,691 miles of main roads included in the State highway system the average daily traffic was found to be 1,144 vehicles. On the 17,175 miles classified at the time of the survey as county roads the traffic averaged 190 vehicles daily, and on the 60,214 miles of township roads, most extensive and least important of the State's road mileage, the traffic averaged only 22 vehicles per day. On 25 percent of these road roads the survey showed the traffic to be 10 vehicles or less daily.

Of the traffic on city streets 69 percent was found to be local to the city, and 31 percent was found to originate at, or destined to, points beyond the city limits. As an incident of the survey it was found that 2½ million motor tourists visited the State during the survey year with estimated total expenditures of \$274,000,000. Over 80 percent of these tourists were found to be from neighboring States and Canada.

WASHINGTON REGIONAL-AREA TRAFFIC SURVEY

Field work of the Washington regional-area traffic survey was finished in September 1932, and a report is now in preparation. Traffic information will be available in sufficient detail to serve as the basis for development of a connected system of main highways in the Washington regional area and to indicate desirable priority of construction. A complete analysis has been made of the necessity for the construction of several alternate routes, including bridges, to relieve congested existing routes, and studies have also been made of possible relocations and extensions of several existing highways. The data are sufficiently inclusive and extended to indicate with reasonable accuracy the minimum volume of traffic which would be carried upon the proposed new routes. It is believed that it will be possible to make recommendations, the adoption of which will result in greater economy and convenience to traffic upon certain of the projected routes, and in large savings in right-of-way and construction costs by modification of prior proposals that have not been based upon factual information with regard to traffic movements.

INDIANA TRAFFIC SURVEY

As the fiscal year closed, field work on a 12-month survey of traffic in 11 representative counties of Indiana was nearing completion, being scheduled to terminate in August. As the first comprehensive traffic census ever made in Indiana, its results, showing relative proportions of foreign and domestic traffic on township, county, and State roads will be of importance to State authorities. A report of the survey will be started upon completion of the field operations.

NEW JERSEY TRAFFIC SURVEY

A survey of traffic upon the entire State highway system of New Jersey and upon a limited mileage of the principal county routes, begun in 1932, is scheduled to be completed September 1, 1933. The resulting report will contain data with regard to the origin and destination of truck traffic, the nominal capacities and body types of trucks, their classification as owner operated, contract haulers, or common carriers, and as of interstate or intrastate operation, the origin and destination of all vehicles observed at the Hudson River and Delaware River crossings, and the determination of the proportions of passenger-car traffic upon each of the highway systems that are local to each county or that originate in other areas. Special studies will be made of the data in connection with the necessity for additional highway facilities in the State.

TRAFFIC CAPACITY AND INTERSECTION STUDIES

Research has been continued into the efficiency of various types of traffic control at highway intersections. A large number of vehicles have been electrically timed through intersections of different types, and data for comparative study have been obtained by the experimental varying of signal cycles or the making of observations before and after the inauguration of new control systems.

Observations of traffic on United States Route No. 1 between Jersey City and Newark, N.J., made in connection with the traffic survey in that State, have indicated that the new high-level viaduct is saving highway users approximately 1 million "vehicle-hours" per year. Speed of vehicles was determined by the

recording of license-plate numbers and time of passage at both ends of the route, before and after its improvement. The results of these observations will be published.

TESTS OF HIGHWAY SIGNS

Tests to determine the relative efficiency of reflector buttons designed for use in highway signs and the attention-arresting values of sign color combinations, undertaken in cooperation with the Bureau of Standards at the request of the American Association of State Highway Officials and the National Conference on Street and Highway Safety, have been completed. This investigation involved the determination of the personal acuity and rapidity of perception of 121 individuals as measured by a tachistoscope adjusted to control definitely the time interval of free observation. The conclusions reached indicate that black letters on a yellow background are more easily read than black letters on white background or white letters on black background, and that a reflecting button with a diameter of 0.76 inch is relatively more efficient for rural use than reflecting units of 0.95 or 0.58 inch. This advantage is not so apparent under conditions usually obtaining in city streets where the absence of glare under dimmed headlights increases the value of the small button.

UNIFORMITY IN MOTOR-VEHICLE REGULATIONS

The complicated situation resulting from the diversified motor-vehicle legislation existing in the 48 States and the District of Columbia was the object of study by the Bureau throughout the year, with representatives participating in several conferences of State administrators and vehicle-operators' associations. The entire problem of motor-vehicle regulation was analyzed in a report published in the December 1932 issue of Public Roads. Movements toward greater uniformity in State legislation have been launched in various parts of the United States, and the Bureau has been lending its cooperation to these efforts.

STUDIES OF TAXATION IN WISCONSIN, MICHIGAN, AND ILLINOIS

Results of extensive inquiry into the finances of Wisconsin, Illinois, and Michigan with special reference to highways were made available to the public in the April, May, and June (1933) issues of Public Roads. All three studies related to the calendar year 1930 as the latest year for which complete data were available. The purpose of the investigations was to establish the relation of highway taxes paid from different sources and by different groups of citizens, based on local administrative units and the highway service furnished, and to lay down a broad basis for adjustment of highway taxes on a rational plan.

Many important facts regarding highway financing may be adduced from these surveys. In all three of the States covered, it was found that rural property paid no tax for urban streets, but a part of the tax on urban property was expended on local township roads. A striking similarity was found to exist between the proportion of motor-vehicle imposts paid by rural and urban motor-vehicle owners and the proportion of highway travel by these owners; for example, rural motor-vehicle owners (residents of townships) in Wisconsin paid 33.9 percent of the total motor-vehicle imposts expended on all classes of roads and streets, and travel by these same rural owners made up 31.9 percent of the total travel on all classes of roads and streets, while the corresponding percentages for city and village motor-vehicle owners were, respectively, 66.1 and 68.1 percent.

PRODUCTION COST STUDIES

ROAD CONSTRUCTION AS AN EMPLOYMENT MEASURE

The resort to highway construction as a means of furnishing employment for idle labor has emphasized the need of more precise knowledge of the amount of human labor entering into each of the various road building and maintenance operations, and how and to what extent the labor element varies when different methods and equipment are used. The collection of data bearing on these questions, in terms of the number of man-hours required to produce a given result, has been made a regular part of the production-cost studies.

Last year a study was made of the extent to which labor profits from the construction of high-type pavements in which mechanical equipment plays an important part. In this study the money paid out by States or communities for the construction of a concrete pavement was traced through its various exchanges showing how these expenditures extend to sand and gravel pits, stone quarries, cement and steel mills, to the manufacturers of equipment, repair parts, explo-

sives, gasoline, lubricating oils, and supplies, as well as to railroad and transportation companies, and to those who furnish them their supplies, equipment, and repairs, which extend from coal and ore mines to mills and factories. When thus traced, it was found not only that about 90 percent of the taxpayers' dollar was eventually paid to workers as wages and salaries, but also that a very large part of the industry of the country took an active part in the work and received a definite financial stimulus. A few more specialized studies have been made to show the extent to which particular industries or activities profit from normal highway work, such for example, as the freight obtained by railroads as a direct and indirect result of highway-construction activities.

A study was also made to discover the trend of costs in highway construction apart from the influence of such factors as changes in use of materials, specifications, and construction practices. This study led to the development of a set of index figures based on the average cost of 1 mile of highway composed of units of grading, surfacing, and structures in the same ratios of use as were found in the highway-construction program for the years comprising the base period. This index, which was published in *Public Roads*, July 1933, shows the trend in unit prices for excavation, surfacing, and structures, as well as for the composite mile of road improvement for the period 1922 to 1933.

The work in connection with carrying out the legislative provisions fixing minimum wage rates and maximum hours of employment on all road-construction projects involving the expenditure of Federal road funds has been carried on in about the same manner as in the past, although the volume has increased considerably. As a regular part of this work a monthly record of the number of persons actually employed in State and Federal road work is compiled.

STUDIES OF ROLLED CONCRETE PAVEMENTS

During the past year studies were made on the placing of two sections of rolled concrete pavement in which 5- to 7-ton tandem road rollers were used to consolidate a very lean and dry mix. In this work all methods of operation were practically the same as in the production of a standard concrete pavement, except certain operations behind the paver. The mix used was so lean that the mortar, while of about normal richness, was only sufficient in quantity to fill the voids in the coarse aggregate when the latter had been thoroughly consolidated by repeated passages of the tandem road roller. On both of the experimental sections a finishing machine was used ahead of the roller as a strike-off, although an ordinary heavy strike-off planer drawn by a winch on the paver would no doubt have been cheaper and apparently equally satisfactory for striking off the lean, harsh concrete mix at the desired height so that the consolidation produced by the roller would just bring the surface to the desired elevation. The second finisher was used behind the roller in the usual manner to spread such excess mortar as might be brought to the surface by the roller and to produce the customary smooth finish. With further experience in conducting the rolling and in designing the mix, this finishing machine may not be necessary, especially on secondary road work.

The rolling, which was begun immediately after the concrete had been spread and struck off, was carried on in much the same manner as in the construction of an ordinary broken-stone macadam surface and was continued until the surface was perfectly smooth and unyielding, and all the coarse particles were firmly interlocked and the mortar was just flushing to the surface. The regular grading of the coarse aggregate as employed in the standard methods of construction was used in both cases, although there were some indications that a grading in which a considerable portion of the intermediate or finer sizes was omitted might prove better.

This method, while still in an experimental stage, seems to have considerable promise of development for use on secondary roads and in regions where sand and cement prices are high. Tests of cores and beams and general observations indicate that it will produce a pavement in point of surface smoothness, density, and both beam and compressive strength, comparing favorably with pavements placed by standard methods containing from 1 to 1½ more bags of cement per cubic yard. The studies will be continued with a view of determining the possibility of developing the method for use in the improvement of secondary highways.

CONCRETE FROM CENTRAL MIXING PLANTS

Concrete for highway work is being supplied in increasing amounts from large central mixing plants that are usually equipped with mixers very much larger than those of the portable type in common use on highway-construction projects. Studies of two such plants equipped with 4- and 5-cubic-yard mixers indicate

quite clearly that, with an actual mixing time varying from 1 to 4 minutes, little or no appreciable increase in either beam or crushing strength and no improvement in the uniformity of distribution of the various ingredients throughout the batch are secured by mixing the batch longer than 1 minute. These tests also show that a grinding action takes place within the drum, the amount of which is directly proportional to the length of the mixing time. With the hard gravel aggregates used in these tests, the grinding was confined almost entirely to the sand, but with long mixing time the stone dust, or flour, thus produced was sufficient to have an appreciable effect on the slump. Thus, to produce a concrete of given slump, more water was necessary when the mixing time was long than when it was short.

METHODS OF BUILDING LOW-COST HIGHWAYS

In view of the increasing difficulty of obtaining sufficient funds to provide and maintain adequate local highway facilities, considerable attention has been devoted to the development of the most efficient methods of building low-cost bituminous surfaces. Two types of such surfaces have been developed—the so-called plant-mix and road-mix types. In the construction of surfaces of the first type the stone and bituminous material are mixed in some form of mechanical mixing plant, either stationary or portable, in much the same manner as standard bituminous concrete. Surfaces of the road-mix type, on the other hand, are constructed by mixing the stone and bituminous material in place on the road.

The methods employed in both types of operation vary a great deal. There are hardly any two localities in which exactly the same methods are used; but everywhere the effort is being made to produce satisfactory dustless surfaces suitable for light traffic by methods and with materials less expensive than those employed in the construction of the higher types of bituminous surfaces.

The Bureau has joined in these efforts with studies of both plant-mixing and road-mixing methods. The studies of the plant-mix type have been devoted largely to finding means of maintaining production rates in the face of a tendency to add refinements which jeopardize the essential low cost of the product. In the case of the road-mix type its work has been mainly a search for ways and means of simplifying and standardizing construction procedures and developing more effective and efficient mixing equipment. Progress along these lines has been gratifying and gives promise of definite results.

GRADING STUDIES

Studies of grading practices have been continued. The changes that have taken place in recent years in this important department of road work are most striking. In 1926 the power shovel in use on the average highway-grading job in the United States had a dipper rated at $\frac{3}{4}$ -cubic-yard capacity and the $1\frac{1}{4}$ - or $1\frac{1}{2}$ -cubic-yard horse-drawn wagon was the prevailing hauling equipment. Today our studies indicate that the average grading job is equipped with a shovel having a dipper capacity of $1\frac{1}{4}$ cubic yards, and that the $1\frac{1}{2}$ -yard shovel is now more common than the $\frac{3}{4}$ yard. Horse-drawn hauling equipment is now seldom seen, the prevailing type of hauling equipment being the heavy truck or large tractor-drawn wagon. A series of articles entitled "Power Shovel Operation in Highway Grading", has been revised and rewritten for publication in the near future.

The bulldozer has long been standard equipment on the dump and in building sidehill trails and minor roads. Recently the use of the bulldozer has been successfully extended to the longitudinal movement of earth and all loose or friable materials in regular highway-grading work. Studies of the operation of this type of equipment indicate that it should find considerable use in connection with the power shovel whenever the topography is broken or rugged and the hard rock is overlain by a considerable mantle of earth, deeply decomposed rock, or other friable materials. The essential requirements for successful use of the bulldozer as a grading unit are steep surface grades, relatively short hauls, and a material of which a load can be accumulated readily. If the material is hard, scarifying or blasting must be resorted to before the bulldozer can operate efficiently. Hard rock or hard shales can seldom, if ever, be fragmented sufficiently even by heavy blasting to make the use of the bulldozer economical. This type of material should be reserved for movement by the power shovel.

Studies of use of the elevating grader in highway work indicate that recent improvements—among them the provision of a separate power unit for operating the elevator belt—have extended the field within which this type of equipment may find profitable employment to include very slippery and very loose and sandy soils, in which operation was formerly impractical or impossible because of bull-

wheel slippage. Broadly speaking, however, the field of the elevating grader is still limited to the movement of earth reasonably free from roots and stones in level to gently rolling country. In a recent study, five elevating graders were observed working under favorable conditions in ground of this type for all of which the production averaged over 200 cubic yards of pay material loaded, hauled, and placed in the fill per hour of actual operation.

HIGHWAY-ACCOUNTING METHODS

Accurate, complete and up-to-date information in regard to the various activities of a highway department is essential to efficient and economical administration and control. The Federal Government is vitally interested in the attainment of the highest possible degree of efficiency in the functioning of the various State departments with which it cooperates in the construction of Federal-aid roads. For these reasons, the Bureau has continued the effort to further the development and installation of efficient accounting and statistical procedures that will provide the State administrative and engineering organizations with full and complete records of current income, expenditures, and accomplishments in highway construction, maintenance, and administration, and by their uniformity permit the accomplishments of one State to be fairly compared with those of another. Such a comparison is as yet largely impossible, except in a few States, because of the dissimilar form of the available records and the lack of a uniform nomenclature and procedure. The aim is to provide a system of accounts and records that will be economical in operation, will fully meet all accounting requirements of the Department, and will provide quickly and in practical form complete statistical information on any desired activity in which the Department is engaged. Cooperative work along these lines was carried on during the past year with the State highway departments of Arkansas, New Hampshire, and Indiana.

PHYSICAL RESEARCH

MOTOR-VEHICLE IMPACT INVESTIGATIONS

During the past year a report has been published covering in detail the study of the impact reactions produced by a heavy motor bus, mentioned in last year's report.

A limited study was made of the impact reactions of a heavy passenger car and of those of a light truck equipped with high-pressure pneumatic tires. Tests with these vehicles were made over actual pavement surfaces. The relation between the magnitude of the reactions developed and the frequency of occurrence was established for each vehicle and the trends of the data were compared with similar data obtained in the bus tests. A complete report of this study has been prepared.

Preparations have been made for the study of the effect on road surfaces of the suddenly applied forces of motor-vehicle impact. A definite program of tests has been outlined. This program includes a series of tests to determine the relative effects of static and impact forces on massive concrete specimens under carefully controlled conditions. For this work a specially designed pendulum-type impact machine has been designed and is being built. The program will also include comparative static and impact tests on actual pavement slabs to follow the series of laboratory tests.

INVESTIGATION OF CONCRETE PAVEMENT DESIGN

This investigation, which has for its object the development of information which will assist in a better understanding of the structural action of concrete pavement slabs and thus lead to improved structural design, has progressed toward its conclusion during the past year. A great many loading tests and other observations have been made and a considerable amount of new information of a definite and conclusive nature has been developed.

The series of reports, mentioned last year, by means of which this information will be made available, has been outlined in detail, and preparation of the reports has been started.

INVESTIGATIONS OF CONCRETE AND CONCRETE AGGREGATES

In previous reports reference has been made to investigations of pavement concrete which involved the construction and testing of full-size pavement slabs. These investigations have yielded valuable information regarding the effect of variations in materials and construction practices on the strength and uniformity of the concrete. The major conclusions from the first series of tests were given in the 1931 annual report. In the second series, the effect of using

high-speed vibrators mounted on the screeds of the finishing machine and the effect of delayed finishing for the purpose of removing excess water were studied. The portion of this investigation dealing with strength and uniformity has been completed and a report issued. The major conclusions were as follows:

EFFECT OF VIBRATION

By the use of vibrating equipment of the general type used in these tests it should be possible to place satisfactorily and to finish concrete considerably drier than is possible with methods now in common use.

For conditions comparable with these tests, it should be possible satisfactorily to place and finish by vibration concrete having a minimum slump of 1 inch as compared to a minimum slump of 2½ inches by methods now in common use.

These tests indicate that, depending on the type of coarse aggregate used, concrete containing from one fourth to three fourths parts more coarse aggregate than the base mix, if vibrated, should show as great uniformity and as high flexural strength as the base mix finished by methods now in common use. Such a mix will contain approximately from 0.2 to 0.6 sack of cement per cubic yard less than the base mix.

The indications of these tests are that the effect of vibration is more marked where angular coarse aggregates are used than where aggregates having rounded surfaces are used.

EFFECTS OF DELAYED FINISHING

The use of the method of delayed finishing as carried out in these tests will increase the density and strength of concrete pavement slabs, by eliminating, before final consolidation, a larger quantity of excess water than is accomplished by methods now in common use.

The application of the method of delayed finishing to a mix containing approximately one half part more fine and 1 part more coarse aggregate than the base mix will produce pavement slabs having substantially the same crushing and flexural strength as the base mix finished by methods now in common use. Such a mix will contain approximately one sack of cement per cubic yard of concrete less than the base mix.

In general, the indications of these tests are that the proper use of either the vibratory method of finishing or the method of delayed finishing should result in an improvement of the quality of concrete pavements. Tests are now under way to determine the effect of these special methods of finishing on the ultimate durability of the concrete as measured by freezing tests on cores cut from the test section.

OTHER CONCRETE TESTS

Several studies having to do with the general question of improving concrete in respect to its durability or resistance to weathering are being continued. In one series, a number of mortar specimens containing various types of concrete sand are being subjected to alternate freezing and thawing for the purpose of developing information which will make it possible to include in specifications definite quantitative requirements designed to insure durability of fine aggregates.

In an effort to improve existing methods of testing the wear-resisting qualities of coarse aggregates, a study was undertaken of the so-called "Los Angeles rattler" test used by the State of California. It has been claimed that this test is superior to the existing standard method because it is possible to test both crushed stone and gravel by the same method, thus eliminating the necessity for two separate specification requirements as at present. These tests were conducted in cooperation with the American Association of State Highway Officials, and a report is now being prepared for publication.

During the year an investigation was started which has for its major object the development of a standard laboratory procedure for testing the numerous new methods and materials continually being developed for curing concrete. Of these methods, one which presents interesting possibilities, not only as a means of curing but also as a means of insulation, involves the use of a cotton mat formed of one or more layers of raw cotton placed between sheets of cotton cloth. A laboratory study of this material showed quite definitely that the cotton mats were not only effective in providing insulation against the sun's rays but were also as efficient, from the standpoint of curing, as a double thickness of burlap kept wet 3 days. The results of this investigation have been published.

Attention has been called recently to the extreme importance of controlling the temperature and moisture content of concrete specimens at the time of test if reliable results are to be obtained. One series of tests, conducted for the purpose

of developing information along this line, has been completed and a report prepared. Another series involves tests, at various periods up to 1 year, of concrete containing both normal and lightweight aggregates stored and tested under both wet and dry conditions. These tests should also yield information of value as to the effect of artificial lightweight aggregates on the strength of concrete at different ages and under various curing conditions.

HIGHWAY BRIDGE INVESTIGATIONS

A complete report of the cooperative investigation of the Freyssinet method of arch construction as applied to the Rogue River bridge in Oregon has been completed and is being published as a bulletin of the Oregon Highway Commission.

A cooperative study of multiple-span reinforced-concrete arch bridges has been completed at the University of Illinois. This study was made for the purpose of determining the effect of spandrel structures of various types and elastic piers of various heights on the action of concrete arches. For this purpose several multiple-span arch ribs, each of three 26-foot spans, were built in the laboratory and deformation measurements made under loads of different intensities and distribution. The factors studied were spacing of expansion joints in the deck, height of deck above the rib at the crown, and height of elastic piers. Much information that will be useful to bridge designers was developed by this study. A complete report is now being compiled.

Tests to determine the friction developed in the sliding of expansion bearings of highway bridges, when the bearing plates are made of various materials and finished in different ways, were mentioned in last year's report. During the past year the schedule of tests has progressed steadily. Several hundred tests have been made, and an appreciable range in the coefficient of friction has been found to exist. The publication of the information obtained in this investigation should assist bridge engineers materially in designing sliding bearings.

MEASUREMENT OF ROAD SURFACE ROUGHNESS

Several years ago the Bureau developed a device, to be mounted on a motor vehicle, by which the successive deflections of the front springs of the vehicle, caused by the surface roughness of any road over which it might be driven, could be summed up and recorded in inches. The device was intended to indicate the relative roughness of road surfaces by the relative amounts of spring deflection recorded on different roads. There was full realization of its limitations, but it is useful nevertheless and has been used in many parts of the country. Its principal shortcoming is that the general level of the values recorded is affected by the vehicle characteristics (springs, weight, tire equipment, etc.), so that it is not possible satisfactorily to compare data obtained with the instrument mounted on different vehicles. This deficiency led to an investigation of the possibility of developing a standardized vehicle which could be used with the relative roughness indicator.

During the past year considerable study has been given to this problem. A single-wheel trailer has been built, capable of standardization in all of its parts, and the work done with it thus far gives promise that it may be satisfactory. It is relatively simple to build and can be readily attached to the rear bumper of any automobile.

With such a vehicle it should be possible to compare directly data taken with different units at widely separated points or to compare data taken from time to time with the same unit. If this becomes possible, the usefulness of the relative-roughness indicator will be greatly increased.

BITUMINOUS MATERIALS AND LOW-COST ROAD INVESTIGATIONS

The bituminous investigations of the Bureau, during the past year, have proceeded along the following lines: (1) Continued observations of experimental highways; (2) field surveys and related laboratory studies in connection with various types of low-cost roads; (3) development of provisional specifications for liquid asphaltic materials based on a standard simplified scheme of analysis; (4) laboratory investigations of bituminous materials and bituminous mixtures to aid in selecting suitable materials, and to develop satisfactory methods of design for special types of low-cost bituminous highway construction.

Of the experimental bituminous-treated roads which the Bureau has constructed and maintained in cooperation with the highway departments of South Carolina, Nebraska, and California, two projects, one in California and the other in South Carolina, have been discontinued, and final reports are being prepared. The Nebraska experiments, which are of mixed-in-place construction in the sand-hill areas, are being closely observed, and a report of the construction and behavior

of these sections is being prepared for publication. Periodic inspections of the bituminous surfacings on marl and sand-clay bases on the remaining project in South Carolina have been made during the past year, and the maintenance costs and behavior have been recorded.

The cooperation of the Bureau with representatives of the tar industry in field surveys of low-cost, tar-treated roads has been discontinued. The report of the survey of tar-treated roads in North Carolina has been published. A report of the observations of tar-bound roads in Pennsylvania is being prepared.

The cooperative effort of the Bureau, the State highway departments, and the asphalt industry to simplify the tests and standardize the specifications for liquid asphaltic road materials has resulted in the promulgation of provisional specifications for the principal grades of these materials. These proposed specifications have been considered by the cooperating agencies at a series of regional meetings, and they have been adopted in whole or in part by a large number of States for use in current construction. This important work will be continued in the hope of accomplishing Nation-wide standardization of specifications and test procedure for liquid asphaltic road materials.

Investigations to determine the weather-resisting properties of slow-curing liquid asphaltic materials from different refineries have been undertaken during the past year. This work is of importance since it is hoped that ultimately it will lead to the development of tests which will insure the durability of this type of bituminous material which is used extensively in low-cost surfaces. A progress report of the work to date has been prepared. Similar materials from other refineries, as well as liquid asphaltic materials of the rapid-curing type and tars from various producers, are to be studied during the coming year. The development of a satisfactory accelerated laboratory test, to supplement the tests more commonly used for the control of quality of liquid bituminous products, should aid greatly in securing longer life and greater durability of the materials.

Laboratory investigations to determine and evaluate the factors essential to the proper design of hot bituminous paving mixtures have been continued. These investigations involve tests of laboratory and field samples both with the Hubbard-Field stability apparatus and with the roller stability machine designed by the Bureau to simulate the action of traffic. A progress report is now being prepared.

There has recently been built for testing purposes a small circular test track having an outside diameter of 14 feet and a width of 18 inches. Facilities are provided for temperature control, and provisions are made for variations in the type and condition of the base. Traffic is applied to the test surface with full-sized rubber-tired automobile wheels. This permits the testing of low-cost bituminous surfaces under controlled conditions which are essentially comparable to those of actual service. To date, the effect of various quantities and consistencies of the bituminous material, in mats of the road-mixed or plant-mixed types, has been studied. As the work progresses, tests will be made to determine the relative importance of other factors influencing the stability and durability of the different types of low-cost bituminous surfaces, such as type of bituminous material, type and grading of mineral aggregate, and character and condition of the base.

SUBGRADE INVESTIGATIONS

During the past year the subgrade research work has been conducted principally along the following lines: (1) Simplification of the routine procedure for testing soils; (2) adaptation of the principle of the drainage indicator to a new device for use in testing topsoils in the field; (3) investigation of the relative efficiency of various preventive measures in common use for overcoming the detrimental effects of subgrade heaving due to frost; (4) investigation of the compression test of soils for practical use in connection with the design of foundations for bridges and other structures; and (5) development of new tests to disclose the properties of soils stabilized by chemical admixtures and other methods.

In the routine procedure for testing subgrade soils, described in Public Roads, vol. 12, nos. 4, 5, 7, and 8, there were included tests sufficient in number and sufficiently varied in character to identify all of the various soils likely to be encountered in a national highway-construction program and to allocate them to the proper subgrade group indicated by their physical characteristics.

Much of the soil testing is now performed for the purpose of determining the suitability of soil or soil material for some particular use as, for instance, binder in sand-clay and gravel roads, filler in bituminous road surfacing or soil in mud-jack operations; to distinguish between the good and the undesirable varieties of individual groups of surfacing materials such as limerock, caliche, shale, etc., and to identify the properties of various materials which, as admixtures, may assist in the stabilization of both subgrades and soil road surfaces.

Generally the efficiency of particular materials for the special uses just mentioned depends upon the presence of several of the half dozen or more physical characteristics investigated in the complete testing procedure. Therefore in the study of special materials, the testing procedure is limited to the use of those tests only which disclose the particular characteristics on which the performance of the special material depends.

Studies of this character consist of three distinct steps as follows: (1) Analysis of the requirements of the material for the use intended; (2) determination of the dominating characteristics satisfying these requirements; and (3) selection of the particular tests best suited to furnish the desired information with regard to these dominating characteristics.

The drainage indicator, developed to furnish the designer with tangible evidence of the drainage properties of soils, was referred to in last year's report. As a further utilization of the principles controlling tests with this apparatus a new device has been designed for field use. This device, termed "the combined soil tester", gives information as to permeability, capillarity, and stability of the soil sample. It was designed primarily for use in prospecting for topsoil and sand-clay road-surfacing materials.

As research has developed information with regard to the causes of frost heave, the locations where it is apt to occur, and possible methods of elimination, various preventive measures based on this information have been utilized in road construction. Comprehensive surveys in regions where frost heave is a serious problem have now been made to determine how well the preventive measures have performed their intended functions. The resulting information will serve as a basis for recommendations guiding the construction of roads where conditions indicate the possibility of frost heave.

Determination of the practical significance of the Terzaghi compression test as a means of disclosing the effect of proposed loads on the performance of soft undersoils resulted from a comprehensive investigation of the hydraulic fill at Four Mile Run on the Mount Vernon Memorial Highway. In this research settlements of the fill as determined by levels, and moisture contents of the soft undersoil as determined from samples in the laboratory, were compared with corresponding settlements and moisture contents as computed from data furnished by the compression test performed upon samples of soft undersoil in the undisturbed state. The agreement between computed and observed values seems substantial enough to warrant the conclusion that the settlement of soil layers in the field follows much the same laws that control the consolidation of small soil samples in the compression test in the laboratory.

In the design of new tests to disclose the suitability of low-cost road materials, an attempt is being made to arrange for the testing of the entire sample, including coarse, as well as fine material; for the preparation of the sample by bringing it into a state of consolidation similar to that attained by such materials when used in low-cost road construction; and for the testing of the sample directly for the properties on which the service of such materials depend.

In the current laboratory procedure the binder fraction, or that fraction passing the no. 40 sieve, is tested for several physical characteristics such as permeability, shrinkage, and water absorption. The mechanical analysis of the soil mortar, that fraction passing the no. 10 sieve, is determined. The coarse fraction, that retained on the no. 10 sieve, is tested for grading, hardness, etc. From the results of these three sets of tests an estimate is made of the value of the materials for the use intended.

These tests are satisfactory for fine-grained subgrade soil, but they do not satisfactorily indicate the properties of soils containing only a small percentage of fine particles. They are also inadequate in showing the effect of admixtures that may be incorporated in soils for stabilizing purposes and that may materially alter their properties. Investigation will be made of the suitability of tests in which the sample is mechanically consolidated to a density representative of that produced in a soil road surface by traffic.

In these tests the entire sample, including coarse fractions, is to be brought to a state of optimum consolidation, and then tested for permeability, capillarity, stability, and shrinkage.

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

Gen. (Pam) File

**REPORT OF THE CHIEF OF THE BUREAU
OF PUBLIC ROADS, 1934**

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PUBLIC ROADS,
Washington, D.C., September 1, 1934.

SIR: I submit herewith the report of the Bureau of Public Roads for the fiscal year ended June 30, 1934.

Respectfully,

THOMAS H. MACDONALD,
Chief.

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

The work of road construction supervised by the Bureau of Public Roads during the fiscal year 1934 far exceeded in volume the work of any previous year. Augmenting balances of earlier appropriations available at the beginning of the year, the grants made under authority of the National Industrial Recovery Act contributed largely to a total fund for road construction under Federal auspices greater than any amount previously available at one time.

The work done has been subject to the provisions of various laws. In part it has consisted of Federal-aid road construction financed with joint Federal and State funds. In part it has been supplied with funds appropriated by the Emergency Relief and Construction Act of July 21, 1932; in part by funds made available by the National Industrial Recovery Act. The roads built have been sections of the Federal-aid highway system, extensions of the system into and through cities, important secondary or feeder roads, and sections of main highways through the national forests, parks, and public lands. The various appropriating acts have required the employment of different procedures; but regardless of class or location the common effect of all work done and, under existing conditions the most important, has been to increase employment.

EMPLOYMENT ON ROAD WORK

Congressional effort to increase employment through road work began with the act approved April 4, 1930, which, for the fiscal year 1931, increased the provision for Federal-aid road construction from \$75,000,000, previously authorized, to \$125,000,000, and authorized like appropriations for the fiscal years 1932 and 1933. This was followed by the act of December 20, 1930, which appropriated \$80,000,000 to be advanced to the States for expenditure prior to September 1, 1931, and repayment by deduction from future apportionments of Federal aid, and this in turn by the Emergency Relief and Construction Act of July 21, 1932, which appropriated \$120,000,000, also to be advanced and expended in a limited period with stipulation of repayment by deduction from future Federal-aid authorizations.

The two emergency appropriations were intended to meet what it was believed at the time would be a quickly passing difficulty of the States in matching Federal authorizations; hence the limited term of expenditure and the requirement of repayment by deduction from future Federal-aid apportionments.

A clearer recognition of the magnitude of the depression is indicated by the outright grant of enlarged amounts provided by the National Industrial Recovery Act, which next provided for road work; and a similar view is evident in the terms of the most recent act, approved June 18, 1934, which not only provides further outright grants, but also cancels the obligations created by the two emergency appropriations, and provides that no further deductions shall be made from future Federal-aid authorizations on account of the advances received by the States. This action was not taken, however, until one installment of the

repayment required by the act of December 20, 1930, had been deducted from the Federal-aid apportionment for the fiscal year 1933.

Effects of all of these acts were present in the work of the past year; that of the act of December 20, 1930, slightly decreasing the funds available, and those of the other acts largely increasing the road-construction provision above the predepression level.

The result in terms of employment is shown by table 1. It will be noted that the employment on Federal and Federal-aid road construction supervised by the Bureau has increased materially each year since the fiscal year 1932, reaching in the last year a total of 2,120,761 man-months, an amount nearly equal to the combined total for the 2 preceding years.

TABLE 1.—*Comparison of employment during fiscal years 1932, 1933, and 1934 on all Federal and Federal-aid highway construction and on all Federal and State road work, including State maintenance operations, 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	1932	1933	1934
July.....	164,708	81,012	129,205	385,349	305,372	332,271
August.....	151,418	89,346	111,211	389,949	333,403	329,813
September.....	116,100	122,193	115,047	356,617	374,405	337,973
October.....	88,869	124,106	154,016	330,104	373,246	384,029
November.....	62,466	129,933	185,860	289,316	371,667	420,069
December.....	35,991	98,271	174,358	244,971	290,465	362,031
January.....	29,518	75,498	154,154	229,189	266,443	315,989
February.....	26,673	78,215	156,814	218,218	255,256	306,090
March.....	28,008	95,704	141,053	211,549	279,213	296,265
April.....	42,205	122,256	187,657	245,843	299,882	345,278
May.....	59,008	139,831	271,972	259,615	330,138	466,504
June.....	71,772	152,276	336,414	280,636	359,605	545,013
Total (man-months).....	876,736	1,308,671	2,120,761	3,441,356	3,839,695	4,441,331

The 1934 monthly employment, never lower than 111,211, the level of August 1933, before the stimulation of the National Industrial Recovery Act had been felt, reached in June 1934 a maximum of 336,414, when the new public works program was at its height. The average employment was 176,730 men throughout the year.

It is desired to stress the fact that these figures represent direct employment on the roads only and do not include the indirect employment provided in the production and transportation of materials and equipment used in the construction work. This indirect employment is conservatively estimated at 1.4 times the direct, or, for the year 1934, approximately 3,000,000 man-months.

It should also be explained that the figures reported represent continuous employment and not numbers of individual workers employed. A study of the pay rolls for the year indicates that the number of individuals given work in any month averages about four-tenths greater than the man-months of continuous employment. This is the result of the limit placed upon individual working hours. The 176,730 continuous employment average, therefore, represents an average of nearly 250,000 individuals directly employed throughout the year.

Referring again to table 1, it will be seen that the Federal and Federal-aid road construction employment supervised by the Bureau, has constituted an increasing proportion of the total employment afforded by all Federal and State highway construction and maintenance work since 1932. In that year the Federal work was approximately a fourth of the total program; in 1933 the proportion increased to about one-third; and in the fiscal year 1934 the work supervised by the Bureau employed nearly half of the total number of workers on all State and Federal projects including those employed on maintenance work by the States.

Table 2 gives details of the 1934 Federal and State employment by months, segregating the numbers of workers employed on the various classes of Federal and Federal-aid work supervised by the Bureau, and giving separately the numbers employed on independent State construction and maintenance. This table shows how the employment on Federal-aid projects and other work financed by the earlier appropriations—large at the beginning of the fiscal year—decreased from month to month, and how the work provided for by the several appropriations of the National Industrial Recovery Act developed monthly to maximum proportions at the end of the year.

TABLE 2.—Employment during the fiscal year 1934 on the several classes of Federal and Federal-aid road construction and State road construction and maintenance

Month	Employment on road construction										Total employment on road maintenance by State highway department and Federal and State road construction and maintenance			
	Without Public Works funds					In whole or in part with Federal funds						Employment on road maintenance by State highway department		
	With Public Works funds, act of June 16, 1933					Under sec. 203 of act								
	National-forest-highways	National-park-highways	Public-land-highways	Federal-aid-highways	On Fed-eral-aid system outside of munic-ipalities	On exten-sions of Federal-aid sys-tem into munic-ipalities	On sec-ondary or feeder roads	National-forest-highways	National-park-highways	Public-lands-highways			Loan-and-grant-highways	National-work-relief-highways
July	7,466	2,193	591	118,953	3,080	720	218	561	125	25	4,795	61,428	141,644	332,277
August	7,698	2,916	244	96,335	20,447	2,592	6,338	1,917	1,069	82	7,473	60,365	158,237	329,813
September	6,353	2,879	416	70,516	55,983	9,465	20,948	2,771	1,599	218	10,673	62,366	160,560	337,973
October	4,637	2,333	314	49,795	78,674	15,962	37,677	3,290	1,872	415	17,977	58,711	171,302	384,029
November	2,635	959	320	34,372	69,423	16,448	43,475	1,966	1,413	316	23,826	63,379	170,830	420,069
December	1,099	154	154	20,112	61,217	13,000	42,592	1,966	1,413	316	23,826	46,810	140,863	362,031
January	300	72	72	7,452	61,217	13,000	42,592	1,966	1,413	316	23,826	23,345	136,490	313,989
February	273	316	60	2,316	62,754	17,077	40,944	1,825	1,319	480	29,966	22,311	126,965	306,090
March	456	1,040	1,040	61,857	81,843	34,569	2,134	1,635	500	670	20,656	19,983	132,227	296,265
April	756	1,476	1,476	81,843	36,164	43,188	3,700	2,601	946	3,456	13,527	13,527	136,111	345,278
May	1,195	2,969	63	117,045	57,920	63,020	5,129	3,671	1,109	1,109	14,750	27,161	167,371	466,504
June	1,371	316	---	132,252	80,082	77,566	6,494	4,437	1,123	8,321	21,147	37,642	170,957	545,013

In consonance with the paramount employment motive of the Recovery Act the rules and regulations imposed a number of conditions upon the expenditure of the public works appropriations which had the effect of increasing the amount of human employment per unit of expenditure, of increasing the numbers of individuals employed, and of distributing the benefits of the expenditure widely and in approximate relation to the employment need.

Wherever practicable and consistent with sound economy and public advantage it was required that work be done by human labor instead of machinery. This was accomplished by means of special provisions requiring hand labor, which were attached to the specifications governing the work. But, in thus requiring the substitution of human labor for mechanical means on certain classes of work, there was studied effort to avoid so great an abandonment of machine methods as would seriously jeopardize the highly efficient and important road-machinery industry.

By the approval of varied types of improvement a desirable balance was maintained between the volume of direct labor afforded at the site of the work and the volume of indirect employment afforded at the material and equipment plants and in the transport industries. On work of the lower types, which was encouraged on the secondary and feeder roads where traffic density would permit, the direct local employment formed a large part of the total. In the higher types of improvement, approved for main rural roads and streets in cities, the element of indirect employment is greater.

By requiring a reasonable minimum of expenditure on extensions of the Federal-aid highway system across cities, opportunities for work were held out to the city unemployed. By imposing a similar requirement necessitating use of a portion of the funds for construction of secondary or feeder roads a volume of work particularly fitted for large local employment was insured.

The limits imposed on the hours of work to be allowed to individuals had the effect of increasing the number of individuals employed, and effort was made to compensate the individual for reduction of his hours of work by increasing his hourly wage. This was done by requiring the establishment by the several State highway departments of minimum rates of wage sufficient to provide, for the hours of labor as limited and in consideration of other existing conditions, a standard of living in decency and comfort.

In the employment of labor the services of local agencies of the Federal Employment Service were invariably utilized, and the several preferences required by the act were closely observed.

The rules and regulations, issued with the approval of the Special Board for Public Works, required that road-building projects should be provided in not less than 75 percent of the counties of each State. As shown by table 3, this desirable degree of diffusion of the employment opportunity was realized and exceeded in the work undertaken up to the end of the fiscal year. In 2,649 counties, or 86 percent of the total number in the United States, some employment was provided by the highway construction funds appropriated by the National Industrial Recovery Act.

TABLE 3.—Number of counties in which Public Works highway projects have been undertaken to June 30, 1934, by States

State	Total counties		Counties in which projects have been undertaken		State	Total counties		Counties in which projects have been undertaken	
	Number	Percent	Number	Percent		Number	Percent		
Alabama.....	67	63	94		New Hampshire.....	10	10	100	
Arizona.....	14	13	93		New Jersey.....	21	20	95	
Arkansas.....	75	63	84		New Mexico.....	31	30	97	
California.....	58	49	84		New York.....	62	54	87	
Colorado.....	63	57	90		North Carolina.....	100	86	86	
Connecticut.....	8	6	75		North Dakota.....	53	53	100	
Delaware.....	3	3	100		Ohio.....	88	87	99	
Florida.....	67	55	82		Oklahoma.....	77	76	99	
Georgia.....	159	99	62		Oregon.....	36	34	94	
Idaho.....	44	32	73		Pennsylvania.....	67	67	100	
Illinois.....	102	93	91		Rhode Island.....	5	5	100	
Indiana.....	92	63	68		South Carolina.....	46	46	100	
Iowa.....	99	91	92		South Dakota.....	69	61	88	
Kansas.....	105	98	93		Tennessee.....	95	68	72	
Kentucky.....	120	100	83		Texas.....	254	229	90	
Louisiana.....	64	49	77		Utah.....	29	28	97	
Maine.....	16	16	100		Vermont.....	14	13	93	
Maryland.....	23	23	100		Virginia.....	100	79	79	
Massachusetts.....	14	11	79		Washington.....	39	31	79	
Michigan.....	83	83	100		West Virginia.....	55	45	82	
Minnesota.....	87	78	90		Wisconsin.....	71	70	99	
Mississippi.....	82	61	74		Wyoming.....	23	23	100	
Missouri.....	114	87	76		Hawaii.....	4	4	100	
Montana.....	56	52	93						
Nebraska.....	93	70	75		Total.....	3, 074	2, 649	86	
Nevada.....	17	15	88						

CLASSES OF WORK SUPERVISED BY THE BUREAU

The road-construction work supervised by the Bureau during the fiscal year was of several classes, supported by funds appropriated by a number of different acts.

A diminishing portion of the program was provided for by the unexpended balances of Federal-aid appropriations authorized over a period of years ended with the fiscal year 1933.

A portion that rapidly increased as the year grew older was financed with funds appropriated by the National Industrial Recovery Act for improvements on the Federal-aid highway system and its municipal extensions and on secondary or feeder roads.

These were the larger classes of work. Smaller in total volume, more restricted in location, but nevertheless locally important were three other classes, embracing the improvement of national-forest highways, national-park highways, and highways through the public lands of the United States. Of these the first and third were under the sole administration of the Department. The national-park highways were constructed with appropriations made to the Interior Department, but under an interdepartmental agreement were supervised by the Bureau. All three classes were supported at the beginning of the year mainly by earlier appropriations, with increasing support from appropriations made by the National Industrial Recovery Act as the year progressed.

Two other classes of work developed during the year—both as outgrowths of the recovery legislation. First was the work-relief construction which was begun in the fall of 1933 as a means of providing quick and specialized relief in a number of States in which unemployment conditions were particularly acute. On this work the Bureau with the cooperation of the State highway departments acted only to supervise the construction. The workers were selected and paid by the Federal Emergency Relief Administration, and funds necessary to meet expenses of material and equipment were provided by special grants made by the Public Works Administration.

The other new class consisted of projects financed under the loan-and-grant provisions of the National Industrial Recovery Act, which after approval by the Public Works Administration were, late in the year, placed by that body under the supervision of the Bureau.

In addition to the several classes mentioned above, the year's work included only an inconsiderable volume of improvement under several appropriations for the reconstruction of roads damaged by floods in several States.

The year's activities in respect to each of these classes of work are reported separately hereafter.

STATUS OF MAJOR APPROPRIATIONS

The greater part of the Bureau's work during the year was supported by appropriations of three general types, as follows:

(1) Federal-aid appropriations made under authorizations for fiscal years up to 1933. These appropriations must be matched with State or other funds, and when so matched are available for expenditure only on the approved Federal-aid highway system.

(2) The appropriation made by the Emergency Relief and Construction Act of 1932. This appropriation was available to the States to be used, in lieu of State funds, for the purpose of matching Federal-aid appropriations. It could also be used in conjunction with funds appropriated by the National Industrial Recovery Act. The availability of this money originally terminated on July 1, 1933, but was extended by later legislation to September 1, 1934.

(3) The appropriation made by section 204 of the National Industrial Recovery Act for improvement of the Federal-aid system and its municipal extensions and secondary or feeder roads. This money is available for payment of the whole cost of improvements except expenses for right-of-way, but may be used in conjunction with either Federal-aid or emergency-construction funds or both.

FEDERAL-AID FUNDS

No funds of this character were authorized for the fiscal year 1934. In 3 years from 1931 to 1933, inclusive, they were authorized at the rate of \$125,000,000 a year but the last authorization was subject to reduction in the amount of one-fifth of the amount actually expended of the emergency funds provided by the act of December 20, 1930. The amount so deducted was \$15,840,743.86.

Table 4 gives for the fiscal years 1923 to 1933, inclusive, the amounts of the Federal-aid funds apportioned among the States after deducting the percentage allowable for Federal administration, and, for the same period of years with addition of 1934, the amounts obligated to definite projects and amounts paid for work done during each of the years. It will be observed that the maximum rate of obligation and expenditure of these funds was reached in the fiscal year 1931, with recession in later years as the unobligated and unexpended balances were reduced and other funds became available. As shown by this table the amount of Federal-aid funds paid to the States in the fiscal year 1934 was \$42,291,937.

TABLE 4.—Federal-aid funds apportioned to the States, obligated to projects and paid to the States each fiscal year, 1923 to 1934, inclusive

Fiscal year	Apportioned amount of appropriation authorized for the year	Amount of Federal-aid funds obligated during the year	Amount of Federal-aid funds paid to States during the year
1923	\$48,750,000.00	\$77,461,559	\$69,677,241.86
1924	63,375,000.00	89,866,864	79,217,397.90
1925	73,125,000.00	87,294,396	95,749,998.11
1926	73,125,000.00	79,698,897	87,754,534.57
1927	73,125,000.00	77,453,046	81,371,013.03
1928	73,125,000.00	88,922,185	80,802,232.55
1929	73,125,000.00	70,428,896	82,097,380.38
1930	73,125,000.00	102,498,084	75,880,862.84
1931	121,875,000.00	157,952,903	133,340,910.64
1932	121,875,000.00	83,793,787	127,367,119.74
1933	106,034,256.14	46,689,026	101,266,331.02
1934	-----	12,847,071	42,291,936.73
Total	900,659,256.14	974,816,714	1,056,816,959.37
Average	¹ 81,878,114.19	81,234,726	88,068,079.95

¹ Average for 11 years. No Federal-aid funds were authorized for fiscal year 1934.

Details of this expenditure are given by States in table 5, which also shows the status of the unexpended funds at the close of the fiscal year. It will be noted that only \$2,343,260 of the authorized funds were at that time unobligated. Unpaid there was a balance of \$16,815,933; but of this sum a portion was already earned by the completion of work for which it was allotted, and the unearned balance was only approximately \$10,211,000 at the end of the year.

TABLE 5.—Federal aid paid to States during the fiscal year 1934, and unpaid, unearned, and unobligated balances of the total Federal-aid apportionment on June 30, 1934

State	Paid to States	Unpaid balance	Unearned balance	Unobligated balance
Alabama.....	\$2,324,634.14	\$2,043,129.04	\$1,592,000	\$351,115.15
Arizona.....	560,394.49	59,784.04	38,000	33,103.61
Arkansas.....	1,494,124.06	648,415.99	545,000	75,129.29
California.....	655,553.02	36,786.21	3,000	1,821.49
Colorado.....	925,237.45	211,472.94	42,000	27,377.17
Connecticut.....	515,624.60	474,321.96	254,000	9,178.67
Delaware.....	201,522.96	5,270.48	5,000	2,312.20
Florida.....	1,695,063.72	394,337.30	197,000	7,447.41
Georgia.....	391,954.97	184,458.57	153,000	152,218.29
Idaho.....	337,566.03	102,711.87	70,000	39,268.92
Illinois.....	1,774,923.47	865,402.93	462,000	54,521.60
Indiana.....	819,805.79	288,186.55	110,000	-----
Iowa.....	264,678.43	-----	-----	-----
Kansas.....	703,004.64	113,490.85	114,000	113,490.85
Kentucky.....	889,745.76	42,503.66	19,000	13,361.92
Louisiana.....	1,086,896.48	251,354.15	168,000	-----
Maine.....	267,431.91	172.41	-----	172.41
Maryland.....	108,541.13	6,123.96	-----	-----
Massachusetts.....	872,096.37	369,103.41	132,000	9,264.56
Michigan.....	1,267,149.36	168,815.75	28,000	7,434.87
Minnesota.....	200,482.17	177,918.47	40,000	-----
Mississippi.....	2,505,921.08	2,087,731.39	1,600,000	259,765.82
Missouri.....	537,918.16	131,801.96	124,000	105,362.40
Montana.....	1,423,177.35	463,904.52	315,000	-----
Nebraska.....	607,433.39	151,237.92	140,000	5,804.68
Nevada.....	387,267.79	43,327.07	43,000	-----
New Hampshire.....	224,716.03	46,441.90	28,000	20,454.57
New Jersey.....	1,182,237.99	813,121.49	167,000	32,005.49
New Mexico.....	475,389.13	167,928.32	80,000	-----
New York.....	3,021,672.54	1,197,343.64	468,000	36,138.40
North Carolina.....	1,448,914.13	816,152.24	714,000	140,296.10
North Dakota.....	1,032,699.12	747,829.63	467,000	65,982.52
Ohio.....	931,300.25	252,357.07	150,000	133,911.36
Oklahoma.....	909,018.25	197,510.08	133,000	129,886.18
Oregon.....	712,204.38	284,343.34	248,000	6,519.97
Pennsylvania.....	1,426,678.37	159,148.20	29,000	29,027.84
Rhode Island.....	191,834.72	62,867.28	25,000	62,867.28
South Carolina.....	275,562.48	105,320.77	34,000	27,749.78
South Dakota.....	360,972.48	555,054.74	365,000	34,633.42
Tennessee.....	1,263,315.71	217,824.10	104,000	14,771.08
Texas.....	2,752,059.57	296,136.07	124,000	73,364.70
Utah.....	318,341.01	249,712.46	100,000	100,228.86
Vermont.....	59,010.26	6,553.48	6,000	-----
Virginia.....	605,451.05	608,934.50	226,000	111,246.83
Washington.....	424,495.23	16,168.04	1,000	-----
West Virginia.....	374,055.40	75,175.40	36,000	32,197.59
Wisconsin.....	515,271.05	66,490.14	40,000	-----
Wyoming.....	277,718.07	143,272.61	75,000	-----
Hawaii.....	688,870.79	408,484.58	397,000	3,827.16
Total.....	42,291,936.73	16,815,933.48	10,211,000	2,343,260.44

By act approved June 18, 1934, additional Federal-aid appropriations were authorized to be made in the amount of \$125,000,000 for each of the fiscal years 1936 and 1937. In accordance with the requirements of the Federal Highway Act, as amended, the first of these sums will be apportioned on or before January 1, 1935.

EMERGENCY CONSTRUCTION FUNDS

The amount appropriated by the Emergency Relief and Construction Act of 1932 was \$120,000,000. The entire sum, without deduction for Federal administrative purposes, was apportioned among the several States and Hawaii as shown by table 6. These sums have since been expended in conjunction with

Federal-aid apportionments and apportionments under the Recovery Act, the total expenditure to June 30, 1934, being \$117,801,106, as also detailed in table 6. Of the total payments to that date the table shows that \$55,669,145 was expended during the fiscal year 1934. The unexpended balance on June 30 was \$2,198,893, which under the law is available for expenditure until September 1, 1934.

TABLE 6.—*Emergency construction apportionment, and amounts paid to States for the fiscal year 1934, and the total paid to June 30, 1934*

State	Emergency construction apportionment	Paid to States during fiscal year	Total paid to States
Alabama.....	\$2,558,229	\$995,831.15	\$2,459,481.88
Arizona.....	1,760,771	532,825.26	1,760,771.00
Arkansas.....	2,101,182	1,103,914.48	1,902,477.37
California.....	4,667,188	1,270,621.86	4,667,188.00
Colorado.....	2,258,613	1,074,298.69	2,252,465.93
Connecticut.....	778,806	579,504.01	778,806.00
Delaware.....	600,000	600,000.00	600,000.00
Florida.....	1,624,752	606,598.97	1,606,492.36
Georgia.....	3,123,298	739,944.03	3,123,298.00
Idaho.....	1,505,912	703,613.01	1,463,572.47
Illinois.....	5,082,847	3,668,754.15	5,047,271.14
Indiana.....	3,058,980	3,058,980.00	3,058,980.00
Iowa.....	3,171,504	767,516.02	3,171,504.00
Kansas.....	3,265,048	1,200,149.43	3,265,048.00
Kentucky.....	2,264,637	1,299,458.60	2,264,637.00
Louisiana.....	1,745,559	587,089.44	1,745,559.00
Maine.....	1,067,079	677,062.94	1,067,079.00
Maryland.....	1,019,570	584,762.73	1,012,258.46
Massachusetts.....	1,716,612	949,563.31	1,716,612.00
Michigan.....	3,779,706	1,943,559.90	3,741,758.47
Minnesota.....	3,368,559	1,632,238.28	3,368,559.00
Mississippi.....	2,160,164	1,451,997.95	2,110,277.21
Missouri.....	3,753,453	2,182,531.78	3,753,453.00
Montana.....	2,525,071	887,899.75	2,525,070.99
Nebraska.....	2,544,773	468,687.55	2,544,773.00
Nevada.....	1,575,756	616,058.23	1,575,756.00
New Hampshire.....	600,000	359,347.65	585,770.91
New Jersey.....	1,657,733	266,812.33	1,126,499.65
New Mexico.....	1,965,473	296,123.13	1,965,473.00
New York.....	6,059,238	3,376,356.51	5,903,568.85
North Carolina.....	2,888,251	1,221,832.19	2,850,691.40
North Dakota.....	1,933,901	1,059,858.72	1,933,747.45
Ohio.....	4,490,175	2,281,141.54	4,360,381.66
Oklahoma.....	2,888,723	1,677,905.78	2,862,675.87
Oregon.....	2,001,740	947,972.47	1,894,260.81
Pennsylvania.....	5,267,060	3,017,822.63	5,267,060.00
Rhode Island.....	600,000	211,931.96	600,000.00
South Carolina.....	1,666,755	515,460.11	1,578,281.29
South Dakota.....	2,001,573	729,537.73	1,947,289.39
Tennessee.....	2,605,160	808,775.44	2,550,438.58
Texas.....	7,664,621	4,295,592.53	7,664,621.00
Utah.....	1,395,331	640,265.91	1,268,956.02
Vermont.....	600,000	341,655.44	600,000.00
Virginia.....	2,256,178	784,024.62	1,947,710.38
Washington.....	1,920,470	713,579.38	1,920,470.00
West Virginia.....	1,323,912	399,990.56	1,269,388.54
Wisconsin.....	2,991,076	983,531.22	2,986,704.18
Wyoming.....	1,541,561	456,621.02	1,541,561.00
Hawaii.....	600,000	99,544.95	592,407.32
Total.....	120,000,000	55,669,145.34	117,801,106.58

The act of December 20, 1930, which appropriated \$80,000,000 to be advanced for emergency construction provided for the repayment of amounts actually expended by deduction in five equal installments from future Federal-aid authorizations beginning with that for the fiscal year 1933. The first deduction was made, as previously reported, in the amount of \$15,840,743.86.

The Emergency Relief and Construction Act provided for repayment of its \$120,000,000 appropriation in similar manner over a period of 10 years, commencing with the fiscal year 1938.

Both of these repayment requirements were rescinded by the act approved June 18, 1934, in accordance with which no further deductions will be made on account of the advances made.

PUBLIC WORKS HIGHWAY FUNDS

By section 204 of the National Industrial Recovery Act the President was authorized to make grants to the highway departments of the several States in an amount not less than \$400,000,000, to be expended by such departments in general accord with the provisions of the Federal Highway Act with certain exceptions.

By direction of the President the amount of \$400,000,000 was allotted for the purpose named by the Public Works Administration for apportionment among the 48 States and the District of Columbia and Hawaii, as required by the act.

After deduction of 1½ percent for Federal administration the balance of \$394,000,000 was apportioned in the manner required by the act of June 16, 1933. Seven-eighths of the total was apportioned, as required in the manner prescribed for Federal-aid authorizations, i. e., three equal parts each were divided according to the area, population, and post-road mileage of the participating governmental units; and one-eighth was divided in proportion to population. The resulting apportionment is given in table 7.

TABLE 7.—Apportionment and assignment of Public Works highway funds, June 30, 1934, as provided by sec. 204 of the National Industrial Recovery Act

State	Apportionment	Assignment of apportioned funds—					
		To projects on the Federal-aid system outside of municipalities		To projects on extensions of the Federal-aid system into and through municipalities		To projects on secondary or feeder roads	
		Amount	Percent	Amount	Percent	Amount	Percent
Alabama	\$8,370,133	\$4,185,067.00	50.0	\$2,092,533.00	25.0	\$2,092,533.00	25.0
Arizona	5,211,960	3,878,555.11	74.0	807,982.36	16.0	525,422.53	10.0
Arkansas	6,748,335	3,374,167.00	50.0	1,889,534.00	28.0	1,484,634.00	22.0
California	15,607,354	7,803,677.00	50.0	4,213,986.00	27.0	3,589,691.00	23.0
Colorado	6,874,530	3,437,265.00	50.0	1,718,633.00	25.0	1,718,632.00	25.0
Connecticut	2,865,740	1,404,213.00	49.0	802,407.00	28.0	659,120.00	23.0
Delaware	1,819,088	909,544.00	50.0	454,772.00	25.0	454,772.00	25.0
Florida	5,231,834	2,615,917.00	50.0	1,307,959.00	25.0	1,307,958.00	25.0
Georgia	10,091,185	5,045,592.00	50.0	2,724,620.00	27.0	2,320,973.00	23.0
Idaho	4,486,249	2,166,858.00	48.3	1,197,829.00	26.7	1,121,562.00	25.0
Illinois	17,570,770	4,585,971.00	26.1	7,718,839.00	43.9	5,265,960.00	30.0
Indiana	10,037,843	5,018,921.00	50.0	4,416,651.00	44.0	602,271.00	6.0
Iowa	10,055,660	5,027,830.00	50.0	2,815,585.00	28.0	2,212,245.00	22.0
Kansas	10,089,604	5,044,802.00	50.0	2,522,401.00	25.0	2,522,401.00	25.0
Kentucky	7,517,359	3,608,332.00	48.0	2,029,687.00	27.0	1,879,340.00	25.0
Louisiana	5,828,591	2,914,295.00	50.0	1,457,148.00	25.0	1,457,148.00	25.0
Maine	3,369,917	1,617,560.00	48.0	909,878.00	27.0	842,479.00	25.0
Maryland	3,564,527	1,782,263.00	50.0	891,132.00	25.0	891,132.00	25.0
Massachusetts	6,597,100	1,101,716.00	16.7	5,007,199.00	75.9	488,185.00	7.4
Michigan	12,736,227	6,113,389.00	48.0	3,438,781.00	27.0	3,184,057.00	25.0
Minnesota	10,656,569	4,561,011.00	42.8	3,719,143.00	34.9	2,376,415.00	22.3
Mississippi	6,978,675	3,489,337.00	50.0	1,744,669.00	25.0	1,744,669.00	25.0
Missouri	12,180,306	5,237,532.00	43.0	4,019,501.00	33.0	2,923,273.00	24.0
Montana	7,439,748	4,463,849.00	60.0	1,115,962.00	15.0	1,859,937.00	25.0
Nebraska	7,828,961	3,914,481.00	50.0	1,957,240.00	25.0	1,957,240.00	25.0
Nevada	4,545,917	2,909,387.00	64.0	500,051.00	11.0	1,136,479.00	25.0
New Hampshire	1,909,839	725,739.00	38.0	706,640.00	37.0	477,460.00	25.0
New Jersey	6,346,039	3,099,370.48	48.8	3,190,118.00	50.3	56,550.52	.9
New Mexico	5,792,935	2,896,467.00	50.0	1,448,234.00	25.0	1,448,234.00	25.0
New York	22,330,101	10,271,846.00	46.0	8,449,487.00	37.8	3,608,768.00	16.2
North Carolina	9,522,293	4,761,147.00	50.0	2,380,573.00	25.0	2,380,573.00	25.0
North Dakota	5,804,448	2,902,224.00	50.0	1,451,112.00	25.0	1,451,112.00	25.0
Ohio	15,484,592	7,277,758.00	47.0	4,335,686.00	28.0	3,871,148.00	25.0
Oklahoma	9,216,798	4,608,399.00	50.0	2,304,200.00	25.0	2,304,199.00	25.0
Oregon	6,106,896	3,053,448.00	50.0	1,526,724.00	25.0	1,526,724.00	25.0
Pennsylvania	18,891,004	6,691,194.00	35.4	4,854,988.00	25.7	7,344,822.00	38.9
Rhode Island	1,998,708	999,354.00	50.0	499,677.00	25.0	499,677.00	25.0
South Carolina	5,459,165	2,729,583.00	50.0	1,364,791.00	25.0	1,364,791.00	25.0
South Dakota	6,011,479	3,005,739.00	50.0	1,502,870.00	25.0	1,502,870.00	25.0
Tennessee	8,492,619	4,246,309.00	50.0	2,123,155.00	25.0	2,123,155.00	25.0
Texas	24,244,024	12,122,012.00	50.0	6,061,006.00	25.0	6,061,006.00	25.0
Utah	4,194,708	2,374,205.00	56.6	771,826.00	18.4	1,048,677.00	25.0
Vermont	1,867,573	928,184.00	49.7	500,509.00	26.8	438,880.00	23.5
Virginia	7,416,757	3,708,379.00	50.0	2,008,458.00	27.1	1,699,920.00	22.9
Washington	6,115,867	3,057,934.00	50.0	1,977,260.00	32.3	1,080,673.00	17.7
West Virginia	4,474,234	2,013,405.00	45.0	1,342,270.00	30.0	1,118,559.00	25.0
Wisconsin	9,724,881	4,615,429.00	47.5	2,684,067.00	27.6	2,428,385.00	24.9
Wyoming	4,501,327	2,250,663.00	50.0	1,125,332.00	25.0	1,125,332.00	25.0
District of Columbia	1,918,469	-----	-----	959,235.00	50.0	959,234.00	50.0
Hawaii	1,871,062	1,683,956.00	90.0	-----	-----	187,106.00	10.0
Total	394,000,000	186,234,275.59	47.3	115,042,340.36	29.2	92,723,384.05	23.5

The rules and regulations, issued by the Secretary of Agriculture with approval of the Special Board for Public Works on June 23, 1933, required that not more than 50 percent of the funds apportioned to any State should be applied to projects on the Federal-aid system outside of the corporate limits of municipalities, and not less than 25 percent to projects on extensions of the Federal-aid system into and through municipalities, the balance (not more than 25 percent) to be applied to secondary or feeder roads, all subject to certain exceptions as might be required by existing conditions.

Each State highway department was required at the outset to submit a preliminary statement of the proposed assignment to the three classes of projects, conforming to the above requirements, and, as promptly as possible thereafter, to submit for approval a program in detail of the locations of projects to be developed with the amounts tentatively to be allotted to each. The assignments as approved are also shown in table 7.

The assignments approved, programs were submitted and approved without undue delay, and the definite obligation of the money to planned projects proceeded rapidly. On June 30, 1934, there remained only \$26,606,762 unobligated as shown by table 8, and the amounts obligated were divided among the three classes of projects in the several States as shown.

TABLE 8.—*Status of obligation of apportioned Public Works highway funds, June 30, 1934*

State	Total apportionment	Obligated to projects—			Balance unobligated
		On the Federal-aid system outside of municipalities	On extensions of the Federal-aid system into and through municipalities	On secondary or feeder roads	
Alabama	\$8,370,133	\$3,703,255.35	\$2,021,073.79	\$1,844,514.68	\$801,289.18
Arizona	5,211,960	3,849,592.80	762,925.76	520,199.36	79,242.08
Arkansas	6,748,335	3,165,249.95	1,785,803.10	1,125,572.99	671,708.96
California	15,607,354	7,794,571.70	4,170,374.60	3,370,187.46	272,220.24
Colorado	6,874,530	3,427,087.02	1,647,302.57	1,690,915.51	109,224.90
Connecticut	2,865,740	1,399,781.88	801,335.26	659,120.00	5,502.86
Delaware	1,819,088	895,682.01	418,154.71	254,337.50	250,913.78
Florida	5,231,834	2,474,109.07	1,307,959.00	1,276,269.83	173,496.10
Georgia	10,091,185	4,150,027.70	1,569,042.30	1,267,603.09	3,104,511.91
Idaho	4,486,249	2,062,955.10	1,131,268.94	1,121,562.00	170,462.96
Illinois	17,570,770	4,526,063.09	7,545,903.54	5,265,960.00	232,843.37
Indiana	10,037,843	5,018,921.00	4,018,041.37	540,734.86	460,145.77
Iowa	10,055,660	5,005,455.50	2,169,419.50	2,212,245.00	665,540.00
Kansas	10,089,604	5,044,802.00	2,522,401.00	2,522,401.00	—
Kentucky	7,517,359	3,608,332.00	1,313,825.58	1,869,467.43	725,733.99
Louisiana	5,828,591	2,671,632.13	1,457,148.00	1,282,354.88	417,455.99
Maine	3,369,917	1,503,746.86	830,956.22	832,924.50	202,289.42
Maryland	3,564,527	1,253,345.03	386,588.31	848,166.20	1,076,427.46
Massachusetts	6,597,100	1,020,088.06	4,760,414.75	469,741.41	346,855.78
Michigan	12,736,227	5,810,696.00	3,330,370.00	3,069,700.00	525,461.00
Minnesota	10,656,569	4,561,011.00	3,116,956.64	2,180,092.88	798,478.48
Mississippi	6,978,675	2,921,629.97	1,051,512.55	1,247,149.80	1,758,382.68
Missouri	12,180,306	4,997,772.36	3,405,062.84	2,861,843.14	915,627.66
Montana	7,439,748	4,460,575.17	1,108,927.26	1,859,101.96	11,143.61
Nebraska	7,828,961	3,913,681.39	1,937,151.64	1,954,539.51	23,588.46
Nevada	4,545,917	2,829,544.63	458,967.14	1,008,029.88	249,375.35
New Hampshire	1,909,839	646,720.06	706,640.00	477,383.82	79,005.12
New Jersey	6,346,039	2,730,945.88	2,928,244.38	56,550.52	630,298.22
New Mexico	5,792,935	2,835,862.97	1,348,276.16	1,246,115.17	362,680.70
New York	22,330,101	10,217,884.12	7,781,926.87	3,598,271.33	732,018.68
North Carolina	9,522,293	4,165,843.62	1,833,496.43	1,851,173.75	1,671,779.20
North Dakota	5,804,448	2,835,758.70	1,151,825.47	727,957.69	1,088,906.14
Ohio	15,484,592	7,241,144.63	4,329,185.88	3,820,428.00	93,833.49
Oklahoma	9,216,798	4,315,911.77	2,081,894.67	2,276,385.92	542,605.64
Oregon	6,106,896	3,044,966.08	1,415,326.54	1,526,724.00	119,879.38
Pennsylvania	18,891,004	6,627,677.96	4,265,313.83	7,247,292.79	750,719.42
Rhode Island	1,998,708	996,029.70	499,677.00	412,465.02	90,536.28
South Carolina	5,459,165	2,444,212.87	1,124,097.85	1,364,791.00	526,063.28
South Dakota	6,011,479	2,752,531.80	1,143,740.66	1,021,899.41	1,093,307.13
Tennessee	8,492,619	4,124,026.04	1,863,450.28	1,934,210.23	570,932.45
Texas	24,244,024	10,710,542.07	5,212,530.13	6,620,455.24	2,700,496.56
Utah	4,194,708	2,295,679.72	657,221.88	1,018,704.93	223,101.47
Vermont	1,867,573	912,174.61	500,509.00	438,880.00	16,009.39
Virginia	7,416,757	3,471,555.25	1,861,920.03	1,632,964.06	430,317.66
Washington	6,115,867	3,040,009.78	1,960,021.92	1,073,983.31	41,851.99
West Virginia	4,474,234	1,945,733.43	1,201,103.25	1,046,755.17	280,642.15
Wisconsin	9,724,881	4,578,428.21	2,487,464.62	2,295,740.74	363,247.43
Wyoming	4,501,327	2,229,816.75	1,012,380.87	1,125,332.00	133,797.38
District of Columbia	1,918,469	—	953,096.04	959,028.70	6,344.26
Hawaii	1,871,062	1,682,967.22	—	177,717.69	10,377.09
Total	394,000,000	177,919,032.01	103,348,260.13	86,125,945.36	26,606,762.50

The amounts paid to the several States for work done under the Recovery Act appropriation are given in table 9. These amounts do not include \$35,275,000 advanced to 32 States, the District of Columbia, and Hawaii to provide revolving funds for direct payment of amounts due for work done, nor do they include amounts due for work completed in other States for which at the time the Federal Government had not made reimbursement.

TABLE 9.—Amounts paid to the States from Public Works highway funds provided by section 204 of the National Industrial Recovery Act, to June 30, 1934

State	Amount	State	Amount	State	Amount
Alabama.....	\$1,897,468.23	Massachusetts...	\$1,478,810.68	Rhode Island....	\$538,181.34
Arizona.....	2,588,102.48	Michigan.....	2,924,506.92	South Carolina...	1,557,411.43
Arkansas.....	1,674,465.29	Minnesota.....	3,937,230.10	South Dakota....	1,345,689.59
California.....	4,570,381.71	Mississippi.....	1,333,164.99	Tennessee.....	2,692,653.22
Colorado.....	3,217,748.86	Missouri.....	4,476,949.44	Texas.....	9,258,492.53
Connecticut.....	763,678.42	Montana.....	3,443,719.02	Utah.....	2,362,403.72
Delaware.....	406,303.82	Nebraska.....	3,270,749.41	Vermont.....	485,450.45
Florida.....	2,983,546.61	Nevada.....	2,120,654.76	Virginia.....	1,557,676.29
Georgia.....	2,851,850.61	New Hampshire...	535,010.21	Washington.....	2,747,160.15
Idaho.....	1,859,379.43	New Jersey.....	1,313,467.55	West Virginia....	1,611,570.57
Illinois.....	2,280,937.40	New Mexico.....	2,247,289.75	Wisconsin.....	2,858,737.46
Indiana.....	1,185,655.28	New York.....	5,321,487.84	Wyoming.....	1,569,632.58
Iowa.....	4,015,611.46	North Carolina...	2,565,598.68	Hawaii.....	361,946.00
Kansas.....	5,462,860.14	North Dakota....	1,148,440.28	District of Co-	
Kentucky.....	3,136,992.52	Ohio.....	5,251,474.89	lumbia.....	846,671.08
Louisiana.....	1,662,460.54	Oklahoma.....	3,674,899.52		
Maine.....	1,441,460.71	Oregon.....	2,324,174.84	Total.....	123,754,297.00
Maryland.....	495,358.56	Pennsylvania.....	4,099,839.64		

¹ In addition, \$35,275,000 had been advanced to 32 States, the District of Columbia, and Hawaii to provide revolving funds from which payments are made directly.

By the Hayden-Cartwright Act, approved June 18, 1934, there was authorized to be appropriated \$200,000,000 to be apportioned and otherwise administered in a manner similar to but not exactly like the \$400,000,000 fund granted by the Recovery Act. This sum was apportioned on June 19, 1934, as shown in table 10, and at the end of the fiscal year further progress toward expenditure of the money awaited issuance of the rules and regulations.

TABLE 10.—Apportionment of Public Works highway appropriation authorized by the act of June 18, 1934

State	Amount	State	Amount	State	Amount
Alabama.....	\$4,259,842	Massachusetts.....	\$3,350,474	Rhode Island.....	\$1,014,572
Arizona.....	2,641,935	Michigan.....	6,452,568	South Carolina...	2,770,954
Arkansas.....	3,428,049	Minnesota.....	5,425,551	South Dakota....	3,047,643
California.....	7,932,206	Mississippi.....	3,540,227	Tennessee.....	4,302,991
Colorado.....	3,486,006	Missouri.....	6,173,740	Texas.....	12,291,253
Connecticut.....	1,454,868	Montana.....	3,769,334	Utah.....	2,132,691
Delaware.....	923,395	Nebraska.....	3,964,364	Vermont.....	948,007
Florida.....	2,661,343	Nevada.....	2,302,356	Virginia.....	3,765,387
Georgia.....	5,113,491	New Hampshire...	969,462	Washington.....	3,106,412
Idaho.....	2,277,486	New Jersey.....	3,220,879	West Virginia....	2,280,335
Illinois.....	8,921,401	New Mexico.....	2,941,700	Wisconsin.....	4,941,837
Indiana.....	5,088,963	New York.....	11,327,921	Wyoming.....	2,287,712
Iowa.....	5,118,361	North Carolina...	4,840,941	District of Columbia	973,842
Kansas.....	5,117,675	North Dakota....	2,938,967	Hawaii.....	949,778
Kentucky.....	3,818,311	Ohio.....	7,865,012		
Louisiana.....	2,963,932	Oklahoma.....	4,685,180	Total.....	200,000,000
Maine.....	1,711,586	Oregon.....	3,097,814		
Maryland.....	1,810,058	Pennsylvania.....	9,590,788		

PROGRESS IN FEDERAL-AID ROAD CONSTRUCTION

Although the expenditure of Federal-aid road funds was far less during the year 1934 than in any other recent year, the largest portion of the mileage on which construction was completed during the year was that built under the Federal-aid plan. The large completion was due to the fact that many projects approved under the Federal-aid apportionments were far advanced when the year began and the small expenditure was due to the fact that the near approach to obligation of all apportioned funds cut off the development of new projects to replace those completed.

Initial Federal-aid improvements were made during the fiscal year on 9,192.3 miles of the Federal-aid highway system; advanced stages of improvement were constructed on 5,583.6 miles; and 4.3 miles previously improved were reconstructed. The total Federal-aid construction completed was therefore 14,780.2 miles. The result of the year's work in this single class of activity was greater than the whole mileage improved during the preceding year, which was 13,255.3 miles, and was exceeded only by the mileage improved in the fiscal year 1932.

The improvements classed as completed and included in the above mileage figures are not only physically completed but have also been paid for by the Federal Government to the full extent of its obligation.

The distribution of the completed mileage by States, its total cost, and the Federal-aid involved are shown in table 11. For the country as a whole, the total cost was \$237,972,675 of which \$84,592,580 was paid from Federal-aid funds and the balance from Federal emergency and State funds.

TABLE 11.—Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage construction, and reconstruction completed and paid for during the fiscal year 1934

State	Total cost	Federal aid	Mileage		
			Initial	Stage	Total
Alabama.....	\$3,482,092.33	\$1,720,016.26	120.3	55.2	175.5
Arizona.....	3,670,947.12	1,746,922.45	94.9	250.9	345.8
Arkansas.....	4,941,959.54	2,349,176.78	153.6	115.1	268.7
California.....	7,877,209.25	1,840,782.69	153.0	34.4	187.4
Colorado.....	4,666,410.98	2,155,405.48	181.3	125.7	307.0
Connecticut.....	1,661,827.34	673,119.47	32.9	7.2	40.1
Delaware.....	811,533.07	178,968.52	30.9	14.4	45.3
Florida.....	5,282,492.80	2,382,797.19	130.7	14.4	145.1
Georgia.....	4,815,820.88	1,837,986.16	116.3	198.1	314.4
Idaho.....	2,159,567.85	761,075.68	90.1	148.8	238.9
Illinois.....	12,820,215.21	4,217,703.01	406.4	48.8	455.2
Indiana.....	6,623,398.08	2,125,386.18	314.2	30.9	345.1
Iowa.....	5,053,779.35	862,583.58	253.1	66.8	319.9
Kansas.....	4,959,012.02	1,510,076.50	294.1	181.2	475.3
Kentucky.....	5,486,233.06	1,908,812.10	189.6	175.5	365.1
Louisiana.....	4,844,155.95	2,041,903.02	38.8	34.4	73.2
Maine.....	2,399,342.03	667,599.68	70.2	2.5	72.7
Maryland.....	1,739,445.09	358,958.61	66.9	1.5	68.4
Massachusetts.....	4,088,522.85	1,252,601.31	47.6	-----	47.6
Michigan.....	7,861,473.23	2,888,473.88	310.5	107.7	418.2
Minnesota.....	6,471,799.78	1,064,307.73	213.7	200.2	413.9
Mississippi.....	3,047,926.43	1,462,623.00	104.0	79.0	183.0
Missouri.....	4,499,358.53	801,780.41	214.5	31.1	245.6
Montana.....	4,992,163.37	2,795,391.22	383.9	312.6	696.5
Nebraska.....	6,317,474.80	2,896,730.18	183.8	166.3	350.1
Nevada.....	3,105,090.55	1,306,233.41	94.3	272.7	367.0
New Hampshire.....	957,756.11	379,664.74	22.8	3.4	26.2
New Jersey.....	4,941,116.02	1,369,305.81	39.7	3	40.0
New Mexico.....	4,618,731.38	2,048,371.47	275.4	155.6	431.0
New York.....	12,779,829.99	4,076,917.97	333.8	36.4	370.2
North Carolina.....	5,235,750.65	2,519,493.79	601.6	35.2	636.8
North Dakota.....	3,560,912.11	1,346,546.63	401.4	734.9	1,136.3
Ohio.....	8,247,547.28	2,276,698.32	201.6	68.4	270.0
Oklahoma.....	6,422,142.63	2,254,905.50	377.8	81.2	459.0
Oregon.....	4,315,366.78	1,606,011.70	109.5	102.4	211.9
Pennsylvania.....	11,491,797.67	3,728,345.46	348.2	14.1	362.3
Rhode Island.....	1,053,589.24	325,973.76	22.5	¹ 4.5	27.0
South Carolina.....	1,900,019.56	745,108.25	77.9	87.6	165.5
South Dakota.....	2,773,970.34	961,978.11	226.8	320.6	547.4
Tennessee.....	4,561,824.34	2,179,750.25	147.9	51.8	199.7
Texas.....	19,089,447.91	6,831,199.02	684.8	707.4	1,392.2
Utah.....	2,144,122.41	917,916.87	152.8	117.2	270.0
Vermont.....	669,158.92	87,446.51	29.7	6.5	36.2
Virginia.....	3,391,053.49	1,480,123.24	159.7	56.0	215.7
Washington.....	3,592,792.73	1,115,686.14	122.2	16.5	138.7
West Virginia.....	2,672,830.24	1,123,570.00	97.3	8.2	105.5
Wisconsin.....	5,854,771.57	1,458,331.96	159.6	106.7	266.3
Wyoming.....	2,968,770.48	913,848.98	262.4	197.6	460.0
Hawaii.....	1,863,119.46	1,037,971.22	47.3	-----	47.3
Total.....	237,972,674.80	84,592,580.20	9,192.3	5,587.9	14,780.2

¹ Includes 4.3 miles of reconstruction.

The classification of the completed mileage by types of surface improvement is shown in table 12.

TABLE 12.—Mileage of Federal-aid roads, by types of construction, completed and final payment made, during the fiscal year 1934

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Totals			
		Untreated	Treated	Untreated	Treated	Untreated	Treated							Initial	Stage	Total	
Alabama.....	74.6							9.4		14.4	75.8			1.3	120.3	55.2	175.5
Arizona.....	26.5							298.7						2.7	94.9	260.9	345.8
Arkansas.....	37.4							26.1						1.3	153.6	115.1	268.7
California.....	17.2							63.9		32.5	63.7			5.8	153.0	34.4	187.4
Colorado.....	7.6							96.9		1.2	31.8			8.1	181.3	125.7	307.0
Connecticut.....									6.9		23.5			1.1	32.9	7.2	40.1
Delaware.....	2.4									.6	42.3			30.9	14.4	45.3	45.3
Florida.....	55.4							43.9		5.2	33.4			7.2	130.7	14.4	145.1
Georgia.....	55.8							100.4		15.9	81.5			1.6	116.3	198.1	314.4
Idaho.....								143.0						1.2	90.1	148.8	238.9
Illinois.....	20.2													5.4	406.4	48.8	455.2
Indiana.....	39.3													1.1	253.1	30.9	315.1
Iowa.....	30.2													3.3	294.1	69.8	319.9
Kansas.....	161.3							135.9	3		26.6			1.2	181.2	181.2	475.3
Kentucky.....	113.3							12.4		26.6				1.2	180.0	173.5	365.1
Louisiana.....	5.3													2.6	38.8	31.1	73.2
Maine.....														.9	70.2	2.5	72.7
Maryland.....	4.3									14.2				1.2	66.9	1.5	68.4
Massachusetts.....										23.3				1.4	47.6	47.6	47.6
Michigan.....	107.0							5.8		12.7				.8	310.5	207.7	418.2
Minnesota.....	192.3									6.5					213.7	106.2	413.9
Mississippi.....	97.2									22.7					215.0	79.0	183.0
Missouri.....	30.4									8.7					104.0	31.1	245.6
Montana.....	122.4														1.6	214.5	245.6
Nebraska.....	121.9														383.9	312.6	696.5
Nevada.....										5.4					183.8	166.3	350.1
New Hampshire.....															94.3	272.7	367.0
New Jersey.....	3.7									1.8					22.8	3.4	26.2
New Mexico.....	44.1									.1					39.7	3	40.0
New York.....	43.3									9.2					275.1	155.6	431.0
North Carolina.....	28.8									36.2					333.8	36.4	370.2
North Dakota.....	432.8									20.7					601.6	35.2	636.8
Ohio.....	7.3									1.4					401.3	731.9	1,136.3
Oklahoma.....	323.7									77.6					201.6	68.3	270.0
Oregon.....	63.3									4					377.8	81.2	459.0
Pennsylvania.....	26.4									6.2					109.5	102.4	211.9
Rhode Island.....										24.0					348.2	14.1	362.3
South Carolina.....										3.3					22.5	4.5	27.0
South Dakota.....	183.0									11.9					77.9	87.6	165.5
Tennessee.....	60.3									46.3					226.8	320.6	547.4
Texas.....	489.0									93.1					147.9	51.8	199.7
Utah.....	1.3									77.6					684.8	707.4	1,392.2
															152.8	117.2	270.0

TABLE 12.—Mileage of Federal-aid roads, by types of construction, completed and final payment made, during the fiscal year 1934—Con.

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Totals		
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Initial	Stage	Total
Vermont.....				19.3				16.0			.1			29.7	6.5	36.2
Virginia.....	40.8	61.6		49.4			4.5	23.6		11.1				159.7	56.0	215.7
Washington.....	11.9			117.3							8.5			122.2	16.5	138.7
West Virginia.....	55.6				.5		19.1				29.9			97.3	8.2	105.5
Wisconsin.....	48.1			23.2							193.1			159.6	106.7	266.3
Wyoming.....	203.5			137.5				117.5						262.4	197.6	460.0
Hawaii.....							1.9		45.1					47.3		47.3
Total.....	3,397.9	377.7	215.6	3,022.4	433.1	263.1	326.7	1,925.6	169.4	438.9	4,061.6	44.4	103.8	9,192.3	5,587.9	14,780.2

In addition to the projects completed and paid for, there were others on which at the end of the year all construction work was completed to the satisfaction of the Bureau, as determined by final inspection, and only the final payment by the Federal Government remained to be made before classifying them as completed. In this report these projects are classified with those under construction and approved for construction at the close of the year.

Together, the projects in these three stages, representing the active Federal-aid improvement program at the end of the year, involved only 2,920.6 miles, as compared with a total of 16,481.3 miles the previous year. The large decrease is the result of the near approach to complete obligation of the available Federal-aid funds.

Of the total of 2,920.9 miles in the current program at the end of the year 2,054.2 miles were in course of initial improvement and 866.7 miles were in course of stage construction active or planned.

The distribution, by States, of the Federal-aid mileage in the three stages of progress toward completion is shown in table 13, together with estimated total costs and the amounts of Federal aid allotted. As in the case of the completed projects the difference between the total cost and the Federal aid will be supplied from Federal emergency-construction funds and State funds. For the country as a whole, the estimated cost of the projects in progress toward completion at the end of the year was \$77,147,811; the Federal aid allotted, \$31,525,545.

TABLE 13.—*Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage improvement, finally inspected, under construction and approved for construction, June 30, 1934*¹

State	Estimated total cost	Federal aid allotted	Mileage		
			Initial	Stage	Total
Alabama.....	\$2,454,570.98	\$1,227,320.42	38.1	64.8	102.9
Arizona.....	268,627.34	218,523.09	2.2	8.7	10.9
Arkansas.....	1,642,344.71	784,865.87	97.0	36.9	133.9
California.....	1,660,884.60	459,033.28	25.5	3.4	28.9
Colorado.....	1,279,941.78	630,203.93	56.9	5.6	62.5
Connecticut.....	2,592,964.59	1,059,366.62	13.8	.....	13.8
Delaware.....	138,879.50	25,512.72	.....	7.2	7.2
Florida.....	2,434,960.51	1,134,981.14	62.2	.....	62.2
Georgia.....	836,784.27	283,492.29	31.5	19.1	50.6
Idaho.....	841,099.57	293,196.85	21.5	48.0	69.5
Illinois.....	9,055,119.93	4,031,115.14	246.7	22.6	269.3
Indiana.....	4,698,920.96	2,068,678.36	100.6	.8	101.4
Kentucky.....	425,699.14	170,746.35	7.6	16.4	24.0
Louisiana.....	2,487,790.47	1,176,664.98	7.8	.4	8.2
Maryland.....	155,884.65	20,284.20	2.5	.....	2.5
Massachusetts.....	3,460,290.04	770,604.17	46.7	4.9	51.6
Michigan.....	2,208,873.05	922,230.00	84.5	24.8	109.3
Minnesota.....	2,433,519.01	837,447.31	43.8	53.3	97.1
Mississippi.....	5,006,100.00	2,496,082.83	130.3	108.7	239.0
Missouri.....	307,318.26	73,274.28	3.3	.....	3.3
Montana.....	1,659,836.98	921,663.27	84.3	75.7	160.0
Nebraska.....	273,047.54	134,200.56	.....	6.1	6.1
New Hampshire.....	210,985.67	75,692.99	2.5	2.2	4.7
New Jersey.....	2,937,392.79	908,098.69	28.1	.....	28.1
New Mexico.....	47,997.80	23,998.90	.2	.....	.2
New York.....	6,841,839.60	2,250,655.00	185.3	3.1	188.4
North Carolina.....	430,742.98	221,757.73	29.5	.....	29.5
North Dakota.....	1,139,400.00	561,797.08	24.3	37.7	62.0
Ohio.....	1,397,810.00	284,369.55	14.0	.....	14.0
Oklahoma.....	1,595,488.10	730,253.20	58.3	26.7	85.0
Oregon.....	724,371.08	330,945.45	14.3	18.5	32.8
Pennsylvania.....	2,459,609.53	699,447.05	82.3	.....	82.3
South Carolina.....	1,752,527.54	661,593.99	84.4	79.1	163.5
South Dakota.....	636,255.57	333,547.32	71.8	25.9	97.7
Tennessee.....	1,154,501.80	575,824.91	24.7	19.5	44.2
Texas.....	2,451,977.26	975,130.76	74.1	48.6	122.7
Utah.....	1,183,396.65	542,563.03	43.6	59.7	103.3
Vermont.....	32,523.66	3,429.60	1.4	.....	1.4
Virginia.....	2,869,150.19	1,311,752.06	126.5	25.5	152.0
Washington.....	507,644.68	84,810.39	5.4	.....	5.4
West Virginia.....	1,131,772.11	432,682.77	42.1	.....	42.1
Wisconsin.....	53,938.65	4,000.00	1.3	.....	1.3
Wyoming.....	134,314.83	64,000.00	6.2	12.8	19.0
Hawaii.....	1,130,712.54	709,706.82	27.1	.....	27.1
Total.....	77,147,810.91	31,525,544.95	2,054.2	866.7	2,920.9

¹ No mileage in this status in Iowa, Kansas, Maine, Nevada, and Rhode Island.

The classification of the projects in the active program by types of surface improvement is shown in table 14.

Virginia.....	76.1	.7	2.0	52.2			11.5	9.5		126.5	25.5	152.0
Washington.....	5.4									5.4		5.4
West Virginia.....	33.7		3.1	5.2					.1	42.1		42.1
Wisconsin.....								1.3		1.3		1.3
Wyoming.....	6.2				12.8					6.2	12.8	19.0
Hawaii.....						27.1				27.1		27.1
Total.....	594.5	18.8	293.7	102.9	13.3	436.3	343.4	748.4	24.4	2,054.2	866.7	2,920.9

1 No projects in this status in Iowa, Kansas, Maine, Nevada, and Rhode Island.

The total mileage, improved with Federal aid from the inauguration of the policy in 1916 to the end of the fiscal year was 119,712 miles. As explained in previous annual reports this total does not include mileage improved but since reduced or eliminated by relocations, mileage initially improved but currently undergoing stage construction and other mileage off the Federal-aid system for which substitutions on the system have been made.

Table 15 shows in parallel columns the mileage by States included in the designated Federal-aid highway system and the mileage improved with Federal aid to June 30, 1934. The total mileage in the system was 207,231; and, as the table shows, more than half of it has been improved with Federal aid.

TABLE 15.—Mileage of designated Federal-aid highway system, in each State, and mileage improved with Federal aid to June 30, 1934

State	Mileage of designated Federal-aid highway system	Mileage improved with Federal aid to June 30, 1934	State	Mileage of designated Federal-aid highway system	Mileage improved with Federal aid to June 30, 1934
Alabama.....	3,933	2,585.6	New Hampshire.....	988	460.5
Arizona.....	1,979	1,452.0	New Jersey.....	1,447	683.0
Arkansas.....	4,953	2,198.8	New Mexico.....	3,678	2,523.8
California.....	5,214	2,703.3	New York.....	8,118	3,922.0
Colorado.....	3,659	2,017.1	North Carolina.....	5,735	2,940.7
Connecticut.....	1,019	330.9	North Dakota.....	7,420	6,082.7
Delaware.....	754	413.6	Ohio.....	5,914	3,290.0
Florida.....	2,478	787.7	Oklahoma.....	6,049	2,806.8
Georgia.....	5,610	3,518.2	Oregon.....	3,795	1,802.3
Idaho.....	3,265	1,778.1	Pennsylvania.....	7,132	3,638.8
Illinois.....	7,498	3,568.1	Rhode Island.....	493	298.7
Indiana.....	4,930	2,369.4	South Carolina.....	3,545	2,258.4
Iowa.....	7,405	3,831.5	South Dakota.....	6,289	4,762.2
Kansas.....	7,920	4,305.1	Tennessee.....	3,982	1,925.1
Kentucky.....	3,701	2,190.9	Texas.....	12,513	9,136.1
Louisiana.....	2,742	1,673.3	Utah.....	1,787	1,474.5
Maine.....	1,588	889.4	Vermont.....	1,036	421.3
Maryland.....	2,177	912.2	Virginia.....	3,851	2,223.7
Massachusetts.....	1,504	935.0	Washington.....	3,177	1,449.3
Michigan.....	5,259	2,719.3	West Virginia.....	2,223	1,046.2
Minnesota.....	6,895	4,595.3	Wisconsin.....	5,557	3,002.3
Mississippi.....	3,709	2,095.1	Wyoming.....	3,565	2,496.6
Missouri.....	7,432	3,441.0	Hawaii.....	532	141.2
Montana.....	5,510	3,491.6			
Nebraska.....	5,594	4,580.0	Total.....	207,231	119,712.4
Nevada.....	1,677	1,543.7			

Classification of the 119,712 miles of completed federally aided roads as of June 30, by States and by types of surface improvement is shown in table 16.

TABLE 16.—Mileage of Federal-aid roads, improved, by types of construction, by States, June 30, 1934

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total
	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							
Alabama	260.8		490.0		899.6	4.5	16.3		37.0	62.8	173.2	610.1		31.3	2,585.6
Arizona	24.7		29.9		379.9				854.5	.8	38.9	110.7		12.6	1,452.0
Arkansas	98.5		922.0		456.3	36.7	87.4	41.1	49.3		266.0	677.7		20.1	2,198.8
California	435.5		47.5		874.5			31.4	503.1	110.1	344.5	795.4		27.0	2,703.3
Colorado	184.6				8.8		.1	17.2	336.6	49.6	15.6	439.9		30.1	2,017.1
Connecticut	2.4				30.3				11.7		6.0	355.5		7.0	330.9
Delaware	56.1		15.5					85.4		72.6	84.3	292.0		1.5	413.6
Florida	316.1		798.8	18.8	383.5	34.9	413.4	52.3	38.5	296.9	133.8	1,067.7	14.3	30.5	3,518.2
Georgia	176.7				647.7			157.7	626.9	30.3	92.7	49.0		7.1	1,778.1
Illinois	133.7				4					3.4	3.2	3,360.7	31.6	13.1	3,968.1
Indiana	42.6				90.2					17.0	12.0	2,193.3	6.6	7.7	2,369.4
Iowa	1,136.3				542.4				608.5	129.9	10.7	1,636.8	22.0	3.6	3,831.5
Kansas	1,173.1		709.6		329.9	115.1	50.3	16.2	38.1	84.3	234.4	649.8	164.5	27.0	2,190.9
Kentucky	603.4				502.2				3.2	3.2	41.8	264.5	3.9	8.3	1,673.3
Louisiana	68.6				1,275.3				240.8	240.8	272.2	216.4		19.9	889.4
Maine					236.4	191.5		.2	22.3	528.1	67.8	512.9		1.0	912.2
Maryland	9.2				45.0	.4	.4	.2	5.8	5.4		289.4		11.2	935.0
Massachusetts	161.0				395.7						163.6	1,964.2	.4	6.9	2,719.3
Michigan	1,201.7		11.1		1,497.5	17.7		11.1			32.7	1,831.5		3.1	4,595.3
Minnesota	394.8		15.0	9.3	1,143.5			19.6			83.6	411.9	9.5	16.4	3,095.1
Mississippi	429.1				836.2						20.0	2,083.5	7.5	17.7	3,441.0
Missouri	239.7				2,453.3						13.1	37.4		14.4	3,491.6
Montana	474.4		3,267.1	6.6	460.0	10.1	.2	91.7	989.0	5.0	30.3	613.6	19.5	18.4	4,380.0
Nebraska	23.5										14.6	21.5		2.3	1,543.7
Nevada											31.9	624.5		5.7	460.5
New Hampshire	23.3				6.0				451.0	.9	9.9	93.2		13.6	2,523.8
New Jersey	256.7		19.1		1,665.3	15.0					190.6	3,065.5	1.8	2.9	3,922.0
New Mexico	109.5				129.1	6.2					308.8	1,073.3		10.5	2,940.7
New York	593.7		593.7	129.8	244.0	102.3	21.8	84.4	229.3	35.3	308.8	1,073.3		10.5	6,082.7
North Carolina	753.9		.3		4,874.5	129.1			286.2		2.6	26.1		10.0	6,082.7
North Dakota					52.4									30.1	3,290.0
Ohio	134.0		.6		511.2	8.3		105.4		373.0	217.3	1,635.4	715.1	30.1	3,290.0
Oklahoma	828.5				801.4	34.7		28.8	17.6	6	151.0	1,248.0	8.9	20.9	3,806.8
Oregon	374.5				3.1			47.7		7.7	162.1	122.5		11.3	1,802.3
Pennsylvania	195.0							616.0		106.3	49.3	332.3	43.4	7.8	3,638.2
Rhode Island	5.8													3.2	298.7
South Carolina	52.8		892.3	217.8	101.0	28.7					183.0	753.6		24.9	2,258.4
South Dakota	241.3		34.0		3,983.2	46.1			232.9	.3	4.9	170.0		7.7	4,762.2
Tennessee					106.2			61.4				2,669.1		13.2	1,925.1
Texas	1,246.7		21.1		2,671.1	657.9		69.0		341.8	888.0	2,669.1	32.8	64.3	9,136.1

TABLE 16.—*Mileage of Federal-aid roads, improved, by types of construction, by States, June 30, 1934*—Continued

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total
	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated									
Utah.....	98.9								502.6	4.5	18.2	128.1		4.6	1,474.5
Vermont.....			440.1	7.4	270.7				128.2	128.6		188.6		8.0	421.3
Virginia.....	262.4		118.4	2.0	1.1				32.2	61.2		527.4		12.1	2,223.7
Washington.....	256.0	13.7	693.9	5.2	386.5	46.0				386.2		491.5		7.9	1,449.3
West Virginia.....	340.3		33.7	.5	19.5	25.9			1.4	200.1		382.5	10.3	3.9	1,046.2
Wisconsin.....	215.4		892.3	15.8					631.5	13.8		1,833.4		12.2	3,002.3
Wyoming.....	532.7		1,269.3		1.9					1.7		17.4		11.7	2,496.6
Hawaii.....										105.5	13.3	19.0		1.5	141.2
Total.....	14,007.1	396.0	33,137.4	1,471.3	2,304.8	1,373.6			7,385.8	4,860.5	4,639.1	41,012.1	1,097.2	652.4	119,712.4

CHANGES IN THE FEDERAL-AID HIGHWAY SYSTEM

In the last annual report the mileage of the Federal-aid system within the boundaries of national forests, Indian reservations, and other Federal reservations was reported as 6,224 miles, as determined up to the close of the fiscal year 1933. During the past year this mileage has been increased to 6,262 miles by the addition to the system of new routes in several States, portions of which lie within the various kinds of reservations. The added mileage was actually 14 miles greater than the difference between the two annual totals, because of the fact that the mileage in Oregon was reduced by that amount, from 495 to 481 miles. The location, by States, of the mileage within Federal reservations is shown in table 17.

TABLE 17.—Mileage of Federal-aid highway system within Federal reservations, being the amounts by which the 7-percent limiting mileage may be exceeded in each State as of June 30, 1934

State	Mileage within Federal reservations	State	Mileage within Federal reservations	State	Mileage within Federal reservations
Arizona.....	547	Minnesota.....	75	Pennsylvania.....	108
Arkansas.....	120	Mississippi.....	10	South Dakota.....	477
California.....	465	Montana.....	1,069	Tennessee.....	66
Colorado.....	438	Nebraska.....	21	Utah.....	103
Georgia.....	58	Nevada.....	22	Virginia.....	49
Idaho.....	558	New Hampshire.....	33	Washington.....	440
Illinois.....	5	New Mexico.....	308	West Virginia.....	29
Iowa.....	2	New York.....	16	Wisconsin.....	46
Kansas.....	15	North Carolina.....	176	Wyoming.....	326
Kentucky.....	6	North Dakota.....	23		
Maine.....	5	Oklahoma.....	48	Total.....	6,262
Michigan.....	57	Oregon.....	1 481		

¹ Due to more accurate measurements and relocations there is a reduction of 14 miles from the previous figure.

By amendment of the Federal Highway Act, approved May 21, 1928, the original 7-percent system may be increased by those mileages within Federal reservations, and such addition, together with an increase in the mileage of the system in Hawaii authorized by a special act approved February 23, 1931, raises the permissible mileage of the initial system to 207,143 miles.

The permissible Federal-aid-system mileage has been further increased by additions to the initial 7-percent mileage in States where provision has been made for the completion and maintenance of 90 percent of the original system, as provided by the Emergency Relief and Construction Act of 1932. Such extensions have been made in Connecticut, Delaware, Florida, Illinois, Maryland, Massachusetts, Nevada, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, and Virginia; amounting in the 14 States to 10,644 miles. The total permissible mileage of the Federal-aid system, as of June 30, 1934, was raised by this further addition to 217,787 miles. As shown in table 15, the amount actually designated and approved by the Secretary of Agriculture up to June 30, was 207,231 miles.

PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION

The National Industrial Recovery Act contained a provision authorizing grants to be made in amount not less than \$400,000,000 to be expended in general accordance with the Federal Highway Act for improvement of roads included in the Federal-aid highway system and extensions thereof into and through municipalities and for improvement of secondary or feeder roads.

The allotment for this purpose was made through the Special Board for Public Works on June 22, 1933, and the allotted funds were apportioned by the Secretary of Agriculture with the approval of the special board on June 23. Rules and regulations to govern the expenditure of the money were issued on the same day, and the preliminary work of submission and approval of programs was accomplished as rapidly as was to be expected in view of the existing circumstances.

Work on the first project to be approved was begun in Utah on August 5 and thereafter the beginning of work followed rapidly in all States. In the course

of the year construction was begun on 20,660 miles of road and completed on 6,986 miles, leaving 13,674 miles under construction on June 30, 1934. On the same date projects approved for construction included 1,718 miles, so that there was included in the year's active program a total of 22,378 miles.

The total cost of the projects completed during the year was \$79,774,036. The estimated total cost of the projects under construction at the close of the year was \$283,506,260; and that of the projects approved for construction at the same time was \$36,312,064, making a total for the year's active program of \$399,592,360.

Of the 6,986 miles in completed projects 4,363 miles was located on the Federal-aid highway system outside of municipalities. The improvement of this mileage cost \$46,283,443, of which \$41,194,237 was paid from Public Works funds, \$2,499,221 from Federal-aid funds and the remainder from Federal emergency construction and State funds.

Four hundred and sixty-nine miles, costing \$17,297,070 was on extensions of the Federal-aid system into and through municipalities. Of the total cost of this mileage the Public Works funds provided \$16,707,715 and Federal-aid funds \$145,863, the balance from the other above-mentioned sources.

The remaining completed mileage—2,154 miles costing \$16,193,523—consisted of secondary and feeder roads. The cost of these was met to the extent of \$15,300,038 from Public Works funds and the balance was paid from State funds. Federal-aid and emergency-construction funds were not available for this portion of the work because the roads improved are in no case included in the Federal-aid system.

The distribution, by States, of the completed mileage in each of the three classes of projects is given in table 18, together with the total costs of the roads built and the amounts paid from Public Works and Federal-aid funds.

TABLE 18.—*Total cost and mileage of Public Works highway projects completed to June 30, 1934, and Federal funds allotted thereto, by States*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$1,596,441.15	\$880,571.63	\$715,869.52	61.9
Arizona.....	1,776,203.88	1,735,542.70	.....	131.1
Arkansas.....	299,964.82	200,126.94	99,837.88	9.5
California.....	3,837,155.68	2,954,376.75	.....	142.5
Colorado.....	1,514,031.09	1,500,790.30	.....	96.0
Connecticut.....	31,798.76	31,798.76	.....	.1
Delaware.....	192,063.14	191,170.71	.....	3.0
Florida.....	1,281,060.88	814,074.82	466,986.06	43.7
Georgia.....	1,232,521.05	1,232,521.05	.....	73.6
Idaho.....	824,604.86	809,780.19	.....	81.8
Illinois.....	50,872.54	50,872.54	.....	.9
Iowa.....	1,057,700.42	1,038,800.00	.....	74.5
Kansas.....	1,330,234.56	1,329,365.58	.....	206.5
Kentucky.....	554,103.01	549,646.72	.....	59.6
Louisiana.....	222,415.49	222,390.49	.....	9.7
Massachusetts.....	289,573.84	212,377.94	69,984.24	6.4
Michigan.....	80,150.00	80,150.00	.....	1.8
Minnesota.....	2,488,707.73	2,468,224.86	20,482.87	509.5
Mississippi.....	288,524.53	164,210.19	124,314.34	12.8
Missouri.....	895,421.61	695,097.86	.....	43.5
Montana.....	1,426,917.20	1,246,901.20	100,000.00	93.4
Nebraska.....	2,122,823.42	1,535,019.12	108,538.00	215.8
Nevada.....	1,349,395.18	1,349,395.18	.....	173.0
New Hampshire.....	52,024.43	52,024.43	.....	.3
New Jersey.....	66,077.87	66,077.87	.....	6.1
New Mexico.....	1,873,447.55	1,873,447.55	.....	210.5
New York.....	510,222.64	410,162.64	43,000.00	8.0
North Carolina.....	1,037,299.11	714,521.55	322,777.56	103.5
North Dakota.....	1,050,552.17	1,047,220.19	3,294.32	457.9
Ohio.....	1,035,375.47	1,030,181.63	.....	27.8
Oklahoma.....	1,239,211.18	1,237,607.64	.....	101.4
Oregon.....	1,525,235.01	1,392,618.01	84,317.50	98.9
Pennsylvania.....	254,788.81	254,421.79	.....	4.4
Rhode Island.....	50,178.00	50,178.00	.....	1.1
South Carolina.....	263,440.39	263,440.39	.....	24.3
South Dakota.....	1,086,296.08	1,066,954.69	19,341.39	184.9

¹ No projects of this class completed in Indiana, Maine, and Maryland.

TABLE 18.—Total cost and mileage of Public Works highway projects completed to June 30, 1934, and Federal funds allotted thereto, by States—Continued

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES—Contd.

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Tennessee.....	\$1,393,206.06	\$1,180,143.76	\$213,062.30	61.5
Texas.....	4,182,635.90	3,504,691.72	.....	542.4
Utah.....	1,432,093.17	1,429,324.46	.....	146.0
Vermont.....	90,524.22	89,926.93	.....	7.4
Virginia.....	1,101,511.50	1,092,037.47	9,474.03	40.2
Washington.....	884,351.00	879,563.10	3,356.82	44.7
West Virginia.....	211,470.33	211,470.33	.....	6.7
Wisconsin.....	1,073,457.39	1,063,118.67	1,190.00	50.0
Wyoming.....	1,005,126.46	882,673.00	80,400.00	177.9
Hawaii.....	122,232.70	109,225.57	12,994.32	6.3
Total.....	46,283,442.88	41,194,236.92	2,499,221.15	4,362.8

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$183,974.41	\$183,974.41	.....	3.1
Arizona.....	179,423.43	177,982.55	.....	4.0
Arkansas.....	267,409.01	239,810.94	\$27,598.07	7.0
California.....	1,201,380.99	1,077,458.87	.....	13.8
Colorado.....	890,911.16	845,103.51	.....	17.2
Connecticut.....	48,325.68	48,325.68	.....	.5
Delaware.....	82,851.95	75,106.31	.....	.8
Florida.....	238,246.83	178,494.68	59,752.15	3.6
Georgia.....	270,623.84	270,623.84	.....	12.4
Idaho.....	191,286.86	187,894.42	.....	4.8
Illinois.....	213,649.45	213,618.50	.....	3.7
Indiana.....	49,616.53	49,616.53	.....	1.2
Iowa.....	703,618.21	667,865.00	.....	23.6
Kansas.....	727,167.34	723,495.87	.....	18.5
Kentucky.....	128,112.17	128,112.17	.....	3.2
Louisiana.....	329,889.35	329,889.35	.....	6.5
Maine.....	162,188.29	161,062.72	.....	2.4
Massachusetts.....	96,850.68	73,850.68	23,000.00	1.8
Michigan.....	195,700.00	195,700.00	.....	2.3
Minnesota.....	956,049.40	955,888.84	.....	53.6
Mississippi.....	122,848.45	110,388.95	12,459.50	3.8
Missouri.....	559,179.26	533,233.11	.....	12.7
Montana.....	345,305.18	345,305.18	.....	9.2
Nebraska.....	269,117.63	268,428.34	.....	11.7
Nevada.....	47,203.38	47,203.38	.....	1.2
New Jersey.....	94,073.38	94,073.38	.....	2.1
New Mexico.....	437,759.58	437,759.58	.....	13.1
New York.....	259,723.17	259,341.87	.....	4.0
North Carolina.....	588,701.49	586,560.20	166.10	30.4
North Dakota.....	128,994.64	128,994.64	.....	9.3
Ohio.....	495,616.80	455,579.08	.....	9.4
Oklahoma.....	220,928.88	220,571.20	.....	7.9
Oregon.....	422,188.01	406,695.04	14,126.97	9.8
Pennsylvania.....	778,975.47	761,814.18	.....	16.9
Rhode Island.....	54,063.40	54,063.40	.....	1.2
South Carolina.....	147,768.44	147,768.44	.....	4.1
South Dakota.....	183,149.74	183,149.74	.....	8.1
Tennessee.....	307,829.45	307,829.45	.....	6.7
Texas.....	1,605,904.15	1,523,073.09	.....	56.4
Utah.....	619,855.49	603,798.90	.....	13.9
Vermont.....	41,791.73	41,791.73	.....	1.9
Virginia.....	402,536.67	381,276.18	8,760.49	10.9
Washington.....	1,187,895.49	1,173,567.02	.....	20.7
West Virginia.....	87,291.15	87,291.15	.....	1.9
Wisconsin.....	399,615.60	393,308.77	.....	13.5
Wyoming.....	82,029.39	81,528.69	.....	1.6
District of Columbia.....	289,445.89	289,445.89	.....	2.4
Total.....	17,297,070.49	16,707,715.45	145,863.28	468.8

² No projects of this class completed in Maryland, New Hampshire, and Hawaii.

TABLE 18.—Total cost and mileage of Public Works highway projects complete to June 30, 1934, and Federal funds allotted thereto, by States—Continued

PROJECTS ON SECONDARY OR FEEDER ROADS³

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$26,236.82	\$26,236.82	.....	0.1
Arizona.....	90,857.40	90,857.40	.....	6.3
Arkansas.....	41,727.43	41,727.43	.....	15.9
California.....	617,476.51	497,034.19	.....	16.0
Colorado.....	617,189.08	616,485.80	.....	82.2
Florida.....	397,589.88	397,589.88	.....	26.0
Georgia.....	69,600.63	69,600.63	.....	4.2
Idaho.....	650,200.91	588,778.89	.....	70.8
Illinois.....	276,114.65	276,114.65	.....	42.0
Iowa.....	238,660.03	229,800.00	.....	49.2
Kansas.....	345,683.96	345,683.96	.....	17.2
Kentucky.....	448,942.86	448,876.03	.....	69.0
Louisiana.....	73,405.37	73,405.37	.....	2.4
Maine.....	577,668.36	571,325.97	.....	54.5
Maryland.....	22,217.70	22,217.70	.....	1.9
Michigan.....	88,500.00	88,500.00	.....	7.3
Minnesota.....	573,461.23	561,616.55	.....	81.8
Missouri.....	504,000.61	504,000.61	.....	141.8
Montana.....	712,695.05	712,695.05	.....	97.6
Nebraska.....	213,260.07	213,260.07	.....	70.3
Nevada.....	700,561.17	700,561.17	.....	70.6
New Hampshire.....	82,647.15	82,647.15	.....	2.5
New Mexico.....	351,481.58	351,481.58	.....	62.1
New York.....	333,721.33	333,721.33	.....	11.8
North Carolina.....	690,265.25	689,866.92	.....	51.2
North Dakota.....	6,021.51	6,021.51	.....	1.4
Ohio.....	610,460.00	610,460.00	.....	159.9
Oklahoma.....	31,741.28	31,741.28	.....	2.9
Oregon.....	541,068.81	502,843.61	.....	41.7
Pennsylvania.....	258,906.83	258,906.83	.....	30.0
South Carolina.....	54,313.20	54,313.20	.....	1.6
South Dakota.....	183,741.74	183,741.74	.....	73.2
Tennessee.....	342,701.04	342,701.04	.....	29.3
Texas.....	2,385,381.53	1,835,753.10	.....	408.9
Utah.....	523,984.51	504,437.24	.....	107.3
Virginia.....	518,382.22	498,897.89	.....	96.9
Washington.....	403,092.71	393,092.71	.....	27.6
West Virginia.....	21,945.79	21,945.79	.....	.7
Wisconsin.....	894,060.15	858,749.84	.....	58.8
Wyoming.....	465,442.38	454,233.00	.....	56.6
District of Columbia.....	208,113.99	208,113.99	.....	2.6
Total.....	16,193,522.72	15,300,037.92	.....	2,154.1

³ No projects of this class completed in Connecticut, Delaware, Indiana, Massachusetts, Mississippi, New Jersey, Rhode Island, Vermont, and Hawaii.

Of the 13,674 miles under construction at the end of the year, 6,949 miles were on the Federal-aid system outside of municipalities, 1,121 miles on extensions of the system into and through cities, and 5,605 miles on secondary or feeder roads. The estimated costs of each of these groups of projects, the sources of the funds employed, and the distribution by States are shown in table 19.

TABLE 19.—Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$4,625,778.67	\$2,588,735.13	\$2,037,043.54	272.3
Arizona.....	2,598,403.90	2,017,309.12	.....	153.2
Arkansas.....	2,721,289.10	2,328,613.72	392,194.13	137.0
California.....	6,084,486.14	4,648,401.55	.....	153.1
Colorado.....	2,059,925.09	1,926,296.72	27,435.65	54.9
Connecticut.....	1,543,762.06	1,367,983.12	175,778.94	30.7
Delaware.....	698,741.30	698,741.30	.....	14.7
Florida.....	1,940,045.73	1,603,752.50	335,683.13	72.3
Georgia.....	2,400,287.81	2,400,287.81	.....	177.5
Idaho.....	1,281,245.97	1,239,392.09	.....	93.5
Illinois.....	2,712,498.06	2,712,498.06	.....	45.1
Indiana.....	4,405,477.21	4,361,358.38	.....	119.5
Iowa.....	4,126,332.98	3,828,980.00	.....	185.6
Kansas.....	3,917,385.48	3,690,045.12	.....	191.1
Kentucky.....	2,599,204.31	2,590,365.88	.....	177.9
Louisiana.....	2,913,268.66	2,406,617.66	.....	67.5
Maine.....	1,515,228.37	1,479,661.42	.....	44.0
Maryland.....	801,143.78	791,495.03	.....	14.9
Massachusetts.....	1,123,369.76	807,710.12	315,659.64	31.4
Michigan.....	5,177,180.00	5,128,180.00	49,000.00	243.8
Minnesota.....	1,980,571.21	1,949,360.33	27,500.00	237.7
Mississippi.....	4,586,982.35	2,481,349.56	2,067,000.85	235.2
Missouri.....	4,390,783.57	4,050,641.00	68,548.60	149.6
Montana.....	3,541,342.66	3,181,685.86	237,025.83	270.5
Nebraska.....	2,961,612.91	2,342,867.69	.....	137.1
Nevada.....	1,401,020.43	1,401,020.43	.....	87.1
New Hampshire.....	601,203.04	594,695.63	.....	10.5
New Jersey.....	2,756,285.14	2,601,364.13	139,466.42	36.4
New Mexico.....	1,064,442.96	920,513.54	143,929.42	60.1
New York.....	11,280,608.68	9,660,723.68	315,000.00	230.0
North Carolina.....	3,310,836.86	2,957,506.09	353,330.77	465.1
North Dakota.....	1,513,926.68	1,315,248.81	198,677.87	404.6
Ohio.....	6,437,458.00	6,133,085.00	51,410.00	159.1
Oklahoma.....	2,931,335.69	2,931,335.69	.....	196.3
Oregon.....	1,623,500.25	1,484,960.05	128,021.20	83.2
Pennsylvania.....	6,079,556.64	5,895,873.50	.....	122.0
Rhode Island.....	937,119.34	937,119.34	.....	19.4
South Carolina.....	2,039,404.99	2,036,675.37	2,729.62	186.3
South Dakota.....	1,849,893.45	1,542,099.63	307,793.82	250.2
Tennessee.....	2,914,317.84	2,553,157.65	361,160.19	104.0
Texas.....	7,415,941.62	6,877,286.38	.....	457.5
Utah.....	798,151.16	798,151.16	.....	48.8
Vermont.....	847,698.77	818,249.22	.....	37.4
Virginia.....	2,115,368.45	1,992,162.00	119,858.30	81.4
Washington.....	2,095,806.01	2,095,806.01	.....	60.9
West Virginia.....	1,706,233.68	1,700,233.68	.....	64.9
Wisconsin.....	3,553,669.34	3,452,135.29	38,500.00	174.3
Wyoming.....	1,423,273.07	1,280,112.23	85,908.57	272.9
Hawaii.....	1,626,253.71	1,325,047.89	251,205.82	26.5
Total.....	141,029,652.88	125,926,891.57	8,229,862.31	6,949.0

¹ No projects of this class under construction in the District of Columbia.

TABLE 19.—Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES ²

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$1, 133, 335. 74	\$1, 133, 335. 74		38. 0
Arizona.....	300, 059. 89	300, 059. 89		7. 3
Arkansas.....	1, 112, 223. 25	1, 058, 589. 04	\$53, 384. 21	28. 4
California.....	2, 800, 607. 08	2, 505, 943. 04		35. 6
Colorado.....	651, 210. 04	651, 210. 04		13. 4
Connecticut.....	687, 857. 65	684, 715. 77	3, 141. 88	9. 2
Delaware.....	203, 298. 40	203, 298. 40		1. 9
Florida.....	1, 307, 477. 38	1, 129, 464. 32	178, 013. 06	13. 8
Georgia.....	1, 047, 709. 04	1, 047, 709. 04		35. 3
Idaho.....	965, 953. 20	943, 374. 52		13. 5
Illinois.....	6, 298, 412. 04	6, 298, 412. 04		64. 2
Indiana.....	2, 548, 474. 57	2, 548, 474. 57		49. 5
Iowa.....	1, 319, 843. 17	1, 247, 030. 00		21. 6
Kansas.....	1, 930, 602. 57	1, 785, 748. 77		18. 7
Kentucky.....	731, 168. 11	724, 814. 00		17. 3
Louisiana.....	617, 871. 43	617, 871. 43		17. 8
Maine.....	646, 816. 12	645, 444. 82		13. 9
Maryland.....	390, 738. 31	386, 588. 31		3. 6
Massachusetts.....	4, 475, 346. 95	4, 436, 270. 79	39, 076. 16	13. 7
Michigan.....	2, 722, 745. 00	2, 720, 595. 00		35. 2
Minnesota.....	1, 880, 914. 07	1, 869, 617. 18	2, 500. 00	41. 9
Mississippi.....	638, 526. 86	638, 526. 86		25. 4
Missouri.....	2, 946, 033. 18	2, 542, 530. 91		38. 8
Montana.....	585, 139. 71	585, 139. 71		17. 0
Nebraska.....	1, 569, 767. 55	1, 569, 767. 55		20. 1
Nevada.....	411, 763. 76	411, 763. 76		7. 0
New Hampshire.....	678, 365. 95	664, 365. 95		15. 6
New Jersey.....	2, 846, 861. 99	2, 792, 728. 99	30, 000. 00	19. 9
New Mexico.....	843, 703. 69	843, 703. 69		16. 0
New York.....	8, 006, 217. 60	7, 489, 785. 00	39, 000. 00	57. 7
North Carolina.....	962, 606. 47	961, 328. 18		34. 4
North Dakota.....	454, 556. 75	427, 371. 39	27, 185. 36	13. 7
Ohio.....	4, 109, 684. 43	3, 625, 318. 43		47. 2
Oklahoma.....	1, 664, 345. 07	1, 664, 345. 07		32. 0
Oregon.....	874, 529. 63	863, 369. 98		14. 6
Pennsylvania.....	2, 963, 101. 24	2, 905, 023. 58		35. 8
Rhode Island.....	338, 974. 92	338, 974. 92		5. 2
South Carolina.....	725, 672. 31	725, 267. 30	405. 01	30. 2
South Dakota.....	680, 060. 88	680, 060. 88		21. 9
Tennessee.....	1, 140, 039. 95	1, 140, 039. 95		14. 3
Texas.....	3, 146, 496. 84	3, 079, 890. 27		49. 4
Utah.....	54, 015. 64	53, 422. 98		2. 8
Vermont.....	455, 811. 48	433, 717. 27	5, 838. 96	12. 0
Virginia.....	1, 330, 699. 04	1, 142, 139. 89		12. 1
Washington.....	786, 454. 90	786, 454. 90		11. 7
West Virginia.....	950, 313. 53	925, 967. 79		16. 2
Wisconsin.....	1, 870, 171. 39	1, 834, 767. 78	25, 898. 24	35. 2
Wyoming.....	922, 428. 60	885, 471. 78		18. 3
District of Columbia.....	680, 633. 97	663, 650. 15		2. 3
Total.....	76, 469, 641. 34	73, 613, 461. 62	404, 442. 88	1, 120. 6

² No projects of this class in Hawaii.

TABLE 19.—Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.

PROJECTS ON SECONDARY OR FEEDER ROADS

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$857,518.34	\$857,518.34	.....	59.7
Arizona.....	441,468.95	429,341.96	.....	36.0
Arkansas.....	948,842.90	948,842.90	.....	118.9
California.....	3,204,357.74	2,721,574.10	.....	154.9
Colorado.....	1,025,898.66	994,429.71	.....	94.0
Connecticut.....	664,915.58	659,120.00	.....	14.5
Delaware.....	181,790.00	181,790.00	.....	1.8
Florida.....	850,256.61	850,256.61	.....	45.6
Georgia.....	920,605.43	920,605.43	.....	77.3
Idaho.....	546,438.63	532,783.11	.....	71.1
Illinois.....	4,610,167.64	4,610,167.64	.....	268.3
Indiana.....	540,734.86	540,734.86	.....	69.2
Iowa.....	1,821,511.10	1,640,950.00	.....	214.0
Kansas.....	2,182,166.63	2,170,276.56	.....	146.6
Kentucky.....	1,391,976.64	1,390,591.40	.....	146.5
Louisiana.....	922,070.51	922,070.51	.....	42.9
Maine.....	347,893.22	261,598.53	.....	27.4
Maryland.....	577,528.60	563,602.60	.....	44.0
Massachusetts.....	469,741.41	469,741.41	.....	15.2
Michigan.....	2,798,900.00	2,798,900.00	.....	218.3
Minnesota.....	1,619,796.48	1,613,476.33	.....	190.1
Mississippi.....	801,275.41	801,275.41	.....	92.4
Missouri.....	2,307,941.20	2,307,941.20	.....	353.6
Montana.....	1,119,834.58	1,119,834.58	.....	125.0
Nebraska.....	1,834,682.07	1,728,953.58	.....	213.3
Nevada.....	307,468.71	307,468.71	.....	28.2
New Hampshire.....	435,560.52	394,736.67	.....	23.2
New Jersey.....	56,550.52	56,550.52	.....	.5
New Mexico.....	874,633.59	874,633.59	.....	240.3
New York.....	3,702,200.00	3,264,550.00	.....	87.8
North Carolina.....	1,119,390.77	1,081,106.83	.....	126.2
North Dakota.....	176,701.59	176,701.59	.....	22.5
Ohio.....	3,316,490.00	3,016,818.00	.....	142.5
Oklahoma.....	1,783,376.08	1,677,379.13	.....	194.4
Oregon.....	1,050,254.52	928,020.15	.....	55.7
Pennsylvania.....	6,821,281.19	6,735,617.79	.....	605.3
Rhode Island.....	412,465.02	412,465.02	.....	33.2
South Carolina.....	1,247,341.80	1,247,341.80	.....	144.0
South Dakota.....	427,523.09	427,523.09	.....	140.4
Tennessee.....	955,167.96	955,167.96	.....	74.3
Texas.....	3,984,158.53	3,667,285.48	.....	366.8
Utah.....	470,666.59	445,300.00	.....	51.3
Vermont.....	444,002.49	424,132.63	.....	36.0
Virginia.....	1,054,220.53	993,814.18	.....	108.5
Washington.....	653,151.30	653,151.30	.....	36.1
West Virginia.....	897,576.45	897,576.45	.....	50.0
Wisconsin.....	1,333,491.78	1,288,586.71	.....	95.3
Wyoming.....	626,347.56	611,181.00	.....	91.6
District of Columbia.....	750,914.71	750,914.71	.....	5.2
Hawaii.....	177,717.69	177,717.69	.....	4.9
Total.....	66,066,966.18	63,502,117.77	.....	5,604.8

Of the 1,718 miles in projects approved for construction on June 30, nearly 639 miles were located on the Federal-aid highway system outside of cities; 227 miles were made up of municipal extensions of the system; and 852 miles consisted of secondary or feeder roads. The distribution of these projects and other information concerning them are given in table 20.

TABLE 20.—*Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$367,849.72	\$233,948.59	\$133,901.13	21.5
Arizona.....	96,740.98	96,740.98		10.7
Arkansas.....	673,389.29	636,509.29	36,880.00	24.0
California.....	1,041,371.05	191,793.40		15.9
Delaware.....	5,770.00	5,770.00		.3
Florida.....	56,281.75	56,281.75		7
Georgia.....	517,218.84	517,218.84		22.4
Idaho.....	13,782.82	13,782.82		.....
Illinois.....	1,762,692.49	1,762,692.49		13.3
Indiana.....	692,050.37	657,562.62		13.2
Iowa.....	148,667.07	140,675.50		9.0
Kansas.....	25,391.30	25,391.30		.3
Kentucky.....	597,972.44	468,319.40		16.5
Louisiana.....	42,623.98	42,623.98		1.5
Maine.....	24,085.44	24,085.44		.2
Maryland.....	461,850.00	461,850.00		6.4
Michigan.....	602,366.00	602,366.00		21.0
Minnesota.....	153,425.81	143,425.81	10,000.00	12.7
Mississippi.....	501,945.70	276,070.22	225,875.48	29.1
Missouri.....	252,033.50	252,033.50		9.3
Montana.....	158,408.58	31,988.11	48,998.40	36.2
Nebraska.....	42,693.12	35,794.58		9.7
Nevada.....	122,456.09	79,129.02	43,327.07	.....
New Jersey.....	63,503.88	63,503.88		.6
New Mexico.....	41,901.88	41,901.88		3.6
New York.....	974,097.80	146,997.80	49,000.00	8.4
North Carolina.....	859,555.64	493,815.98	356,922.36	52.9
North Dakota.....	706,685.76	473,289.70	233,396.06	138.2
Ohio.....	196,500.00	77,878.00		5.0
Oklahoma.....	146,968.44	146,968.44		3.1
Oregon.....	235,870.38	167,388.02		1.4
Pennsylvania.....	630,347.36	477,382.67		5.7
Rhode Island.....	8,732.36	8,732.36		.....
South Carolina.....	144,097.11	144,097.11		9.0
South Dakota.....	232,337.41	143,477.48	88,859.93	41.9
Tennessee.....	390,724.63	390,724.63		24.2
Texas.....	410,924.29	328,563.97		26.2
Utah.....	68,204.10	68,204.10		.4
Vermont.....	3,998.46	3,998.46		.....
Virginia.....	414,970.61	387,355.78	27,614.83	23.8
Washington.....	64,640.67	64,640.67		1.4
West Virginia.....	34,029.42	34,029.42		.7
Wisconsin.....	66,816.72	63,174.25		1.4
Wyoming.....	83,169.89	67,031.52		10.2
Hawaii.....	426,495.88	248,693.76	129,332.90	6.8
Total.....	14,565,639.03	10,797,903.52	1,384,108.16	638.8

¹ No projects of this class in this status in Colorado, Connecticut, Massachusetts, New Hampshire, and the District of Columbia.

TABLE 20.—Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$703,763.64	\$703,763.64	.....	18.4
Arizona.....	284,883.32	284,883.32	.....	2.0
Arkansas.....	513,563.12	487,403.12	\$26,160.00	5.8
California.....	797,671.66	586,972.69	.....	3.6
Colorado.....	164,710.53	150,989.02	.....	3.6
Connecticut.....	68,293.81	68,293.81	.....	.5
Delaware.....	139,750.00	139,750.00	.....	4.9
Georgia.....	250,709.42	250,709.42	.....	11.9
Illinois.....	1,033,873.00	1,033,873.00	.....	3.0
Indiana.....	1,419,950.27	1,419,950.27	.....	19.3
Iowa.....	267,956.32	254,524.50	.....	5.6
Kansas.....	13,156.36	13,156.36	.....	.1
Kentucky.....	509,741.79	460,899.41	.....	9.6
Louisiana.....	535,980.65	509,387.22	26,593.43	2.8
Maine.....	24,448.68	24,448.68	.....	.4
Massachusetts.....	250,293.28	250,293.28	.....	1.0
Michigan.....	414,075.00	414,075.00	.....	3.5
Minnesota.....	306,952.70	291,480.62	.....	4.8
Mississippi.....	302,596.74	302,596.74	.....	7.1
Missouri.....	372,497.64	329,298.82	.....	6.0
Montana.....	178,482.37	178,482.37	.....	9.1
Nebraska.....	98,955.75	98,955.75	.....	1.5
New Hampshire.....	50,553.20	42,274.05	8,279.15	.9
New Jersey.....	41,442.01	41,442.01	.....	.5
New Mexico.....	84,837.68	66,812.89	.....	3.2
New York.....	71,000.00	32,800.00	.....	.6
North Carolina.....	306,693.48	285,608.05	1,885.81	10.0
North Dakota.....	596,045.77	595,459.44	586.33	25.2
Ohio.....	310,650.00	248,288.37	.....	2.7
Oklahoma.....	196,978.40	196,978.40	.....	4.5
Oregon.....	145,761.63	145,261.52	.....	3.3
Pennsylvania.....	605,111.22	598,476.07	.....	6.2
Rhode Island.....	157,015.50	106,638.68	.....	1.0
South Carolina.....	251,062.11	251,062.11	.....	7.8
South Dakota.....	280,530.04	280,530.04	.....	9.0
Tennessee.....	415,580.88	415,580.88	.....	4.8
Texas.....	761,103.20	609,566.77	.....	9.0
Vermont.....	29,051.10	25,000.00	.....	.7
Virginia.....	342,648.65	338,503.96	.....	5.0
West Virginia.....	187,844.31	187,844.31	.....	2.2
Wisconsin.....	259,388.07	259,388.07	.....	3.1
Wyoming.....	45,961.52	45,380.40	.....	3.2
Total.....	13,791,564.82	13,027,083.06	63,504.72	227.4

² No projects of this class in this status in Florida, Idaho, Maryland, Nevada, Utah, Washington, District of Columbia, and Hawaii.

TABLE 20.—Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.

PROJECTS ON SECONDARY OR FEEDER ROADS³

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$960,759.52	\$960,759.52	.....	83.0
Arkansas.....	135,002.66	135,002.66	.....	9.3
California.....	185,735.56	151,579.17	.....	6.7
Colorado.....	139,684.71	80,000.00	.....	3.4
Delaware.....	72,547.50	72,547.50	.....	12.2
Florida.....	28,423.34	28,423.34	.....	3.6
Georgia.....	277,397.03	277,397.03	.....	25.2
Illinois.....	379,677.71	379,677.71	.....	10.3
Iowa.....	663,054.66	341,495.00	.....	58.9
Kansas.....	6,440.48	6,440.48	.....	1.7
Kentucky.....	52,875.49	30,000.00	.....	5.4
Louisiana.....	286,879.00	286,879.00	.....	11.5
Maryland.....	262,345.90	262,345.90	.....	17.0
Michigan.....	197,200.00	182,300.00	.....	2.7
Minnesota.....	5,000.00	5,000.00	.....	1.5
Mississippi.....	445,874.39	445,874.39	.....	40.0
Missouri.....	50,017.33	49,901.33	.....	5.1
Montana.....	26,572.33	26,572.33	.....	3.5
Nebraska.....	12,325.86	12,325.86	.....	.1
New Mexico.....	20,000.00	20,000.00	.....	3.0
North Carolina.....	105,352.55	80,200.00	.....	15.1
North Dakota.....	545,234.59	545,234.59	.....	165.0
Ohio.....	193,150.00	193,150.00	.....	2.5
Oklahoma.....	596,666.00	567,265.51	.....	73.8
Oregon.....	120,230.36	95,860.24	.....	11.1
Pennsylvania.....	252,768.17	252,768.17	.....	20.7
South Carolina.....	63,136.00	63,136.00	.....	8.7
South Dakota.....	410,634.58	410,634.58	.....	153.1
Tennessee.....	636,341.23	636,341.23	.....	48.8
Texas.....	203,289.06	117,416.66	.....	2.5
Utah.....	68,967.69	68,967.69	.....	5.9
Vermont.....	14,823.57	14,747.37	.....	.4
Virginia.....	160,251.99	160,251.99	.....	1.0
Washington.....	27,739.30	27,739.30	.....	3.9
West Virginia.....	140,139.29	127,232.93	.....	9.2
Wisconsin.....	148,404.19	148,404.19	.....	16.6
Wyoming.....	59,918.00	59,918.00	.....	9.6
Total.....	7,954,860.04	7,323,789.67	.....	852.0

³No projects of this class in this status in Arizona, Connecticut, Idaho, Indiana, Maine, Massachusetts, Nevada, New Hampshire, New Jersey, New York, Rhode Island, District of Columbia, and Hawaii.

The classification of the mileage of Public Works highway projects by surface types is shown for each of the States and each class of project completed in table 21. Similar information concerning projects under construction at the end of the fiscal year is given in table 22, and for projects approved for construction at the close of the year in table 23.

TABLE 21.—Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934

State	Graded and drained	Sand-clay				Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated		Treated		Un-treated	Treated	Un-treated	Treated								Rail-road-high-way	High-way-high-way
		Un-treated	Treated	Un-treated	Treated													
Alabama	6.0			4.9	4.7				76.6		1.0	46.0			61.9	2		
Arizona	29.0			22.8	3.8							5.2			131.1	1		
Arkansas				4	15.0			15.7	5.1		53.7	4.3			9.5	4	3	
California	.6			32.5	90.9										142.5	2		
Colorado															96.0	1		
Connecticut																		
Delaware												3.0			3.0			
Florida	3.3							23.1				17.2			43.7			
Georgia	9.9			4.9	14.2			12.7				31.8			73.6	1		
Illinois	7			44.0					37.1		.4				81.8	1		
Iowa	22.3			25.8								1.1			26.1	2		
Kansas	139.0		47.2	15.6					7.8			2.7	1.6		74.5	1		
Kentucky				37.8								14.0			206.5			
Louisiana									.5			9.2			59.5			
Massachusetts												2.3			9.7			
Michigan									4.1			1.8			6.4	1		
Minnesota	41.4			357.2	15.6		13.2		60.0			21.9			1.8			
Mississippi	6.1											6.6			509.5	6		
Missouri				5.2								38.2			12.8			
Montana				81.7					10.5						43.5			
Nebraska									43.4						6			
Nevada	29.7	100.8		89.5					83.4			41.6			215.8	6		
New Hampshire															173.0	1		
New Jersey												6.1			6.1			
New Mexico				18.9	84.3				94.8		11.3				210.5			
New York	4											7.5			8.0			
North Carolina	2.5	15.0	22.1						10.6		.9	10.1			103.5	1		
North Dakota	146.1			311.4	24.5	10.4	7.1								457.9	2		
Ohio				1.8											27.8			
Oklahoma	82.3			1.8							3.1	17.5	3.6	1.8	101.4			
Oregon	8.1			16.9			5.5				1.6	4.6	4.9	1.1	98.9			

1 No projects of this class completed in Indiana, Maine, Maryland, and the District of Columbia

TABLE 21.—Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934—Continued

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

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-high-way
Pennsylvania	0.1								0.5		4.2		0.1	4.4		
Rhode Island											0.6			1.1		
South Carolina		19.9									3.9		.5	24.3		1
South Dakota	75.8			76.9				21.9			10.0		.3	184.9		
Tennessee	10.3							5.1			46.0		.1	61.5		1
Texas	392.7			66.4	21.3			11.3		1.9	44.6	2.1	2.1	542.4		3
Utah				8.6				108.9			28.0		.5	146.0		
Vermont								5.2	2.2					7.4		
Virginia	5.4	5.6	2.4			6.0	9.3				10.7		.5	40.2		3
Washington	6.6			27.3				.5			9.0		.7	44.7		2
West Virginia				.3							6.3		.1	6.7		
Wisconsin								8.1			41.9			50.0		
Wyoming				119.4				58.3					.2	177.9		
Hawaii									6.3					6.3		
Total	1,018.3	168.6	44.4	1,462.8	183.4	29.6	73.4	649.1	74.2	74.0	554.2	12.2	18.6	4,392.8	41	3

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES

Alabama	0.5									1.4	2.5		0.1	3.1		1
Arizona								2.1		2.1	.5			4.0		
Arkansas								.7		6.3	6.2		.4	13.8		4
California				0.2				.8	0.3	5.3	9.3		.1	17.2		1
Colorado				1.4						.5				5.5		
Connecticut										.2	6			.8		
Delaware							1.2				2.3		.1	3.6		1
Florida											9.7			12.4		
Georgia	.5			.4	1.1			1.7		.7	3.2			4.8		
Idaho				1.2				1.7		1.7	.2			3.7		
Illinois											3.1	0.6		3.7		
Indiana											1.2			1.2		

Iowa.....	3.1	1.4								19.0	.1	23.6	2
Kansas.....	5.3	.2		.5		.9				7.3	1.3	18.5	1
Kentucky.....										3.2		3.2	
Louisiana.....										6.4		6.5	
Maine.....					.7					1.6		2.4	
Massachusetts.....										1.8		1.8	
Michigan.....						2.2				2.2		2.3	
Minnesota.....	7.0	28.3	3.3	1.6	0.8	3.5				9.0		53.6	3
Mississippi.....	2.4									1.4		3.8	
Missouri.....					.4					10.7		12.7	
Montana.....	.7	2.1		5.5		.4				5.5	1.0	19.2	4
Nebraska.....	2.5									1.2		11.7	
Nevada.....										1.2		1.2	
New Jersey.....										2.1		2.1	
New Mexico.....						7.8				1.4	.7	1.2	
New York.....	.4			2.8		1.3				1.0	.2	13.1	1
North Carolina.....	4.4			1.8		1.8				1.8		4.0	
North Dakota.....	4.7			10.0	.5	10.0				9.6		30.4	1
Ohio.....	3.1	3.5	.3	2.7		.6				.5		9.3	
Oklahoma.....	.3					3.2				2.9	2.9	9.4	
Oregon.....	.3					1.0				3.3	.5	7.9	
Pennsylvania.....						4.0				4.1		9.8	
Rhode Island.....					.6	10.4				6.2		16.9	
South Carolina.....							1.2					1.2	
South Dakota.....										2.0		4.1	2
Texas.....	2.4					.9				5.2		8.1	
Tennessee.....	14.0	6.9	9.1	1.2		9				4.4		6.7	
Utah.....					.4					15.0	1.6	56.4	2
Vermont.....										13.6	.3	13.9	1
Virginia.....													
Washington.....										3.7		1.9	
West Virginia.....										3.6	.6	10.9	1
Wisconsin.....										14.8	.5	20.7	
Wyoming.....										1.0		1.9	
District of Columbia.....										13.3		13.5	
Total.....	47.6	7.9	3.9	25.7	2.4	77.4	21.3	5.4	9.2	213.9	3.1	408.8	22

PROJECTS ON SECONDARY OR FEEDER ROADS 3

Alabama.....												0.1	
Arizona.....	6.0										.3	6.3	1
Arkansas.....		15.7								0.2		15.9	
California.....				7.6		0.2	7.9				.3	16.0	
Colorado.....		82.1									.1	82.2	
Florida.....							6.5	18.7		8		26.0	
Georgia.....										4.2		4.2	
Idaho.....		67.9					2.8				.1	70.8	

1 No projects of this class completed in Maryland, New Hampshire, and Hawaii

3 No projects of this class completed in Connecticut, Delaware, Indiana, Massachusetts, Mississippi, New Jersey, Rhode Island, Vermont, and Hawaii.

TABLE 21.—Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934—Continued

PROJECTS ON SECONDARY OR FEEDER ROADS—Continued

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Illinois.....				41.7									0.3	42.0		2
Iowa.....	8.1			40.3							0.6		.2	49.2		
Kansas.....	14.6	0.9									1.7			17.2		
Kentucky.....	27.1			35.6							6.3			69.0		
Louisiana.....											2.4			2.4		
Maine.....				54.3							0.2			54.5		
Maryland.....							0.9	1.0						1.9		
Michigan.....	47.1			7.3									.1	7.3		
Minnesota.....	135.1			34.6									.3	141.8		
Missouri.....				6.4				2.4					.2	97.6		
Montana.....				95.0									.1	70.3		
Nebraska.....	19.5	50.7						14.9						70.6		
Nevada.....				55.7										70.6		
New Hampshire.....					1.0		1.4							2.5		
New Mexico.....	7.5			54.5										62.1		
New York.....								6.2		2.0				11.8		
North Carolina.....	1.4	13.8		27.7	7.2			2.2					.3	51.2		
North Dakota.....	2.2													1.4		
Ohio.....			2.3	85.7	2.9	66.1								159.9		
Oklahoma.....										2.9		.5		2.9		
Oregon.....	.8			9.9	19.6		7.9		10.9				.5	41.7		1
Pennsylvania.....					2.9				18.8	.4				30.0		
South Carolina.....		.6	.9											1.6		
South Dakota.....	22.0			51.2										73.2		
Tennessee.....	4													29.3		
Texas.....	163.0			61.4	73.9	9.1		4.6	13.0	2.4	8.9			29.3		
Utah.....	2.3			97.0				5.1	12.5	80.4	2.5		1.0	408.9		1
Virginia.....						4.0		7.0	3.8					107.3		1
Washington.....		23.9	26.5	38.5									.2	96.9		1
West Virginia.....	8.6			18.9										27.6		
Wisconsin.....														1.7		
Wyoming.....				46.7							3			58.8		
District of Columbia.....				51.2				5.3			12.0		.1	56.6		
Total.....	465.7	89.9	29.7	1,079.6	115.1	79.2	16.7	78.1	59.0	91.9	43.6	.7	4.9	2,154.1		7

TABLE 22.—Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES 1

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)		
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road-high-way	High-way-high-way	
Alabama.....	4.0		28.0	7.6	61.3			116.7		30.0	23.8		0.9	272.3	2		
Arizona.....	23.0			61.2				67.5			.6		.9	133.2	1		
Arkansas.....	9.0			77.8	5.3					11.6	.6		1.8	137.0	2		
California.....	18.2			17.1	3.6			46.8	8.8	49.3	8.1		1.2	133.1	3		
Colorado.....	6.4			46.7					23.9		1.0		.8	54.9	4		
Connecticut.....				3.8							2.9		.1	30.7			
Delaware.....	5.3										9.3		.1	14.7			
Florida.....	16.5			22.7	48.1			31.0			11.8		.6	72.3	1		
Georgia.....	10.7	0.1	41.9	41.7				20.2			5.7		1.3	177.5	1		
Idaho.....	7.5							38.6					.3	93.5			
Illinois.....	2.3											1.8	4.9	45.1	19		
Indiana.....	16.9										36.1		2.0	119.5	3		
Iowa.....	80.7									.2	100.4		2.5	185.6	8		
Kansas.....	126.2			5.4							46.1		1.7	191.1	1		
Kentucky.....	57.2	9.5		30.3								2.2	1.7	171.9			
Louisiana.....	10.3			2.2	7.5			36.4	.8		40.8		.8	177.9			
Maine.....					14.0						45.9		1.0	67.5			
Maryland.....								21.7			1.9		.5	44.0			
Massachusetts.....											5.2		.1	14.9			
Michigan.....	33.8										7.2		.1	31.4	1		
Minnesota.....	66.0							22.5			117.4		.6	243.8			
Mississippi.....	125.9							40.3						2.2	237.7	3	
Missouri.....	11.2										52.3		3.6	235.2	3		
Montana.....	30.6										104.1		1.0	149.6	3		
Nebraska.....	59.8	.6		161.0							9.3		.8	270.5	5	1	
Nevada.....				12.3							54.4		1.2	137.1	2		
New Hampshire.....					3.1								.1	87.1	2		
New Jersey.....											3.1		.5	10.5			
New Mexico.....					32.6						36.1		.1	36.4	1		
New York.....	25.4			2.4				11.9			15.3		.3	60.1			
North Carolina.....	6.4	56.9	178.7	28.7	67.0			1.1			152.3		.9	230.0	8		
North Dakota.....	262.5			82.6				18.2	5.5		1.0		.5	465.1			
								59.5						404.6			

1 No projects of this class under construction in the District of Columbia.

TABLE 22.—*Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934—Continued*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Ohio.....	1.1			9.8		0.5		3.7	8.3	26.1	92.6	15.5		1.5		
Oklahoma.....	87.3			28.0	30.9					26.0	22.2			1.9		2
Oregon.....	12.3			2.6	7.2	0.1			4.7	7.6	5.0			3.3		
Pennsylvania.....	9.4								20.5	17.3	73.8			1.0		1
Rhode Island.....								5.3	7.9	1.9	9.6					
South Carolina.....	22.6		180.4					109.6	3.1		4.6					5
South Dakota.....	123.7			.7					1.2	11.7	16.1					1
Tennessee.....	37.6						8.0			41.8	52.0			1.5		2
Texas.....	243.2			51.3	60.9			11.6		8.4	47.7			4.6		7
Utah.....				24.3				23.3	.5		7.4					
Vermont.....	4.5		18.1	6.0			11.2	36.6		4.2	4.4					
Virginia.....	13.0			19.7						28.0	28.0			1.3		5
Washington.....	23.6									.1	30.8			.2		3
West Virginia.....	8.8			37.5			10.0	29.0		28.1	70.2			.4		2
Wisconsin.....								255.5						.7		1
Wyoming.....	17.3													.1		
Hawaii.....									26.3					.2		
Total.....	1,620.4	68.2	431.7	983.3	373.1	92.5	154.6	1,088.4	201.2	383.9	1,485.0	20.3	46.4	6,949.0	106	3

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES:

State	Graded and drained	Sand-clay	Gravel	Macadam	Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Rail-road—high-way	High-way—high-way
Alabama.....					15.3		4.5	9.1	0.8		38.0	1	
Arizona.....					1.8	0.6	2.5	2.4			7.3		
Arkansas.....	0.2	.6	1.9	2.0	1.0		4.5	17.8		0.4	28.4	1	
California.....					4	3	20.4	8.3		.2	35.6		3
Colorado.....			.5		1.5	2.8	4.0	3.5			13.4		
Connecticut.....						.5	5.0	3.7			9.2		
Delaware.....	1.3						.8	1.0			1.9		
Florida.....	2.0	3.9	3.2	7.8	13.0			11.7	.3		13.8		2
Georgia.....					1.1			3.5			35.3		3

Idaho.....						4.8	3.2	1.9	6.8	.2	13.5	3
Illinois.....								33.3		1.1	64.2	12
Indiana.....						1.5	23.6	23.6		.5	49.5	1
Iowa.....								14.5	4.4	1.5	21.6	7
Kansas.....						4.5	4.1	9.0	2.7	.5	18.7	2
Kentucky.....							6.8	4.4		.2	17.3	
Louisiana.....							2.5	5.0			17.8	
Maine.....						7.2	3.1	2.8			13.9	
Maryland.....							3.1	.5	.7	2.2	3.6	
Massachusetts.....						4.1	3.5	3.2			13.7	4
Michigan.....							8.3	25.2		4.4	35.2	3
Minnesota.....						6.9	3.2	11.4		.6	41.9	4
Missouri.....							2.4	6.4	1.2		25.4	3
Mississippi.....						3.0	7.5	22.5		.9	38.8	5
Montana.....						6.5	4.9	2.0			17.0	
Nebraska.....						1.7	2.4	12.2	1.9	.2	20.1	1
Nevada.....						1.9	5.1				7.0	
New Hampshire.....						2.1		13.2			16.6	
New Jersey.....							1.4	18.1		.1	19.9	2
New Mexico.....						4.3	2.0	3.2		.3	16.0	1
New York.....							14.7	35.0	.8	.8	57.7	5
North Carolina.....						1.7	8.7	5.8		.2	34.4	5
North Dakota.....						2.3	2.0	4.0		.1	13.7	2
Ohio.....						.9	12.9	16.7	15.2	.5	47.2	1
Oklahoma.....						.5	10.7	20.0		.1	32.0	1
Oregon.....							1.9	7.0		.1	14.6	1
Pennsylvania.....							1.0	23.5	2.6	.6	35.8	1
Rhode Island.....							1.7	1.1			5.2	
South Carolina.....						4.7	4.4	5.3			30.2	
South Dakota.....						6.7		12.4		.0	21.9	2
Tennessee.....							4.6	7.0	1.1	.1	14.3	1
Texas.....						3.4	10.5	14.9		1.0	43.4	13
Utah.....							1.7	.1		.1	2.8	
Vermont.....						.5	2.7	6.9			12.0	
Virginia.....						1.9	2.5	2.7	1.8	.9	12.1	3
Washington.....						5.1	1.9	6.1		.1	11.7	2
West Virginia.....						.7	4.2	8.7		.4	16.2	1
Wisconsin.....							5.0	20.1		1.3	35.2	2
Wyoming.....						2.1		3.4		.1	18.3	
District of Columbia.....						6.3	8.5	.7		.1	2.3	
Total.....	71.6	4.6	36.0	40.7	38.1	4.3	27.6	79.5	34.8	38.5	17.4	92
							248.5	479.0			1,120.6	26

* No projects of this class under construction in and Hawaii.

TABLE 22.—Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934—Continued

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Alabama	4.8	7.9	12.4	20.9					0.4					0.5	59.7		
Arizona			8						35.0					.7	36.0		
Arkansas			116.8	1.4										.7	118.9		
California	25.4		18.9	4.1					87.2					1.3	154.9		
Colorado	3.1		88.8	1.9										.2	94.0		
Connecticut										14.5					14.5		
Delaware										.9					1.8		
Florida	23.8		4.8											.3	45.6		
Georgia	6.5		42.2	19.3				16.7	4.6					.6	77.3		1
Idaho	6.0		51.2					4.1	13.9						71.1		
Illinois	18.0		213.9						5.3						268.3		9
Indiana			28.1	37.8					5.1				3.6	3.2	69.2		2
Iowa	173.6		25.0											.8	214.0		1
Kansas	133.2		5.2											.3	146.6		1
Kentucky	76.2		61.1	14.6										.6	146.5		1
Louisiana	1.2		23.9	1.0					3.0					.0	42.9		1
Maine														.5	27.4		
Maryland	1.4		2.0	1.7				10.0	3.1	14.1	1.3	.8			44.0		
Massachusetts									3.7	11.5					15.2		
Michigan	14.4		166.5						4.0	19.0				.3	218.3		
Minnesota	154.0		26.7						4.0	5.1				.3	190.1		
Mississippi	55.8		30.8	5.0										.8	92.4		
Missouri	274.4		75.4						.9	1.2				1.7	353.6		3
Montana	.3		107.3						16.1	1.1				.2	125.0		
Nebraska	136.4		64.9						3.9	7.2				.9	213.3		
Nevada	.4		27.8	.7				22.0		.5					28.2		1
New Hampshire															23.2		
New Jersey										.5					23.7		
New Mexico			207.3												240.3		
New York	.2		10.7											.4	87.8		
North Carolina			36.5	41.2				2.6	11.6	15.0				.3	126.2		
North Dakota			16.8	18.9											22.5		
Ohio	4.9		81.5	3.9			.4		14.9	18.6			4.6	1.0	142.5		1

TABLE 23.—Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934

State	Graded and drained	Sand-clay	Gravel	Macadam	Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures shown with bridges
Alabama.....	22.5		122.5	13.7							194.4	1
Arizona.....			12.7	4.0							55.7	
Arkansas.....			72.3	72.3							1.1	
California.....			33.2	33.2							605.3	1
Delaware.....				3.6							33.2	
Florida.....	3.7	3.2	67.0								144.0	
Georgia.....	34.8		66.3	46.1							74.3	
Illinois.....	247.1		41.7	4.1							366.8	5
Indiana.....	6.2		8.5								51.3	
Iowa.....			8.5								1.8	
Mississippi.....			6.8	6.8	26.1						36.0	1
Missouri.....			23.9	11.1	31.5						108.5	
Montana.....			8.4								36.1	1
Nebraska.....			28.7	1.0	38.8						50.0	
Nevada.....			90.1		39.5						95.3	
New Hampshire.....					1.3						91.6	
New Jersey.....											5.2	
New York.....											4.9	
North Carolina.....											26.4	
Ohio.....											26.4	
Oklahoma.....											5.2	
Oregon.....											4.9	
Pennsylvania.....											233.7	
Rhode Island.....											134.1	
South Carolina.....											413.0	
South Dakota.....											8.2	
Tennessee.....											23.4	
Texas.....											5,604.8	
Utah.....											23.4	
Vermont.....											5.2	
Virginia.....											23.4	
Washington.....											23.4	
West Virginia.....											23.4	
Wisconsin.....											23.4	
Wyoming.....											23.4	
District of Columbia.....											23.4	
Hawaii.....											23.4	
Total.....	1,507.6	167.8	1,943.6	310.6	23.6	323.5	308.5	413.0	134.1	233.7	8.2	28

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures shown with bridges	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road-high-way	High-high-way
Alabama.....	9.4		1.7	9.0				1.1						21.5	0.3	
Arizona.....								10.7						10.7		
Arkansas.....				6.9										9		
California.....				3.0				3.5	5.4	14.0	2.2			24.0		
Delaware.....														15.9		
Florida.....														.2		
Georgia.....														.3		
Illinois.....	2.2			4.0										.7		
Indiana.....										3.8	3.4			1		
Iowa.....										.9	10.2			9		
Mississippi.....											12.0			2		
Montana.....											4.0			2		
Nebraska.....														.9		
Nevada.....														2		
New Hampshire.....														2		
New Jersey.....														2		
New York.....														2		
North Carolina.....														2		
Ohio.....														2		
Oklahoma.....														2		
Oregon.....														2		
Pennsylvania.....														2		
Rhode Island.....														2		
South Carolina.....														2		
South Dakota.....														2		
Tennessee.....														2		
Texas.....														2		
Utah.....														2		
Vermont.....														2		
Virginia.....														2		
Washington.....														2		
West Virginia.....														2		
Wisconsin.....														2		
Wyoming.....														2		
District of Columbia.....														2		
Hawaii.....														2		

¹ No projects of this class in this status in Colorado, Connecticut, Idaho, Massachusetts, Nevada, New Hampshire, Rhode Island, Vermont, and the District of Columbia.

TABLE 23.—Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934—Contd.

State	Graded and drained		Sand-day		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road-high-way	High-high-way
Kansas																	
Kentucky	2.4		0.3						5.2			8.4		0.3	0.3	16.5	2
Louisiana																1.5	1
Maine																	
Maryland	3.3																
Michigan	7.4																
Minnesota																	
Mississippi	20.8																
Missouri																	
Montana																	
Nebraska	2.4								25.0								
New Jersey									7.3								
New Mexico																	
New York	1.6																
North Carolina	4.7																
North Dakota	66.7																
Ohio																	
Oklahoma																	
Oregon																	
Pennsylvania																	
South Carolina																	
South Dakota	20.6																
Tennessee	17.2																
Texas	11.5																
Utah																	
Virginia																	
Washington																	
West Virginia																	
Wisconsin																	
Wyoming																	
Hawaii																	
Total	170.2		10.1	26.2	101.0	14.6	4.6	16.3	145.5	16.2	49.2	78.3	.2	6.4	638.8	40	2

TABLE 23.—*Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934—Contd.*PROJECTS ON SECONDARY OR FEEDER ROADS³

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total		Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Rail-road—high-way	High-way—high-way		
Alabama	7.5	13.7	9.3	26.0	2.6	9.9	0.8	12.3			0.6		0.3	83.0	2		
Arkansas				9.1				5.5					.2	9.3			
California	1.2			3.4										6.7			
Colorado				12.2										3.4			
Delaware														12.2			
Florida			3.5										.1	3.6			
Georgia		7.6		12.4	5.0			6.4					.2	25.2	1		
Illinois								24.5			3.9		.5	10.3	2		
Iowa	33.7							1.7			.2			58.9			
Kansas								1.7						1.7			
Kentucky								5.4					.3	5.4			
Louisiana	10.2			1.0					4.0					11.5			
Maryland				7.8	1.0					4.2				17.0			
Michigan				1.6						1.0				2.7			
Minnesota	1.5													1.5			
Mississippi	26.2	4.7		8.6										40.0			
Missouri				4.3						0.5				5.1			
Montana				3.5										3.5			
Nebraska	.1													.1			
New Mexico		3.0												3.0			
North Carolina		3.9	11.2											15.1			
North Dakota	133.0			31.9										165.0			
Ohio								6.2					1.1	73.8			
Oklahoma				51.3					10.4					83.8			
Oregon				.5	5.5				8.7				.1	20.7			
Pennsylvania	4.6													8.7			
South Carolina	33.2	4.1												153.1			
South Dakota	31.3			119.9					4.0					48.8			
Tennessee	2.3			12.9										2.5			
Texas														2.5			
Utah				5.9										3.9			
Vermont									.4					.4			

It will be noted that the completed projects included 70 structures separating the grades of railroad and highways at intersections and 7 highway-highway grade-separation structures. In course of construction at the close of the year were 226 other railroad-highway grade-separation structures and 29 structures eliminating level intersections of highways. To these will be added the 71 railroad-highway and 2 highway-highway structures shown in table 23 as approved for construction to make up the total of 405 grade-crossing-eliminating structures included in the Public Works highway program up to the end of the year.

The number of projects of this character included in the program is evidence of the importance attributed to the elimination of accident hazards in preparing the program of work under the National Industrial Recovery Act. In addition to the grade crossings eliminated by structures many more have been avoided by relocation of the highways as part of the improvement to be made; and the ends of safety are also served by the widening of existing surfaces, the easing of curves and grades, the lengthening of sight distances, and other marked betterments which result from the improvements planned and in course of realization.

Other major objectives to which, subject always to the primary employment purpose, special effort has been directed, include the closing of the remaining unimproved gaps in the Federal-aid highway system; and the provision of road facilities to aid in the better coordination of transportation, especially roads to local railroad stations and roads that will be capable of taking over the service heretofore rendered by nonpaying railroad branch lines.

Prominent also among the special objects sought by the Public Works expenditure is the landscaping of a reasonable mileage of roadsides. To provide for the inclusion of a reasonable amount of work of this character it was required that at least 0.5 percent of each State's apportionment of the Public Works funds should be devoted to it. A minimum of nearly \$2,000,000 was thus assured for the pioneer work toward the ultimate elimination of unsightly roadside conditions, which, next to the provision of safe, convenient, and economical roadways, must be an object of all future road-improvement programs.

CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Special appropriations for the survey, construction, reconstruction, and maintenance of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, and other Federal reservations except national forests have been made by four Congressional acts passed up to the end of the fiscal year 1934.

As reported last year, the first two of these appropriations, aggregating \$5,000,000, were made by the Emergency Employment Act of December 20, 1930, and the Emergency Relief and Construction Act of 1932. To this sum the National Industrial Recovery Act added \$5,000,000, and the act approved June 19, 1934, \$2,500,000.

TABLE 24.—*Status of appropriations for roads through public lands and Federal reservations, June 30, 1934*

State	Total sum apportioned	Sums allotted to projects—					Unobligated balance
		Not yet under construction	Under construction	Completed and finally inspected	Completed and final payment made	Total allotted	
Arizona.....	\$1,456,479	\$123,344.82	\$522,508.71	\$190,205.82	\$620,376.38	\$1,456,435.73	\$43.27
California.....	891,893	205,000.00	546,847.35	22,713.90	-----	774,561.25	117,331.75
Colorado.....	375,881	164,886.26	199,130.00	-----	-----	364,016.26	11,864.74
Idaho.....	543,486	12,125.39	263,590.00	101,200.93	164,569.68	543,486.00	-----
Montana.....	530,411	-----	295,425.09	35,362.59	199,623.32	530,411.00	-----
Nevada.....	2,159,555	361,477.50	584,671.36	185,410.38	896,147.16	2,027,706.40	131,848.60
New Mexico.....	807,512	-----	119,682.11	233,714.95	408,663.19	762,060.25	45,451.75
North Dakota.....	88,597	2,750.52	23,487.11	12,928.48	21,106.44	60,272.55	28,324.45
Oklahoma.....	104,733	62,200.02	-----	-----	41,460.41	103,660.43	1,072.57
Oregon.....	659,223	10,000.00	291,543.89	61,759.79	295,919.32	659,223.00	-----
South Dakota.....	198,275	132,794.43	65,715.00	-----	-----	198,509.43	215.57
Utah.....	1,100,495	-----	534,823.61	22,136.95	543,534.44	1,100,495.00	-----
Washington.....	145,209	-----	48,469.42	5,842.10	87,772.30	142,083.82	3,125.18
Wyoming.....	812,801	89,793.77	-----	222,251.00	449,350.00	761,394.77	51,406.23
Total.....	9,875,000	1,164,372.71	3,497,893.65	1,093,526.89	3,728,522.64	9,484,315.89	390,684.11

Of the total of \$12,500,000 authorized only the first \$10,000,000 has been apportioned up to the close of the fiscal year. As deduction for administrative purposes was made from the first \$5,000,000 only, the amount apportioned for road construction was \$9,875,000. The States benefiting and the amounts of their apportionments are shown in table 24. The same table also shows the progress made toward expenditure of the funds in the several States.

RESTORATION OF FLOOD-DAMAGED ROADS

No addition has been made during the past year to the appropriations previously made for relief of States on account of damage to roads by floods.

Of the various appropriations those made to Vermont and New Hampshire and reported as expended in the last annual report are still the only ones completely expended. Of the appropriation to Kentucky nearly \$300,000 was paid during the year and the unobligated balance was reduced by about \$37,000.

There was no change in the status of the appropriations to Arkansas, Louisiana, Mississippi, Missouri, and Alabama; but with the exception of the last named these appropriations have no definite time of availability. Availability of the Alabama appropriation, extended to June 30, 1934, by the act of March 3, 1933, was further extended to June 30, 1935, by the Emergency Appropriation Act approved June 19, 1934.

Of the remaining appropriations—those to Georgia, South Carolina, and Florida—the first lapsed on June 30, 1934, with \$18,771.85 still unobligated, that to South Carolina was completely obligated and in course of expenditure by June 30, and that to Florida was unaltered in status since the previous year's report.

The status of these several appropriations on June 30, 1934, is shown in table 25.

TABLE 25.—*Flood relief appropriated, amounts paid to States, and the unobligated balance of the appropriation on June 30, 1934*

State	Appropriated	Paid to States	Unobligated balance
Vermont.....	\$2,654,000.00	\$2,654,000.00	-----
New Hampshire.....	653,300.00	653,300.00	-----
Kentucky.....	1,889,994.00	1,234,442.47	\$629,512.59
Total.....	5,197,294.00	4,541,742.47	629,512.59
Arkansas.....	1,800,000.00	1,477,693.56	322,306.44
Louisiana.....	967,582.00	786,271.13	181,310.87
Mississippi.....	628,000.00	345,266.57	282,733.43
Missouri.....	258,418.00	119,428.31	130,865.95
Total.....	3,654,000.00	2,728,659.57	917,216.69
Alabama.....	¹ 1,618,500.00	481,083.81	1,137,416.19
Georgia.....	¹ 505,167.50	464,351.67	² 18,771.85
South Carolina.....	¹ 801,361.00	782,362.18	-----
Florida.....	80,307.00	77,296.48	-----
Total.....	3,005,335.50	1,805,094.14	1,156,188.04
Grand total.....	11,856,629.50	9,075,496.18	2,702,917.32

¹ Does not include fund allowable for administration.

² Availability for obligation expired June 30, 1934.

The mileage of road improved under the flood-relief acts up to the end of the fiscal year and the corresponding total cost and Federal payment are given in table 26. Similar information for roads completed and paid for during the past year is presented in table 27; and for roads under construction and approved for construction in table 28.

TABLE 26.—*Total cost, flood relief, and mileage improved to June 30, 1934*

State	Total cost	Flood relief	Miles
Vermont.....	\$5,651,965.83	\$2,654,000.00	61.2
New Hampshire.....	1,408,479.45	653,300.00	29.1
Kentucky.....	2,951,767.56	1,213,483.95	209.2
Total.....	10,012,212.84	4,520,783.95	299.5
Arkansas.....	843,914.04	405,711.21	49.8
Mississippi.....	11,433.59	3,563.66	.3
Total.....	855,347.63	409,274.87	50.1
Alabama.....	319,797.49	155,615.15	41.7
Georgia.....	417,306.53	202,008.56	5.1
South Carolina.....	1,392,434.71	637,421.98	18.5
Total.....	2,129,538.73	995,045.69	65.3
Grand total.....	12,997,099.20	5,925,104.51	414.9

TABLE 27.—*Total cost, flood relief, and mileage of roads which were completed and paid for during the fiscal year 1934*

State	Total cost	Flood relief	Miles
Kentucky.....	\$1,152,560.78	\$463,142.88	106.1
Georgia.....	32,792.16	14,573.70	.3
South Carolina.....	161,643.66	77,700.00	.3
Total.....	194,435.82	92,273.70	.6
Grand total.....	1,346,996.60	555,416.58	106.7

TABLE 28.—*Total cost, flood relief, and mileage of roads under construction and approved for construction on June 30, 1934*

State	Total cost	Flood relief	Miles
Georgia.....	\$70,249.18	\$31,178.18	0.8
Kentucky.....	93,994.93	46,997.46	10.2
South Carolina.....	366,521.23	163,939.02	3.9
Total.....	530,765.34	242,114.66	14.9

The mileage of the several surface types represented in flood-relief roads completed and fully paid for during the fiscal year 1934 is given in table 29, and the total mileages completed, and under construction or approved for construction at the close of the fiscal year are given in tables 30 and 31, respectively.

TABLE 29.—*Mileage of various types of flood-relief roads completed and paid for during the fiscal year 1934*

State	Graded and drained	Gravel, untreated	Portland cement concrete	Bridges and approaches	Total
Georgia.....			0.2	0.1	0.3
Kentucky.....	100.9	4.6		.6	106.1
South Carolina.....				.3	.3
Total.....	100.9	4.6	.2	1.0	106.7

TABLE 30.—*Mileage of the various types of flood-relief roads improved to June 30, 1934*

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Gravel, surface treated	Macadam, surface treated	Bituminous macadam	Portland cement concrete	Bridges and approaches	Total
Vermont.....			7.0	9.2		6.1	32.5	6.4	61.2
New Hampshire.....				2.9	4.9	2.3	18.4	.6	29.1
Kentucky.....	203.0		4.7					1.5	209.2
Total.....	203.0		11.7	12.1	4.9	8.4	50.9	8.5	299.5
Arkansas.....	16.1		31.1				.3	2.3	49.8
Mississippi.....							.3		.3
Total.....	16.1		31.1				.6	2.3	50.1
Alabama.....	17.4	15.9	7.6					.8	41.7
Georgia.....		.4			3.3		.6	.8	5.1
South Carolina.....	10.1						5.3	3.1	18.5
Total.....	27.5	16.3	7.6		3.3		5.9	4.7	65.3
Grand total.....	246.6	16.3	50.4	12.1	8.2	8.4	57.4	15.5	414.9

TABLE 31.—*Mileage of the various types of flood-relief roads under construction and approved for construction on June 30, 1934*

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Macadam, treated	Portland cement concrete	Bridges and approaches	Total
Georgia.....				0.3	0.4	0.1	0.8
Kentucky.....	1.4		8.7			.1	10.2
South Carolina.....	2.9	0.4				.6	3.9
Total.....	4.3	.4	8.7	.3	.4	.8	14.9

WORK-RELIEF HIGHWAY PROJECTS

In the early fall of 1933 relief needs were especially urgent in a number of Western and Southwestern States in which farm crops had been destroyed or greatly reduced as a result of severe drought and, in the Dakotas, by a scourge of grasshoppers.

Relief authorities were desirous of providing useful work that could be done by those in need of aid, so that the relief extended would have as much as possible of the character of a wage paid for services rendered and as little as might be of the aspect of a dole. It was felt that road work of a simple but needed and useful character could be provided, but the effort to do so was embarrassed by the fact that the relief funds were usable only for relief purposes and could not be employed to pay for road materials and equipment and other nonservice items which enter in some part into even the simplest of road improvements. This difficulty was overcome by effecting an arrangement under which the Public Works Administration granted amounts necessary to pay such nonservice costs, limited to not more than 30 percent of the total expenditure, and the Federal Emergency Relief Administration supplied from its relief rolls and paid the necessary workers.

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

Work of this sort has been carried on during the fiscal year in 9 States on nearly 7,500 miles of road. The number of projects in each State, the estimated cost and amount payable from Public Works funds, and the mileage of road involved are given in table 32.

TABLE 32.—*Number and estimated cost and mileage of National Recovery work-relief projects undertaken during the fiscal year 1934, and Public Works funds involved*

State	Projects	Estimated total cost	Public Works funds	Mileage
	<i>Number</i>			
Colorado.....	3	\$600,000.00	\$180,000.00	155.0
Florida.....	1	1,000,000.00	300,000.00	(1)
Kansas.....	18	2,096,277.71	628,883.31	542.9
New Mexico.....	6	970,000.00	291,000.00	654.0
North Dakota.....	42	2,998,450.00	899,535.00	1,587.1
Oklahoma.....	7	1,740,000.00	522,000.00	460.6
South Dakota.....	54	3,300,000.00	990,000.00	1,341.0
Texas.....	34	6,548,620.10	1,964,586.02	975.0
Wisconsin.....	44	2,960,477.00	883,727.40	1,784.2
Total.....	209	22,213,824.81	6,659,731.73	7,499.8

¹ Repairs to roads and bridges damaged by floods.

LOAN-AND-GRANT HIGHWAY PROJECTS

Under the provisions of section 203 of the National Industrial Recovery Act, the Public Works Administration, during the course of the year agreed to finance or aid in the financing of, by loans or grants or both, the construction of roads in a number of States. The road-building activity thus provided for was additional to all other projects initiated under the grants specifically authorized for highway construction by sections 204 and 205 of the act.

Late in the fiscal year, the detailed administration of this work was transferred to the Bureau of Public Roads by the Public Works Administration. The status of the work transferred is given in table 33.

TABLE 33.—Status on June 30, 1934 of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit

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	Allotment by contracts executed		Estimated total cost	Loan	Other	
		Grant					Loan	Grant
California.....	\$1,501,000	\$1,501,000.00	10.7	\$4,093,734.01	\$1,161,560.98	\$2,932,173.03	
Connecticut.....	1,034,100	1,034,100.00	106.7	3,241,902.10	776,742.71	2,465,159.39	
Illinois.....	88,500	84,000.00	2.9	225,241.66	67,572.51	157,669.15	
Indiana.....	204,300	204,300.00	34.4	709,613.66	193,015.46	516,598.20	
Iowa.....	406,400	380,100.00	142.8	75,610.74	22,683.21	52,927.53	
Kansas.....	338,700	65,200.00	103.2	229,580.57	62,316.71	167,263.86	
Maryland.....	5,411,866	1,411,866.00	40.2	3,185,161.38	955,548.44	3,239,612.94	
Massachusetts.....	1,574,500	1,574,500.00	86.5	4,675,767.61	1,381,857.94	3,293,909.67	
Michigan.....	20,400	20,400.00					
Minnesota.....	627,500	269,000.00	210.8	653,382.93	180,533.65	185,534.99	
Mississippi.....	531,000	131,000.00			287,204.20		
Missouri.....	1,805,000	1,803,000.00					
Montana.....	1,648,758	397,758.00	.1	18,041.92	3,480.00	14,561.92	
Nebraska.....	11,500	11,500.00	496.1	1,076,002.73	250,733.73	36,278.83	
New York.....	3,204,733	1,033,799.90	59.5	38,376.20	10,755.89	27,620.31	
Ohio.....	306,300	90,000.00	3.2	143,950.00	34,000.00	109,950.00	
Texas.....	306,300	198,800.00	6.5	316,739.00	83,587.70	233,151.30	
Vermont.....	9,000	9,000.00	67.7	787,294.88	228,266.37	487,978.43	
Washington.....	249,550	246,550.00	152.7	906,152.65	236,890.29	669,261.76	
West Virginia.....	5,114,500	1,216,500.00	31.3	505,004.13	121,201.00	383,803.13	
Wisconsin.....	437,500		138.1	365,677.50	109,703.25	255,974.25	
Total.....	24,615,107	11,625,373.90	1,683.4	21,247,233.07	5,880,463.84	11,350,038.37	

NATIONAL-FOREST-ROAD CONSTRUCTION

As explained in previous annual reports, the appropriations made for improvement of roads in the national forests have hitherto recognized and provided separately for the improvement of two principal classes of road 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 of Public Roads 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 of Public Roads, include all projects in the forest-highway system, except those which 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.

Departing from the previous practice, Congress, in the National Industrial Recovery Act, did not attempt to delimit the amounts to be allotted to each of these classes of roads, but provided for both in a single authorization for the expenditure of not less than \$50,000,000 for the construction of roads in several classes of Federally controlled areas including the national forests. Under this authorization the Public Works Administration allotted to forest highways \$10,000,000 and to forest-development roads \$5,000,000. Similar provision was made for continuance of the work in the Hayden-Cartwright Act which authorizes appropriation of \$24,000,000 for the various classes of road work. Of this amount the allotment for forest highways is \$7,000,000 and for forest-development roads \$3,000,000.

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, 1934, of 16,963 miles, classified as shown in table 34.

TABLE 34.—Classification of the mileage of the forest-highway system as revised to June 30, 1934

State	Mileage of forest-highway system			
	Class 1	Class 2	Class 3	Total
Western:				
Alaska.....			484.87	484.87
Arizona.....	320.6	245.0	495.90	1,061.50
California.....	578.4	1,357.0	406.9	2,342.3
Colorado.....	508.0	1,113.0	104.0	1,725.0
Idaho.....	687.21	176.6	184.5	1,048.31
Montana.....	628.3	335.8	240.0	1,204.1
Nevada.....	104.0	190.6	165.3	459.9
New Mexico.....	164.0	518.0		682.0
Oregon.....	524.66	418.68	422.13	1,365.47
South Dakota.....	227.0		86.0	313.0
Utah.....	96.65	530.30	110.2	737.15
Washington.....	386.5	135.4	247.9	769.8
Wyoming.....	387.3	37.0	217.7	642.0
Total.....	4,612.62	5,057.38	3,165.40	12,835.40

TABLE 34.—Classification of the mileage of the forest-highway system as revised to June 30, 1934—Continued

State	Mileage of forest-highway system			
	Class 1	Class 2	Class 3	Total
Eastern:				
Alabama.....	4.0		31.0	35.0
Arkansas.....	192.33	144.32	90.5	427.15
Florida.....	39.69	134.98	36.3	210.97
Georgia.....	41.8	37.5	68.7	148.0
Illinois.....			24.0	24.0
Kentucky.....	41.0	58.0	13.0	112.0
Louisiana.....	48.3	118.7	23.0	190.0
Maine.....			11.0	11.0
Michigan.....	49.91	108.5	150.3	308.71
Minnesota.....	89.50		222.2	311.70
Mississippi.....	32.0	13.0	78.0	123.0
Nebraska.....			28.8	28.8
New Hampshire.....	41.5	60.5	49.0	151.0
North Carolina.....	102.0	105.3	48.3	255.6
Oklahoma.....	31.48		70.5	101.98
Pennsylvania.....	134.0	248.0	25.0	407.0
Puerto Rico.....			21.0	21.0
South Carolina.....		26.0	11.0	37.0
Tennessee.....	83.8	105.0	79.0	267.8
Vermont.....	7.0		12.0	19.0
Virginia.....	79.0	117.9	210.0	406.9
West Virginia.....	76.0	102.0	62.0	240.0
Wisconsin.....	5.0	148.9	136.1	290.0
Total.....	1,098.31	1,528.60	1,500.70	4,127.61
Grand total.....	5,710.93	6,585.98	4,666.10	16,963.01

During the past year improvements were constructed on 938 miles of the forest-highway system, bringing the total mileage improved to date with Federal funds to 5,868 miles. Of the mileage improved during the year 877 miles were in the Western States and Alaska, and the remaining 61 miles were in the forests of 7 Eastern States. Of the total mileage improved to date 5,400 miles are in the West and 468 miles in the East.

The mileage of forest-highway projects constructed during the year and to date by States is shown in table 35.

TABLE 35.—Mileage of completed forest-highway projects, by States

State	Mileage of forest-highway projects completed		State	Mileage of forest-highway projects completed	
	During 1934	Total to June 30, 1934		During 1934	Total to June 30, 1934
Western:			Eastern:		
Alaska.....	6.4	235.7	Alabama.....		5.1
Arizona.....	106.8	496.0	Arkansas.....	17.4	102.2
California.....	202.3	712.7	Florida.....	16.4	56.6
Colorado.....	106.5	486.5	Georgia.....		21.4
Idaho.....	86.9	592.2	Michigan.....	5.9	36.4
Montana.....	52.0	533.0	Minnesota.....	13.9	107.4
Nevada.....	10.1	149.2	New Hampshire.....	5.1	13.2
New Mexico.....	62.9	282.6	North Carolina.....	1.3	46.4
Oregon.....	108.5	903.7	Pennsylvania.....	1.2	3.0
South Dakota.....	3.5	58.8	South Carolina.....		15.6
Utah.....	21.3	318.8	Tennessee.....		37.4
Washington.....	54.7	293.1	Virginia.....		19.3
Wyoming.....	55.0	337.9	West Virginia.....		3.6
Total.....	876.9	5,400.2	Total.....	61.2	467.6
			Grand total.....	938.1	5,867.8

On June 30, 1934, work was in progress under the supervision of the Bureau of Public Roads on 1,089 miles of road at a total estimated cost of \$12,207,568. Work estimated to cost \$2,020,021 had been planned but not yet started; and there was a balance of authorized funds not yet obligated to definite projects amounting to \$1,916,808.

ROAD CONSTRUCTION IN NATIONAL PARKS

During the fiscal year 1934 construction was completed on a total of 157 miles of roads in the national parks, making a total of 831 miles thus far improved. Under the agreement of several years' standing construction of these roads is supervised by the Bureau of Public Roads.

The mileage constructed during the fiscal year and to date in the several parks is shown in table 36.

TABLE 36.—Mileage of national-park roads improved under the supervision of the Bureau of Public Roads

National park or monument	Mileage completed under supervision of the Bureau		National park or monument	Mileage completed under supervision of the Bureau	
	During fiscal year 1934	Total to June 30, 1934		During fiscal year 1934	Total to June 30, 1934
Acadia.....	3.9	7.8	Mount Rainier.....	6.5	61.3
Bryce Canyon.....	1.8	16.2	Petrified Forest.....	9.6	26.3
Colonial National Monument.....	1.0	11.0	Rocky Mountain.....	2.1	38.9
Crater Lake.....	3.5	41.6	Scott's Bluff.....	.0	.6
Devils Tower National Monument.....	.0	.3	Sequoia.....	6.5	39.3
General Grant.....	.0	6.4	Shenandoah.....	.0	40.1
Glacier.....	7.1	54.4	Washington, D.C.....	.7	.7
Grand Canyon.....	21.4	151.1	Wind Cave.....	8.6	15.3
Great Smoky Mountains.....	4.0	4.0	Yellowstone.....	63.2	156.1
Hawaii.....	4.7	24.9	Yosemite.....	8.7	65.1
Lassen Volcanic.....	.0	30.4	Zion.....	3.4	18.9
Mesa Verde.....	.0	20.4	Total.....	156.7	831.1

During the past fiscal year Bureau activities on park-road construction were greatly expanded and the National Park Service was expanded to include national military parks, battlefields, and cemeteries. Over \$20,000,000 has been appropriated for road construction under supervision of this Bureau in the national-park areas.

In the Western States the largest and most expensive project constructed by this Bureau was the Red Lodge-Cooke City National Park Approach road to Yellowstone National Park. This project lies in Montana and Wyoming and comprises a northeast entrance to Yellowstone Park. It is approximately 60 miles long, and on June 30, 1934, approximately 43 miles were complete. The remaining 17 miles will be completed during the season of 1934. Contracts have been let providing for surfacing and oiling of the road which will be done during 1935.

Another large project undertaken for the National Park Service is the Cameron-Desert View east approach to Grand Canyon National Park. The entire project is not complete, but approximately 18 miles were completed during the past year, and it is expected that the road will be graded and surfaced during 1935.

One new park of importance enters the list of those in which roads have been built by the Bureau, that of Great Smoky Mountains National Park in North Carolina and Tennessee. One project was completed during the past year. A very large project involving approximately \$750,000 is under construction in this park.

Surveys and plans are progressing rapidly on the Shenandoah-Great Smoky Mountains Parkway connecting Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee. An initial appropriation of \$3,960,000 has been made for this project. When completed this road will extend along the ridge of the Blue Ridge Mountains and will be one of the most scenic mountain drives in the eastern part of the country.

The Green Mountain Parkway in Vermont is another large project which is now being surveyed. No funds have been appropriated for the construction to date, but a \$40,000 allotment has been made for survey and plans.

Nearly \$12,000,000 of road work is under construction with funds made available by the National Industrial Recovery Act. Of this amount approximately \$8,000,000 is under construction in the West and \$4,000,000 in the East. These figures represent 78 projects of which 61 are located in the West and 17 in the East.

INTER-AMERICAN HIGHWAY

A report of a reconnaissance survey for the proposed Inter-American Highway from Panama to the United States was prepared during the first half of the fiscal year and transmitted to the Department of State on January 22, 1934. The President of the United States in turn transmitted this document to the Congress on March 6. Printing of the report as a congressional document was authorized by Senate Resolution 271, under date of June 6.

The report covers reconnaissance surveys over the proposed line of the highway through the Republics of Panama, Costa Rica, Nicaragua, Honduras, and Guatemala, supplemented by aerial photographs.

In addition to necessary engineering details and cost estimates, with plan and profile maps, the report contains detailed analysis of the economic characteristics of each of the countries involved. The five republics listed above made official request for the reconnaissance survey, but the report treats also of the countries of El Salvador and Mexico which are traversed by the highway. The entire route from Panama City to Nuevo Laredo, Mexico (on the boundary between Mexico and the United States) is approximately 3,200 miles long.

The continued interest of the Congress in this project was evinced by its authorization in June 1934 of \$1,075,000, in two separate bills, for further survey and initial construction activities.

TRANSPORTATION AND ECONOMIC AND STATISTICAL INVESTIGATIONS

WASHINGTON REGIONAL AREA TRAFFIC SURVEY

Compilation of a report on a traffic survey of the regional area of Washington, D.C., was nearing completion.

Detailed recommendations with regard to proposed new routes and bridges are a part of the report, and data with regard to present volume of traffic, the type and composition of this traffic, and studies of its normal movement are also presented. This material will be found useful in the study of numerous problems which are not touched upon in the report itself. Large savings in right-of-way and construction costs should be realized from the detailed data and recommendations resulting from the survey.

INDIANA TRAFFIC SURVEY

The fieldwork of the Indiana traffic survey was completed in the fall of 1933, and since that time the Bureau has had no personnel on the work. The analysis has been handled in accordance with the agreement by the State highway commission. The survey was largely for administrative purposes of the State Highway Commission of Indiana and a report will be issued by the commission.

NEW JERSEY TRAFFIC SURVEY

Field operations for a survey of traffic upon the entire State highway system of New Jersey and upon a limited mileage of the principal county routes were completed in September 1933, and the resulting report is now in process of preparation.

The report will contain data with regard to the origin and destination of truck traffic, the nominal capacities and body types of trucks, their classification as owner-operated, contract haulers, or common carriers, and as of interstate or intrastate operation, the origin and destination of all vehicles observed at the Hudson and Delaware River crossings, and the determination of passenger-car traffic upon each of the highway systems which is local to each county or which originates in other areas.

FLORIDA TRAFFIC SURVEY

A 12-month survey of traffic on the highways of Florida was begun in September 1933.

This project is to obtain complete data with regard to present use of the State highway system. At certain major points in the citrus area, the volume and movement of citrus-hauling trucks will be studied. Complete analysis of the volume and movement of tourist traffic, together with detailed data with regard to their expenditures, speed of travel, purpose in visiting Florida, length of stay, and areas of origin, are a part of the survey.

CONNECTICUT TRAFFIC SURVEY

Field work on a 12-month survey of traffic in Connecticut was begun in October 1933.

Truck data relating to origin and destination, classification of trip as city or country; situs of ownership of vehicles, as city, village, or farm; and classification of operators as private, contract haulers, or common carriers, are a part of the project. The volume of trucks engaged in railway service will be obtained and trucks will be weighed at all points where scales are available.

ARKANSAS TRAFFIC SURVEY

Field work was begun at approximately 250 points in Arkansas in April 1934.

Data for passenger-car and bus traffic will cover the following items: State of registration, route used, classification of trip as State or interstate, situs of ownership, and travel, with either origin or destination at railroad stations. The same information will be obtained for trucks, and, in addition, information with regard to the following: Make of vehicle; wheel loads (obtained by weighing on portable scales); rated capacity; number of trailers; classification, as owners, contract haulers, or common carriers; commodities carried; and whether or not return loads are picked up.

TRAFFIC CAPACITY AND INTERSECTION STUDIES

The studies of intersection efficiency were continued, to include analysis of the movement of vehicles at some 20 intersections, most of which were operated under at least two different control methods. The results of the Seventeenth Street and Constitution Avenue analysis (Washington, D.C.), and of the study of the time saving over the New Jersey high-level viaduct, were presented before the Highway Research Board, and were reported also in Public Roads.

New and improved methods of recording developed during the year have made possible studies of the movement of individual vehicles. These methods will permit analysis of highway capacity under various conditions of traffic and alignment, of vehicle speeds on the open highway, and of the efficiency of intersections carrying the heaviest traffic volumes.

ORGANIZATION OF AMERICAN ASSOCIATION OF MOTOR-VEHICLE ADMINISTRATORS

Continuing its interest in the problem of greater uniformity in State laws and regulations affecting the registration of motor vehicles and their operation on the highways, the Bureau participated in the formation of the American Association of Motor Vehicle Administrators at a meeting held in Chicago in September 1933. This new organization comprises in its membership the various State administrative officials having jurisdiction over all phases of motor-vehicle operation. It embraces four regional groups (East, South, Midwest, and West), all of which had been officially organized with closely similar constitutions and bylaws by the end of June 1934. The Bureau holds an active membership in the national association, and acts in an advisory capacity with the regional groups. This new organization is regarded as an effective channel for contacts with the growing movement toward promotion of safety on streets and highways and greater uniformity in State motor-vehicle laws.

NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY

The Bureau assisted in the holding of the Fourth National Conference on Street and Highway Safety, at Washington, D.C., in May 1934. This conference adopted a revision of the Uniform Motor Vehicle Code, bringing this document up to date.

The code now contains the following acts, designed for the consideration of and enactment by State legislatures: (1) Uniform motor vehicle administration, registration, and certificate of title and antitheft act; (2) uniform motor vehicle operators' and chauffeurs' license act; (3) uniform motor vehicle civil liability act; (4) uniform motor vehicle safety responsibility act; (5) uniform act regulating traffic on highways. Two other documents completed the work of the conference—a model municipal traffic ordinance and a manual on uniform traffic-control devices. The conference attracted a large attendance of public officials and other traffic specialists from all parts of the country, whose collective experience and judgment were embodied in the uniform acts as adopted.

STUDIES OF TAXATION

A series of studies of the finances of various States, with special reference to highways, was continued during the past fiscal year.

An inquiry into the tax situation in New Hampshire was conducted. Similar studies were begun in Minnesota, Colorado, Wyoming, and New Mexico. The results of investigations of this character in Wisconsin, Illinois, and Michigan have already been published. The general purpose of all these studies is to establish the relation of highway taxes paid from different sources and by different groups of citizens to highway expenditures, and to lay down a broad basis for adjustment of highway taxes on a rational plan.

MOTOR-VEHICLE TAXATION IN 1932

A special statistical survey of motor-vehicle taxation in the United States in the year 1932 was made during the past fiscal year, and the resulting report is now being prepared for publication. This inquiry elicited, for the first time, facts in complete detail regarding the many types of fees and taxes paid by owners of all classes of vehicles in all the States. Another phase of the survey related to local fees and taxes, including county and municipal imposts, and personal-property taxes. This investigation revealed both the extent and diversity of motor-vehicle taxes, and showed total collections in the year 1932 of slightly more than 1 billion dollars.

WIDTH OF HIGHWAY USED BY VEHICLES IN PASSING

Observations were made of highway traffic in the vicinity of Baltimore, Md. to obtain information concerning the position upon the highways of various types of vehicles in the act of passing one another in either direction, as well as the longitudinal distance required for completing the passing maneuver when the vehicles are moving in the same direction. A motion-picture camera mounted in an observer's car moving in the stream of traffic was used. It is planned to publish the results of these tests.

RAILROAD LINE ABANDONMENT STUDIES

By arrangement with the Interstate Commerce Commission and the American Railway Association, the bureau undertook to make studies of branch lines and sections of railroad proposed for abandonment, with a view to ascertaining the effect of such action on highway traffic in the immediate vicinity. Cases studied included both those under formal application to the Interstate Commerce Commission and those informally proposed by the railroads through the American Railway Association. A detailed inspection was made of the territory served by the existing railroad, with special reference to the amount of traffic which would result if freight transported by rail should be carried on the roads, and to the condition of the existing roads leading from each population center or railroad station to the nearest available station after abandonment. The potential highway traffic was estimated as an annual daily average in truck loads based on a 5-year period, and for maximum average truck loads per day for the peak month.

Distances, types of road, condition of bridges, and other relevant features were reported, in order that a definite determination might be made as to the amount and kind of highway construction or reconstruction which would be necessary to provide equivalent service to that furnished by the rail line proposed for abandonment.

During the fiscal year 72 cases were studied, involving 1,893 miles proposed for abandonment, distributed among the States as shown in table 37.

TABLE 37.—*Sections of railroads proposed for abandonment and inspected during fiscal year*

State	Projects	Railroad	High-ways in-spected	State	Projects	Railroad	High-ways in-spected
	Number	Miles	Miles		Number	Miles	Miles
Alabama.....	1	21.00	60	Missouri.....	7	204.50	373
Arkansas.....	3	112.10	242	New Hampshire.....	4	102.70	171
Delaware.....	1	34.60	78	New Jersey.....	2	15.46	31
Florida.....	1	27.42	48	New York.....	2	28.88	45
Illinois.....	2	39.83	85	North Carolina.....	2	17.74	52
Iowa.....	3	72.85	134	Oklahoma.....	1	10.61	13
Kansas.....	7	445.23	673	Pennsylvania.....	4	74.63	132
Kentucky.....	3	63.52	185	Tennessee.....	3	39.66	149
Louisiana.....	1	43.05	35	Texas.....	3	127.23	256
Maryland.....	1	5.00	12	Virginia.....	4	69.44	176
Massachusetts.....	3	24.53	78	West Virginia.....	1	8.00	24
Michigan.....	2	45.64	124	Wisconsin.....	6	151.18	285
Minnesota.....	4	70.36	159				
Mississippi.....	1	37.90	89	Total.....	72	1,893.06	3,712

This work was done for the purpose of determining the selection of secondary or other roads which should be built to serve communities in the regions of the abandonments.

PRODUCTION-COST STUDIES

PRODUCTION COSTS ON RELIEF PROJECTS

During the past year requirements in the administration of highway work, especially those pertaining to employment of labor, and assistance in connection with such activities as drought relief, flood relief, and civil works, necessitated a considerable curtailment of the usual production studies.

However, the drought and flood-relief road work carried on in nine States since the fall of 1933 has produced much valuable information and experience aside from providing needed road improvements and giving employment to needy farmers. At the period of maximum activity during the fiscal year about 20,000 local destitute workers in 8 States were given employment and their efforts utilized so effectively that on the whole every dollar of public expenditure is believed to have yielded a dollar's worth of useful and needed improvement. This belief is based on many concrete and exact data from each of these States. Reports from Kansas may serve as an example.

In the 18 drought-stricken counties of southwestern Kansas the Kansas State Highway Commission in cooperation with Federal authorities provided employment for able-bodied, needy farmers in the improvement of some of the most important of their local roads. During November and December 1933 and January 1934, the State highway commission started 59 of these road projects, using men taken from the relief and civil-works lists. These 59 road projects involved a total of 349 miles, but during the 3 months the major part of the actual work was confined to approximately 126 miles, on which a total of 1,270,000 cubic yards of excavation were moved, mostly with fresnoes, culverts were constructed, the roadway and slopes finished, right-of-way cleared, and fences built—all at a total cost of \$337,500. Applying the total cost to the grading only results in a cost of 26.6 cents per cubic yard. Of this total expenditure, 88.4 percent was paid directly to the laborers for personal services and the use of their personally owned teams and trucks. The remaining 11.6 percent was spent largely in the purchase of materials and in providing supervisory labor and the necessary tools and equipment. These expenditures include all miscellaneous and incidental labor connected with the completion of the road, such as finishing the slopes and shoulders, placing culverts (but not the cost of culvert materials), moving and erecting fences, together with some long-haul fills and clay and caliche surfacing in which wagons and trucks were used and the materials loaded by hand. Table 38 shows the relative average amount of human and team labor required per cubic yard on this work.

TABLE 38.—*Man-hours and horse-hours per cubic yard of excavation on relief projects in Kansas*

Class of work	All grading work except wagon and truck haul ¹	Jobs using only fresnoes	Wagon- and truck-haul work with hand loading
	Hours	Hours	Hours
By men:			
Dirt-moving organization.....	0.299	0.338	1.259
Hand finishing slopes.....	.106	.103	.....
All other labor.....	.045	.044	.028
Total man-hours per cubic yard of excavation.....	.450	.485	1.287
By horses:			
On fresnoes.....	.520	.505	.104
On plows.....	.098	.098	.110
On wagons.....	.008	.038	.474
On all other work.....	.040	.026	.036
Total horse-hours per cubic yard of excavation.....	.666	.667	.724

¹ Includes 8 jobs on which the elevating grader was used to throw up approximately 84,200 cubic yards on the grade. Total yardage handled exclusively by fresnoes was 1,140,700; by elevating grader, 84,200; and by trucks and wagons, 47,500. Wage rates were almost uniformly 40 cents an hour for labor and 7½ cents an hour for horses.

While the primary object of this work was to provide relief and consequently the crews were not always well balanced in respect to the number of teams available and the individual members changed a great deal, it is clear from table 38 that the production rates per man-hour and per horse-hour are very creditable for this type of work. These people not only supported themselves, their families, and their livestock throughout the winter by their own efforts, but in doing so they made a definite contribution to the future welfare and improvement of their communities in the form of needed public highways, which in mileage and in quality represent a value fully equal to the total outlay.

Continuing former studies of the extent to which labor profits from the construction of high-type pavements in which mechanical equipment plays an important part, a number of corollary studies have been carried on to determine more fully the returns to labor from other types of construction. Considerable time has been devoted to obtaining adequate records of the amount of employment actually provided by the current State and Federal-aid highway-construction program in each of the several States. As a part of this plan a weekly record is obtained of the number of persons actually employed on State and Federal road work. This provides a definite means of predicting the total amount of employment which would be provided by any given expenditure.

It was found impossible to continue active field work on a number of studies during the past year, and the data which had been obtained were analyzed and prepared for publication. Reports were prepared on the construction of high-type bituminous pavements, some new relations bearing on concrete mixtures, and power-shovel operation in highway grading.

The first report is based on the analysis of detailed studies on 23 bituminous paving jobs. The causes of reduced production rates and high unit costs are given and methods whereby these causes may be eliminated or reduced are discussed.

STUDIES OF CONCRETE MIXTURES

Studies of concrete mixtures have developed indications of certain relations not heretofore established between the proportions of the solid ingredients of the concrete, the water content, and the strength and density of the resulting concrete. These relations may be stated briefly as follows:

For a particular combination of sand and cement a relation exists between the amount of coarse aggregate and (1) the total voids in the concrete mixture and (2) the amount of water required for basic or any relative proportion of basic water contents.¹

¹ Basic water content is that amount of water which produces maximum density in a particular combination of materials. Quantities of water expressed in terms of basic water content (as a ratio) are referred to as relative water contents.

Likewise, for a particular coarse aggregate content, a relation exists between the ratio of the amounts of sand and cement in the mixture and (1) the amounts of water required as the basic and various relative water contents, and (2) the corresponding total voids in the mixture. As the sand-cement ratio is uniformly increased, a uniform change occurs in the amount of water required for the basic and each relative water content and the total voids in the concrete corresponding to each. In these tests, increase in the ratio of sand to cement resulted in an increase in both the amounts of water required for each relative water content and the corresponding total voids in the concrete.

For each relative water content, using the same kinds of materials, the slump of every concrete mixture will be the same, regardless of the proportions of cement and aggregate used in it.

GRADING STUDIES

In the studies of power-shovel operation in highway grading it was found that the management was the most important single factor affecting production costs; that the hauling usually presented more difficult problems than the digging and loading; and that in rock or hard ground the drilling and blasting are frequently the most poorly managed operations on the job. These studies cover several hundred projects distributed over practically all parts of the country and should therefore form a fairly accurate indication of present practice, as well as a basis for evaluating the efficiency of different methods of operation and procedure.

The studies begun last year of the man-hours and equipment-hours involved in the numerous unit items of the various types of highway construction were discontinued soon after the opening of the fiscal year. The need for more precise knowledge of the amount of human labor required in each road-building and maintenance operation, and the extent to which the labor element varies with different methods and different kinds of equipment is so urgent, however, that these studies should be resumed at the earliest opportunity. In adopting means for relieving unemployment, both the legislator and the administrator are in need of comprehensive data.

HIGHWAY ACCOUNTING METHODS

The Bureau has continued its efforts to further the development and installation of efficient accounting procedures by highway-building agencies. It has a direct interest as a result of its cooperation with the States in road construction and also because of its collection of general statistics in the highway field. Accurate and complete information in regard to the various activities in which a highway department is engaged is a prerequisite to efficient administration. Efficient and effective statistical and accounting control is necessary not only for administrative reasons but also to provide the engineering organization with proper means for determining costs and properly evaluating and comparing the relative merits and demerits of both new and old procedures, methods of operation, and types of organization. For these accumulations of experience and data to be of the widest possible value it is necessary that the statistical methods, terms, and nomenclature be uniform among the several States so that the accomplishments of one can be fairly compared with those of any other. As yet, such comparisons can be made only between a few States. The aim of the Bureau is to provide a system of accounts and records that will be economical in operation, will fully meet all accounting requirements of a department, and will provide quickly and in practical form complete statistical information on any desired activity in which a department is engaged, and which shall be fully comparable with similar activities in any other State. Cooperative work along these lines was continued during the year insofar as time and opportunities would permit.

PHYSICAL RESEARCH

MOTOR-VEHICLE IMPACT INVESTIGATIONS

The current research in this field is the study of the effect on pavement surfaces of the suddenly applied forces developed by motor-vehicle impact as compared with the effect of static or slowly applied forces of the same magnitude. Preparations have been made for laboratory tests under carefully controlled conditions of temperature and moisture. These tests will be made upon massive specimens of concrete mounted as cantilevers utilizing a specially designed pendulum-type impact machine to produce the impact. This machine, now practically completed, consists of a structural frame carrying a vertical pendulum

100 inches in length with a motor-truck wheel mounted at its center of percussion. The pendulum is to be swung against the vertical face of the test specimens and the strains and deflections of the specimens under the resulting impact reaction will be measured and compared with those caused by an equivalent static force.

Twenty-six specimens have been fabricated and are ready for test. Essential preliminary calculations and calibration tests have been made.

SUBSURFACE EXPLORATIONS

This new investigation has for its object the development of instruments and operating technic which will reveal subsurface formations of rock or other materials of concern in the construction of highways and highway structures.

At the outset of the work in September 1933, two independent scientific methods for sounding relatively shallow rock depths were considered as being probably most suitable. Both of the methods have been used extensively in mining and, to some extent, for shallower work. One involves the measurement of the electrical resistivity of the soil while the other, known as the seismic method, depends on the propagation and measurement of sound waves through the earth. As the first method mentioned is the simpler it was given first attention and a convenient and practical field apparatus has been designed, built, and given a considerable amount of use locally. Results to date justify the belief that this method of test can be used to advantage for determining the amount of rock excavation in highway construction, for locating dredging and quarry material, and for determining rock depths for bridges or other structures.

For the seismic tests a three-element oscillograph has been designed and is now under construction. It is believed that this method will be particularly useful in connection with bridge construction.

HIGHWAY-BRIDGE INVESTIGATIONS

Tests to determine the friction developed in the sliding of expansion bearings in highway bridges were described in the reports of the last 2 years. The originally scheduled tests in this investigation have been completed and a few additional tests involving other combinations of metals are now being made. The data which have been obtained are being analyzed and a detailed report is being prepared.

MEASUREMENT OF ROAD-SURFACE ROUGHNESS

The development of a standardized vehicle for use with the relative roughness indicator as described in last year's report has been continued. Because of certain difficulties encountered in the spring action of the single-wheel trailer, the development has been directed toward a means for satisfactorily damping the spring motion and considerable progress has already been made in this effort.

INVESTIGATION OF CONCRETE PAVEMENT DESIGN

Studies of the structural action of concrete-pavement slab and joint designs have been conducted actively throughout the year and the original program of tests is now practically complete. The scheduled tests to develop the efficiency of joint designs and of the relative balance of cross-sectional designs have been completed.

Advantage was taken of the unusual temperature conditions of the past winter to obtain data concerning the effects of subgrade freezing on the load resistance of pavement slabs. Valuable data on the magnitude and distribution of stresses due to restrained warping have also been obtained. Two of the five scheduled reports on this project are in practically final form and the others are in the course of preparation.

INVESTIGATIONS OF NONBITUMINOUS ROAD MATERIALS

PORTLAND CEMENT

During the year work was started on two laboratory investigations designed to develop information regarding the effect of variations in the chemical composition of portland cement on the durability of concrete. In one series a number of specially prepared cements differing widely in composition are being subjected

to an accelerated weathering test in combination with sands of both good and poor quality. In the other series, which is being conducted simultaneously in eight research laboratories under the sponsorship of the Highway Research Board, 11 brands of commercial portland cements differing in composition are being subjected to alternate freezing and thawing. This problem is of importance in connection with concrete for pavements and bridges, since in certain sections of the country structures are subjected to severe weathering and there is good evidence that the quality of the cement may affect the resistance of the concrete to weathering to a considerable extent.

AGGREGATES

Several investigations dealing with the methods of testing and the physical properties of stone, gravel, sand, etc., are being continued. These tests are being conducted, for the most part, in cooperation with various standardizing bodies, such as the American Association of State Highway Officials and the Highway Research Board. Additional information regarding the possibilities of the Los Angeles rattler test, referred to in the report of last year, was obtained and a report prepared for the use of the committee on materials of the American Association of State Highway Officials. Additional data were obtained in the development of improved laboratory methods of testing the soundness of aggregates. This work, conducted in cooperation with the American Association of State Highway Officials, contributed toward the adoption of two new tentative association standards covering methods of conducting soundness tests of aggregates.

CONCRETE

The promising results indicated by the series of tests to determine the effect of finishing pavement concrete by vibration led to a decision to continue this investigation during the coming year. In this work the latest types of vibrating equipment are being studied. As a result of the work done already along this line, a marked interest has been developed in this method of finishing which, from present indications, may eventually displace the methods now in use.

The study of methods for curing concrete has been temporarily delayed owing to the pressure of other work. However, the necessary equipment has been constructed and the tests will be conducted during the coming year. Tests of light-weight aggregates have been completed and a report is now being prepared for publication. Further tests were also made in connection with the standardization of the flexure test used in the control of paving concrete. Certain variables which may affect the results were investigated.

Recent inspections of concrete specimens stored in Medicine Lake, S.Dak., to determine the effect of various surface treatments in protecting the concrete against alkali attack indicate that, insofar as specimens treated with water-gas and coal-gas tar are concerned, resistance to attack is increased by (1) lowering the water-cement ratio, (2) increasing the length of the moist-curing period, (3) treating the concrete after as short a drying period as possible subsequent to moist curing, and (4) by the use of a coal-tar seal coat following initial priming with water-gas tar.

JOINT FILLERS

A recent development in preformed joint fillers for concrete structures, particularly pavements, has been the introduction of the so-called "resilient type" to replace the conventional plastic fillers which have been in use for many years. The results of a laboratory investigation designed to compare the efficiency of various types of resilient fillers, such as cork, sponge rubber, fiber, etc., were published during the year. The major conclusions from this investigation are as follows:

Considering the essential features of the resilient types of filler, as determined by the tests described in the report, the different types studied may be rated as follows: Sponge rubber and cork, fiber, and asphalt-rubber.

The different samples of sponge-rubber filler exhibit a considerable range in physical characteristics, which warrants careful investigation of any particular material prior to use.

A compression test with three edges restrained is believed suitable for testing resilient expansion-joint fillers. Measurements of the recovery, extrusion, and applied load can be made in a single test.

INVESTIGATIONS OF BITUMINOUS MATERIALS AND BITUMINOUS PAVING MIXTURES

Several years ago the Bureau conducted an investigation of sheet-asphalt and asphaltic-concrete paving mixtures on a circular track or roadway at the Arlington Experiment Farm. The foundation for the experimental sections of bituminous pavement was a reinforced concrete base 13 feet wide and 180 feet in mean diameter. Two series of tests were made and involved a total of 60 test sections which were subjected to a traffic of heavy trucks. The test sections in the first series were subjected to 50,000 truck trips and the second series to 64,000. The observed performance under this traffic, as affected by the variables included in the various sections, furnished the data for a report which has been published during the past year.

Two of the experimental projects, built in cooperation with State highway departments for the study of low-cost bituminous-treated surfaces, are active at the present time. One of these is in South Carolina and the other in Nebraska. The project in South Carolina is for the study of bituminous surfacings of several types on bases of marl and sand-clay. In Nebraska the experiments are with mixed-in-place construction in the sand-hill area of the State, the mineral aggregate being the soil material of the area which is largely blow sand. Periodic inspections are made of both projects and records of maintenance costs and service behavior are being kept.

Mention has been made in previous reports of the cooperative effort of the Bureau, the State highway departments, and the asphalt industry to simplify the tests and standardize specifications for the liquid asphaltic materials which are used extensively in low-cost road construction. A review of the 1933 specifications of the State highway departments for materials of this character indicates substantial progress in obtaining acceptance of the provisional standard specifications which have been recommended. This work is being continued and another series of regional meetings will be held during the coming year for the further promotion of uniformity in the requirements of specifications.

The investigations of the weather-resisting properties of liquid asphaltic materials, undertaken 2 years ago, are being continued. In these studies the basic changes occurring in such materials, when exposed to atmospheric conditions, are determined and the results correlated with the results of various laboratory tests. The ultimate purpose is the development of methods of test which will insure the use of durable materials and thereby result in minimum maintenance costs. A report of the work done during the summer of 1932 has been published and the data obtained in 1933 are being assembled for publication. The investigation has been broadened to include a study of the weathering properties of bituminous mixtures subjected to atmospheric exposure and controlled traffic. For this purpose a small circular track, similar to the indoor track described in last year's report, has been constructed out of doors. This phase of the study includes asphaltic materials from different producing fields and refined by different manufacturing processes.

The studies of low-cost bituminous mixtures on the indoor circular track, described in last year's report, are being continued.

The laboratory study of the factors essential to the proper design of hot bituminous paving mixtures is being continued. The work consists largely of making stability tests. A future phase of this investigation will be a correlation of the service behavior of bituminous pavements with the results of the stability tests.

SUBGRADE INVESTIGATIONS

Subgrade investigations have formerly been directed toward the establishment of the fundamental relationships of the physical phenomena observed when soils are subjected to load and variable climatic conditions. During the past year the work has taken on a somewhat more practical aspect in that it has been directed mainly toward the preparation of available information in such form as to make it more readily usable by the highway engineer, and the development of apparatus and procedures for attacking particular problems of highway construction.

The routine procedures for testing subgrade soils, referred to in last year's report, have been recommended to the American Association of State Highway Officials and the American Society for Testing Materials for adoption as tentative standards and, if accepted, will become a uniform basis for the formulation of specifications throughout the country.

Reports on hydraulic-fill settlement and on frost heave in highways and its prevention, which show the value and application of subgrade information in

practice, have been published. Continued investigation of the mechanical device for determining the liquid limit of soils has indicated its suitability for standardizing the liquid-limit test in various laboratories, as well as for revealing information of a character not furnished by any other test. A procedure for determining the centrifuge-moisture equivalent, which will eliminate the relatively expensive centrifuge, is being investigated and appears promising at the present time.

A standard procedure for performing the flocculation test has been established. This test has proved particularly valuable in differentiating between the good and poor varieties of limerocks, caliches, etc.

Continued research on the hydrometer method of mechanical analysis of fine-grained materials has led to the publication of two reports, the first dealing with the accuracy of the method, and the second detailing a procedure for making the mechanical analysis of portland cement. In addition, progress has been made in the development of a method for rapid mechanical analysis suitable for control purposes in the field. This method will eliminate the use of sieves and scales to a large extent.

A report describing a procedure for selecting soils suitable for use in mud-jacking operations has been published and further investigations of this process may furnish additional information of practical value.

The combined compression and permeability apparatus as proposed by Charles Terzaghi, has proved valuable in the investigation of special problems relating to the behavior of soils under load and in the presence of water. Recent investigations of the expansive action of soils on absorbing water indicate a possible solution of the problem of warping of concrete pavements. These investigations will be continued on an enlarged scale.

A series of admixture tests has confirmed the statement previously made that certain simple tests were satisfactory for indicating the presence of the various soil constituents. A project has been inaugurated to determine the stability requirements of soils used in various parts of the highway structure and to investigate means of increasing the stability by admixture and manipulation. The apparatus used in these tests will include the drainage indicator and soil consolidator. The material tested will include the coarse as well as the fine fractions of soil. Since the purpose of the investigation is to furnish practical information regarding the construction of low-cost roads, base courses, earth fills, and the like, the results of the research will ultimately be carried to the field for demonstration.

Observations of the Virginia demonstration road have been continued and a progress report is in preparation.

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 soil laboratories, has continued as in past years.

REPORT OF THE CHIEF OF THE BUREAU OF PUBLIC ROADS, 1935

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PUBLIC ROADS,
Washington, D. C., September 1, 1935.

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, 1935.

Sincerely yours,

THOMAS H. MACDONALD, *Chief.*

Road construction work supervised by the Bureau of Public Roads during the fiscal year 1935 continued at the high volume of the preceding year that far exceeded the amount in any previous year. Work was done almost entirely with the grant of \$400,000,000 under authority of the National Industrial Recovery Act of June 1933 and the grant of \$200,000,000 under the Hayden-Cartwright Act of June 1934, but small amounts were available from Federal-aid and emergency authorizations of previous years.

The year began with the volume of road construction with Federal funds and employment at an all-time peak, made possible by the funds provided under the National Recovery Act. Construction activity continued large in volume through the fall months, and many projects were brought to completion. With the beginning of the construction season of 1935 work began in considerable amount on projects carried on with Hayden-Cartwright funds but not in sufficient volume to equal the record in the same months of the preceding year, as there was a decrease in the funds available.

The roads built have been constructed under conditions similar to those prevailing last year. They consist of sections on the Federal-aid highway system, extensions of the system into and through cities, and important secondary or feeder roads and sections of main highways through the national forests, parks, and public lands.

In all the work the primary motive has been to increase employment, and other considerations have been of secondary importance.

EMPLOYMENT ON ROAD WORK

Efforts to increase employment through the use of Federal funds for road construction began in 1930 when Federal aid for the fiscal year 1931 was increased from the \$75,000,000 previously authorized to \$125,000,000, and a like amount was authorized for each of the fiscal years 1932 and 1933. Subsequently emergency funds of \$80,000,000 and \$120,000,000 were advanced to the States and were used largely in matching Federal-aid funds.

The suitability of road work as a relief measure and the magnitude of the employment problem were recognized in the National Recovery Act of June 16, 1933, under which \$400,000,000 was authorized as a direct grant to the States and \$50,000,000 was authorized for roads in federally controlled areas.

The employment produced by these various acts is shown in table 1. Each year shows an increase in employment over the preceding year, and winter employment has been furnished on a scale considered impossible of attainment a few years before.

TABLE 1.—Comparison of employment during the fiscal years 1932, 1933, 1934, and 1935 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	1932	1933	1934	1935
July.....	Number 164,708	Number 81,042	Number 129,205	Number 335,223	Number 385,349	Number 305,372	Number 332,277	Number 549,203
August.....	151,418	89,346	111,211	297,224	389,949	333,403	329,813	531,034
September.....	116,100	122,193	115,047	247,880	356,617	374,405	337,973	498,151
October.....	88,869	124,106	154,016	210,079	330,104	373,246	384,029	450,322
November.....	62,466	129,933	185,860	201,046	289,316	371,667	420,069	426,603
December.....	35,991	98,271	174,358	147,101	244,971	290,465	362,031	323,700
January.....	29,518	75,498	154,154	96,594	229,189	266,443	315,989	240,414
February.....	26,673	78,215	156,814	81,257	218,218	255,256	306,090	221,406
March.....	28,008	95,704	144,053	90,999	211,549	279,213	296,265	217,539
April.....	42,205	122,256	187,657	123,063	245,843	299,882	345,278	282,740
May.....	59,008	139,831	271,972	167,535	259,615	330,138	466,504	331,000
June.....	71,772	152,276	336,414	193,263	280,636	359,605	545,013	362,339
Total (man-months).....	876,736	1,308,671	2,120,761	2,191,264	3,441,356	3,839,095	4,441,331	4,434,451

The preceding fiscal year closed with 336,414 man-months of direct-job employment in June on work involving Federal funds—the largest employment yet recorded in any single month. With the beginning of the fiscal year 1935 there began a gradual decline in employment, resulting from the completion of projects under the program planned under the National Recovery Act.

The Hayden-Cartwright Act of June 18, 1934, had provided \$200,000,000 as a direct grant to the States on substantially the same terms as the National Recovery Act, and also \$24,000,000 for roads in national forests, national parks, and other areas under Federal control. These authorizations were not immediately reflected in employment on new projects since it was necessary for each State to prepare a program, make surveys, and prepare plans. Employment during the first 5 months of the year, although declining, far surpassed that of any similar period in past years. It was not until December that employment dropped below that of the same month of the preceding year. This decline continued through February, but in March new projects financed with Hayden-Cartwright funds reversed the trend, and direct employment climbed to 193,263 men at the close of the year. This is considerably below the 336,414 men employed in June 1934, and resulted from the decrease in funds available.

The average full-time employment was 182,605 men throughout the year. The number of men actually employed was somewhat greater than this, as contractors' pay rolls, because of labor turn-over, show about one-third more names than are reported as being required for normal operation. Therefore approximately 244,000 men were given direct-job employment in road work in the average month. To this should be added the indirect employment supplied in the production and transportation of materials and equipment. It is estimated that such indirect employment required by the work done has averaged approximately 1.4 times the direct employment, and on this basis the indirect employment afforded during the fiscal year 1935 is estimated at 3,067,800 man-months, which, added to the direct employment, results in a total of approximately 5,259,000 man-months for the year.

Table 1 also shows that Federal and Federal-aid road-construction employment supervised by the Bureau continues as a large proportion of the total employment afforded by all Federal and State highway construction and maintenance work since 1932, increasing from about one-fourth of the program in 1932 to one-third in 1933 and nearly one-half for the past 2 years.

Table 2 gives details of the 1935 Federal and Federal-aid employment by months, segregating the numbers of workers employed on the various classes of Federal and Federal-aid work supervised by the Bureau, and giving separately the numbers employed on independent State construction and maintenance. The total figures were affected by the decrease in State maintenance employment and by the drop in Federal road construction due to the partial completion of the Public Works highway program.

TABLE 2.—Direct job employment of men during the fiscal year 1935 on the several classes of Federal and Federal-aid road construction and State road construction and maintenance

Month	Men employed on road construction—											Total men employed on Federal and State road construction and maintenance			
	In whole or in part with Federal funds—														
	Without Public Works funds						With Public Works funds, acts of June 16, 1933, and June 18, 1934								
	National-forest highways	National-park highways	Public-lands high-ways	Federal-aid high-ways	On Federal-aid system outside of municipal-ities	On exten-sions of Federal-aid system into munici-palities	On sec-ondary or feeder roads	National-forest highways	National-park highways	Public-lands high-ways	Loan-and-grant high-ways		National-work-relief highways		
July.....	1,067	474		3,489	127,669	71,623	75,634	6,550	6,038	1,040	10,679	30,960	45,478	168,502	549,203
August.....	689	568		2,676	109,269	62,388	65,061	6,601	6,212	1,152	13,044	29,564	53,540	180,270	531,034
September.....	501	581		1,936	86,536	48,639	54,101	6,069	6,168	1,149	14,683	27,577	61,865	188,406	498,151
October.....	956	396	100	1,459	73,632	34,539	49,630	5,091	5,812	1,249	14,670	22,549	71,008	169,233	450,322
November.....	1,454	333	228	2,008	69,299	29,196	47,957	3,325	4,875	650	16,346	25,375	66,106	184,451	426,603
December.....	1,354	113	178	1,512	50,962	18,624	36,941	1,341	2,341	593	11,276	21,866	41,919	134,080	323,700
January.....	961	83	126	626	35,620	10,861	21,421	1,697	1,428	457	6,448	17,866	23,537	120,283	240,414
February.....	678	110	134	307	30,526	10,612	15,614	415	913	338	3,561	19,049	17,940	122,209	221,406
March.....	758	111	125	412	34,305	11,765	17,539	505	854	168	3,960	20,497	18,391	108,149	217,539
April.....	1,193	140	179	449	46,532	18,038	25,785	706	1,312	51	8,083	20,595	24,193	135,484	282,740
May.....	1,864	154	308	1,067	65,692	25,768	37,869	961	2,535	130	12,176	19,011	27,924	135,541	331,000
June.....	2,880	548	480	880	76,906	31,517	46,654	1,392	3,251	183	12,485	16,127	30,823	138,253	362,339

CLASSES OF WORK SUPERVISED BY THE BUREAU

The road construction work supervised by the Bureau during the fiscal year was of several classes supported by funds appropriated by a number of different acts.

The major portion of the program was financed by funds authorized as direct grants to the States by the National Industrial Recovery Act for improvements on the Federal-aid highway system and its municipal extensions and on secondary or feeder roads and by the authorization in the Hayden-Cartwright Act made for similar purposes.

A relatively small part of the program was provided for by the unexpended balances of Federal-aid appropriations authorized over a period of years ended with the fiscal year 1933, and the emergency authorization of 1932. As in the preceding fiscal year, no Federal aid was provided for 1935, but the policy of Federal aid was resumed by an authorization in the Hayden-Cartwright Act for the fiscal years 1936 and 1937, and an apportionment to the States for 1936 has been made.

Other work in special areas for which the Federal Government was responsible consisted of: (1) The improvement of national-forest highways and (2) the improvement of highways through the public lands of the United States, both of which classes were under the supervision of the Department; and (3) the improvement of national-park highways. The national-park highways were constructed with appropriations made to the Interior Department, but under an interdepartmental agreement were supervised by the Bureau of Public Roads. The three classes of work were supported mainly by appropriations made in the National Industrial Recovery Act and the Hayden-Cartwright Act.

Another class of road work, an outgrowth of the recovery legislation, begun last year and expanded during the current year, consisted of projects financed under the loan-and-grant provisions of the National Industrial Recovery Act, which, after approval by the Public Works Administration, were placed by that body under the supervision of the Bureau of Public Roads.

Supervision of work-relief construction in cooperation with the State highway departments, begun in the preceding year, was continued on an enlarged scale. The workers on these projects were selected and paid by the Federal Emergency Relief Administration, and funds for materials and equipment were provided by the Public Works Administration.

The year's program included also an inconsequential volume of improvement under several appropriations for the reconstruction of roads damaged in several States.

The year's activities in connection with each of these classes of work are reported separately hereafter.

Under the Emergency Relief Appropriation Act of April 8, 1935, funds were allocated for highway improvement and the elimination of hazards at grade crossings by direct grants to the States. In this work even greater emphasis than in the past is to be laid on the selection of projects so as to provide the greatest employment of labor. Administrative procedure to attain this end was being developed at the close of the year.

ALL CLASSES OF WORK ADMINISTERED WITH EMPLOYMENT AS PRINCIPAL OBJECTIVE

To carry forward the paramount work-relief purpose of the different recovery acts, conditions were imposed in the preceding year by rules and regulations, issued with the approval of the Special Board for Public Works, for the administration of public-works appropriations that had the effect of increasing employment and of distributing the benefits of the expenditure over a wide area closely related to the need for employment. These policies were continued with some changes in procedure resulting from experience in 1934.

Human labor instead of machinery was used where practicable and to the public advantage. However, machine methods were used on certain classes of work, and an effort was made to avoid serious jeopardy to the effective road-machinery industry. The approval of varied types of construction maintained a desirable balance between labor directly employed at the site of the work and men employed in materials, equipment, and transportation industries.

On work of the lower types, encouraged on the secondary and feeder roads where traffic density would permit, the direct local employment formed a large part of the total. In the higher types of improvement, approved for main rural roads and streets in cities, the element of indirect employment was greater.

On extensions of Federal-aid highways across cities reasonable minimum expenditures were required, thereby increasing work-relief opportunities in centers where unemployment was concentrated. The requirement that not less than 25

percent of the funds be used on secondary or feeder roads insured large rural employment.

An increase in the number of individuals employed resulted from the limitation of hours of work; and by an increase in hourly wage an effort was made to compensate individuals for the reduction of their hours of work. This result was accomplished by requiring the various State highway departments to establish minimum-wage rates sufficient to provide a standard of living in decency and comfort considering the reduced hours of work and the other conditions existing.

ADMINISTRATIVE CHANGES MADE BY THE HAYDEN-CARTWRIGHT ACT

The Hayden-Cartwright Act of June 18, 1934, altered the procedure for the public-works highway construction administered by the Bureau in some respects, and, in providing funds for the resumption of the policy of Federal aid in 1936 and 1937, made certain changes in policy as a result of the changed conditions of the last few years.

The importance of increased provision for secondary roads and of employment in rural areas was recognized by a requirement that not less than 25 percent of the funds provided by the act for the year 1935 should be expended on secondary roads. In the preceding year it had been required that not more than 25 percent should be expended on such roads.

To provide a program of projects for immediate construction, the rules and regulations issued by the Secretary of Agriculture with the approval of the Special Board for Public Works on July 7, 1934, required that initial programs be prepared by the several States consisting of approximately 25 percent of the apportionment under the Hayden-Cartwright Act, priority being given to projects in the following order: (1) The closing of gaps in the Federal-aid highway system; (2) the elimination of traffic hazards, particularly those caused by railroad grade crossings; (3) the improvement of those projects of particular use to other Government agencies; (4) road construction correlating and supplementing other existing transportation facilities; (5) the improvement of roadsides, involving not less than 1 percent of the total apportionment of each State; (6) reconstruction designed to reduce maintenance costs and decrease future expenditures; and (7) to provide a large number of small projects to employ the maximum of human labor. A substantial program of railroad grade-crossing elimination was required in each State.

Important changes were made in provisions applying to Federal aid to be resumed in the fiscal year 1936. Federal-aid funds have heretofore been limited in application to the Federal-aid system in rural and suburban areas and have not been available for use in the built-up portion of cities. With the initial improvement of the system nearing completion, the movement of traffic through cities has become an important problem, and the restriction on municipal improvements has been removed.

In many instances proper development of heavy-traffic routes on the Federal-aid system routes requiring wide, high-type, costly surfaces has been made difficult by the restriction of Federal participation to \$15,000 per mile. This restriction has been removed, and participation is possible up to 50 percent of the cost. This change will be particularly helpful where additional width is required and an amount close to \$15,000 has already been spent on the initial improvement.

In the last few years funds available to the States for road purposes have been considerably depleted by the diversion of motor-vehicle revenues and gasoline taxes to other purposes. The Hayden-Cartwright Act states the principle that it is unfair to tax highway transportation for purposes other than highway improvement and imposes on the Secretary of Agriculture the duty of withholding not more than one-third of Federal-aid apportionments to any State that applies to highway purposes a lesser amount of motor-vehicle fees and gasoline taxes than was legally required on June 18, 1934.

The occasional need of the States for funds with which to plan projects for future road construction and the generally recognized need for more complete information regarding the present condition of our complete highway system, the use being made of it, and the extent to which further improvements should be made led to the authorization that as much as 1½ percent of the \$200,000,000 provided for 1935 and of Federal-aid funds for the fiscal years 1936 and 1937 may be used for planning surveys.

At the close of the year, survey plans to give a clearer picture of our highway situation than has heretofore existed were being developed. The work is to be done in cooperation with the States and much of the data will be collected by white-collar workers taken from relief rolls.

NATIONAL DEFENSE ROADS

A War Department study of highways, based on a previous collaboration of the Bureau with the War Department General Staff, established national defense highway priorities of improvement that will hereafter be considered by the Bureau in approving road programs involving the use of Federal funds. Some of the War Department recommendations with respect to these highways were as follows: (1) That certain roads selected by the War Department be at least two lanes wide with a minimum overhead clearance of 14 feet at all structures; (2) that bridges on major priority roads be designed for at least an H-15 loading as specified by the American Association of State Highway Officials and on minor priority roads for an H-10 loading as specified by the association;¹ and (3) that road surfaces be suitable to serve traffic comparable to that for which the bridges were designed under all weather conditions.

THE EMERGENCY RELIEF APPROPRIATION ACT OF 1935

The Emergency Relief Appropriation Act of April 8, 1935, authorized the allocation of not to exceed \$800,000,000 for highways, roads, streets, and grade-crossing elimination. Under this authorization \$200,000,000 was allocated for highways, \$200,000,000 for grade-crossing work and \$100,000,000 was provided as the unappropriated balance of the \$200,000,000 authorized by the Hayden-Cartwright Act.

The funds for highways and grade crossings were apportioned by the Secretary of Agriculture on June 3, 1935; those for highways on the basis provided in the National Recovery Act; and, those for grade crossings one-fourth in proportion to mileage of the Federal-aid system, one-fourth in proportion to mileage of railroads, and one-half in proportion to population.

A great many grade crossings have been eliminated in past years with funds administered by the Bureau. However, the amount of work done has been far below the need. For the first time a major attack on this problem was possible.

As the year closed, rules and regulations for the expenditure of both funds were being prepared. These regulations contemplated wide diffusion of the funds, the requirement of a man-year of employment for each \$1,400 of highway funds expended, and the fixing of minimum wage limits by the States with the approval of the Department.

HIGHWAY SAFETY

The increasing number of highway accidents is a matter of grave concern to all in positions of responsibility for highway construction or the use of highways. The Bureau has contributed to the solution of this problem by activity in several directions. In approval of plans for highway construction it has constantly endeavored to effect a desirable widening of surfaces, straightening of alignment and reduction of grades to make the roads suitable for the increased speed of modern traffic. The desirability of eliminating dangerous grade crossings, of adequate road marking, and of provision of footpaths and walks for pedestrians has also been strongly urged upon the States.

A manual for signs and markers has been prepared by the Bureau in cooperation with the American Association of State Highway Officials and other agencies and is now used as a standard throughout the country. Participating in the work of the National Conference on Street and Highway Safety, it has contributed to the preparation of, and has published, five codes relating to motor-vehicle registration and regulation proposed for uniform adoption by the States. Uniformity in regulation of motor vehicles must be one of the most important steps in promoting highway safety.

Special safety studies have been made in Rhode Island, South Carolina, and four cities of Tennessee in cooperation with local authorities and the Federal Emergency Relief Administration.

STATUS OF MAJOR APPROPRIATIONS

Appropriations of several general types supported the greater part of the Bureau's work during the year. The major types were as follows:

(1) Federal-aid appropriations made under authorizations for fiscal years up to 1933. These appropriations must be matched with State or other funds, and

¹ The H-15 loading or heavier loading is used by practically all of the State highway departments in the design of bridges for primary roads. The H-10 loading is used in designing bridges for secondary roads.

when so matched are available for expenditure only on the approved Federal-aid highway system. These funds represented only a small portion of the year's program, and all such funds were obligated at the end of the fiscal year.

(2) Emergency relief funds appropriated by the act of 1932. These funds were available to the States to be used, in lieu of State funds, for the purpose of matching Federal-aid appropriations. They could also be used in conjunction with National Recovery funds.

(3) The appropriation made by section 204 of the National Industrial Recovery Act for the improvement of the Federal-aid system and its municipal extensions and secondary or feeder roads. This money was available for payment of the entire cost of improvements except expenses for right-of-way, and could be used in conjunction with Federal-aid funds or emergency-construction funds or both.

(4) The appropriation made by the Hayden-Cartwright Act providing for the emergency construction of public highways and related projects in accordance with the provisions of section 204 of the National Recovery Act as amended. The same act set up a fund of \$10,000,000 to be used in the repair of roads and bridges on the Federal-aid system damaged by floods, hurricanes, earthquakes, and landslides.

(5) The appropriation made by the Emergency Relief Appropriation Act of 1935 became available at the end of the year, but did not affect construction during the year.

Other appropriations more limited in scope and application were made for forest-highway construction and road building on Federal public lands.

FEDERAL-AID FUNDS

No Federal-aid funds were authorized for the fiscal year 1935. In the 3 years from 1931 to 1933, inclusive, they were authorized at the rate of \$125,000,000 a year, but the last authorization was subject to reduction in the amount of one-fifth of the amount actually expended of the emergency funds provided by the act of December 20, 1930. The amount so deducted was \$15,840,743.86. The Hayden-Cartwright Act provides that no further deductions are to be made as reimbursement for emergency advances of 1930 and 1932.

Table 3 gives for the fiscal years 1923 to 1933, inclusive, the amounts of the Federal-aid funds apportioned among the States after deducting the percentage allowable for Federal administration, and, for the same period of years with addition of 1934 and 1935, the amounts obligated to definite projects and amounts paid for work done during each of the years. It will be observed that the maximum rate of obligation and expenditure of these funds was reached in the fiscal year 1931, with recession in later years as the unobligated and unexpended balances were reduced and other funds became available. As shown by this table, the amount of Federal-aid funds paid to the States in the fiscal year 1935 was \$12,657,267.

TABLE 3.—Federal-aid funds apportioned to the States, obligated to projects, and paid to the States each fiscal year from 1923 to 1935, inclusive

Fiscal year	Apportioned amount of appropriation authorized for the year	Amount of Federal-aid funds obligated during the year	Amount of Federal-aid funds paid to States during the year
1923.....	\$48,750,000.00	\$77,461,559	\$69,677,241.86
1924.....	63,375,000.00	89,866,864	79,217,397.90
1925.....	73,125,000.00	87,294,396	95,749,998.11
1926.....	73,125,000.00	79,608,897	87,754,534.57
1927.....	73,125,000.00	77,453,046	81,371,013.03
1928.....	73,125,000.00	88,922,185	80,802,232.55
1929.....	73,125,000.00	70,428,896	82,097,380.38
1930.....	73,125,000.00	102,498,084	75,880,862.84
1931.....	121,875,000.00	157,952,903	133,340,910.64
1932.....	121,875,000.00	83,793,787	127,367,119.74
1933.....	106,034,256.14	46,689,026	101,266,331.02
1934.....	.....	12,847,071	42,291,936.73
1935.....	.....	2,343,260	12,657,266.66
Total.....	900,659,256.14	977,159,974	1,069,474,226.03
Average.....	¹ 81,878,114.19	75,166,152	82,267,248.15

¹ Average for 11 years. No Federal-aid funds were authorized for the fiscal years 1934 and 1935.

Details of this expenditure are given by States in table 4, which also shows the status of the unexpended funds at the close of the fiscal year. All of the authorized funds were at that time obligated. There was an unpaid balance of \$4,158,667; but of this sum a portion was already earned by the completion of work for which it was allotted, and the unearned balance was only approximately \$2,147,000 at the end of the year.

TABLE 4.—Federal aid paid to States during the fiscal year 1935, and unpaid and unearned balances of the total Federal-aid apportionment on June 30, 1935

State	Paid to States	Unpaid balance	Unearned balance
Alabama.....	\$1,699,369.02	\$343,760.02	\$214,000
Arizona.....	52,330.41	7,453.63	-----
Arkansas.....	513,796.00	134,619.99	71,000
California.....	28,547.56	8,238.65	-----
Colorado.....	167,904.89	43,568.05	29,000
Connecticut.....	271,644.57	202,677.39	113,000
Delaware.....	5,270.48	-----	-----
Florida.....	330,051.51	64,285.79	20,000
Georgia.....	118,649.70	65,808.87	63,000
Idaho.....	72,798.38	29,913.49	9,000
Illinois.....	627,295.10	238,107.83	71,000
Indiana.....	141,039.68	147,146.87	67,000
Iowa.....	-----	-----	-----
Kansas.....	113,490.85	-----	-----
Kentucky.....	25,173.97	17,329.69	8,000
Louisiana.....	124,285.64	127,068.51	113,000
Maine.....	172.41	-----	-----
Maryland.....	6,123.96	-----	-----
Massachusetts.....	325,243.77	43,859.64	10,000
Michigan.....	135,831.76	32,983.99	1,000
Minnesota.....	118,281.00	59,637.47	-----
Mississippi.....	1,595,857.68	491,873.71	353,000
Missouri.....	128,371.09	3,430.87	-----
Montana.....	414,065.51	49,839.01	25,000
Nebraska.....	151,237.92	-----	-----
Nevada.....	43,327.07	-----	-----
New Hampshire.....	44,660.77	1,781.13	1,000
New Jersey.....	693,237.16	119,884.33	-----
New Mexico.....	153,083.82	14,844.50	-----
New York.....	996,661.69	200,681.95	60,000
North Carolina.....	599,476.47	216,675.77	152,000
North Dakota.....	439,153.24	308,676.39	168,000
Ohio.....	117,103.84	135,253.23	71,000
Oklahoma.....	44,148.28	153,361.80	153,000
Oregon.....	251,107.17	33,236.17	2,000
Pennsylvania.....	54,240.81	104,907.39	1,000
Rhode Island.....	62,867.28	-----	-----
South Carolina.....	84,011.38	21,309.39	8,000
South Dakota.....	476,774.85	78,279.89	32,000
Tennessee.....	203,809.39	14,014.71	1,000
Texas.....	146,299.91	149,836.16	103,000
Utah.....	207,799.55	41,912.91	30,000
Vermont.....	6,553.48	-----	-----
Virginia.....	311,007.22	297,927.28	162,000
Washington.....	16,168.04	-----	-----
West Virginia.....	64,564.16	10,611.24	10,000
Wisconsin.....	63,232.16	3,257.98	-----
Wyoming.....	94,393.04	48,874.57	1,000
Hawaii.....	316,748.02	91,736.56	25,000
Total.....	12,657,266.66	4,158,666.82	2,147,000

By the Hayden-Cartwright Act, approved June 18, 1934, additional Federal-aid appropriations were authorized to be made in the amount of \$125,000,000 for each of the fiscal years 1936 and 1937. In accordance with the requirements of the Federal Highway Act, as amended, the first of these sums was apportioned on December 27, 1934, for construction work in the fiscal year 1936.

EMERGENCY-CONSTRUCTION FUNDS

The amount appropriated by the Emergency Relief and Construction Act of 1932 was \$120,000,000. The entire sum, without deduction for Federal administrative purposes, was apportioned among the several States and Hawaii as shown by table 5. These sums have since been expended in conjunction with Federal-aid apportionments, State funds, and apportionments under the Recovery Act, the total expenditure to June 30, 1935, being \$119,936,769, as detailed in table 5. Of the total payments to that date, only \$2,135,663 was expended during the fiscal year 1935.

TABLE 5.—Emergency-construction apportionment, and amounts paid to States for the fiscal year 1935, and the total paid to June 30, 1935

State	Emergency-construction apportionment	Paid to States during fiscal year	Total paid to States
Alabama.....	\$2,558,229	\$98,747.12	\$2,558,229.00
Arizona.....	1,760,771	-----	1,760,771.00
Arkansas.....	2,101,182	198,704.63	2,101,182.00
California.....	4,667,188	-----	4,667,188.00
Colorado.....	2,258,613	6,147.07	2,258,613.00
Connecticut.....	778,806	-----	778,806.00
Delaware.....	600,000	-----	600,000.00
Florida.....	1,624,752	18,259.64	1,624,752.00
Georgia.....	3,123,298	-----	3,123,298.00
Idaho.....	1,505,912	42,339.53	1,505,912.00
Illinois.....	5,082,847	-----	5,047,271.14
Indiana.....	3,058,980	-----	3,058,980.00
Iowa.....	3,171,504	-----	3,171,504.00
Kansas.....	3,265,048	-----	3,265,048.00
Kentucky.....	2,264,637	-----	2,264,637.00
Louisiana.....	1,745,569	-----	1,745,569.00
Maine.....	1,067,079	-----	1,067,079.00
Maryland.....	1,019,570	7,311.64	1,019,570.00
Massachusetts.....	1,716,612	-----	1,716,612.00
Michigan.....	3,779,706	37,947.63	3,779,706.00
Minnesota.....	3,368,559	-----	3,368,559.00
Mississippi.....	2,160,164	49,886.79	2,160,164.00
Missouri.....	3,753,453	-----	3,753,453.00
Montana.....	2,525,071	.01	2,525,071.00
Nebraska.....	2,544,773	-----	2,544,773.00
Nevada.....	1,575,756	-----	1,575,756.00
New Hampshire.....	600,000	14,229.09	600,000.00
New Jersey.....	1,657,733	531,233.35	1,657,733.00
New Mexico.....	1,965,473	-----	1,965,473.00
New York.....	6,059,238	128,014.47	6,031,583.32
North Carolina.....	2,888,251	37,559.60	2,888,251.00
North Dakota.....	1,933,901	153.55	1,933,901.00
Ohio.....	4,490,175	129,793.34	4,490,175.00
Oklahoma.....	2,888,723	26,047.13	2,888,723.00
Oregon.....	2,001,740	107,479.19	2,001,740.00
Pennsylvania.....	5,267,060	-----	5,267,060.00
Rhode Island.....	600,000	-----	600,000.00
South Carolina.....	1,666,755	88,473.71	1,666,755.00
South Dakota.....	2,004,573	57,283.61	2,004,573.00
Tennessee.....	2,605,160	54,721.42	2,605,160.00
Texas.....	7,664,621	-----	7,664,621.00
Utah.....	1,395,331	126,374.98	1,395,331.00
Vermont.....	600,000	-----	600,000.00
Virginia.....	2,256,178	308,467.62	2,256,178.00
Washington.....	1,920,470	-----	1,920,470.00
West Virginia.....	1,323,912	64,523.46	1,323,912.00
Wisconsin.....	2,991,076	4,371.82	2,991,076.00
Wyoming.....	1,541,561	-----	1,541,561.00
Hawaii.....	600,000	7,592.68	600,000.00
Total.....	120,000,000	2,135,662.88	119,936,769.46

PUBLIC WORKS HIGHWAY FUNDS

The public works highway program was initiated by the National Industrial Recovery Act of June 16, 1933 under which the President allocated \$400,000,000 for highways. It was provided that work be done in accordance with the Federal Highway Act with the exception that extensions of the Federal-aid system into and through cities, and secondary roads, formerly ineligible for improvement, were included in the program.

Construction work financed with these funds had reached a peak at the close of the last fiscal year, with the prospect that a large part of the program would be completed and employment correspondingly decline during the fall months of 1934. In anticipation of the depletion of National Recovery funds, the Hayden-Cartwright Act of June 18, 1934, authorized an additional \$200,000,000 to be expended under the same general plan. Rules and regulations applying to new projects under both of the above-mentioned funds were issued on July 13, 1934. The new regulations differed from those formerly used where the experience of the previous year showed changes to be desirable, but the changes were not such as to alter the general character of the program. The most significant change, required

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by the act, and applying only to the new funds, was that not less than 25 percent of the funds should be applied to secondary roads, whereas not more than 25 percent of the first authorization could be applied to roads of that class.

State programs showing types and locations of proposed improvements grouped according to the three classes of improvements contemplated—Federal-aid system, extensions of the system into and through municipalities, and secondary roads—were submitted and approved without undue delay. The apportionment of funds and assignments to classes of projects are shown in table 6.

TABLE 6.—Apportionment and assignment of 1935 Public Works highway funds, June 30, 1935, as provided by the act of June 18, 1934

State	Apportionment	Assignment of apportioned funds—					
		To projects on the Federal-aid system outside of municipalities		To projects on extensions of the Federal-aid system into and through municipalities		To projects on secondary or feeder roads	
		Dollars	Per cent	Dollars	Per cent	Dollars	Per cent
Alabama.....	4,259,842	2,129,921.00	50.0	1,064,960.50	25.0	1,064,960.50	25.0
Arizona.....	2,641,935	1,338,712.23	50.7	305,191.25	11.5	998,031.52	37.8
Arkansas.....	3,428,049	1,714,000.00	50.0	857,025.00	25.0	857,024.00	25.0
California.....	7,932,206	3,713,643.00	46.9	2,219,360.00	27.9	1,999,203.00	25.2
Colorado.....	3,486,006	2,424,504.00	69.6	190,000.00	5.4	871,502.00	25.0
Connecticut.....	1,454,868	607,500.00	41.8	426,500.00	29.3	420,868.00	28.9
Delaware.....	923,395	461,697.50	50.0	230,848.75	25.0	230,848.75	25.0
Florida.....	2,661,343	1,116,600.00	42.0	501,200.00	18.8	1,043,543.00	39.2
Georgia.....	5,113,491	2,556,745.00	50.0	1,278,373.00	25.0	1,278,373.00	25.0
Idaho.....	2,277,486	1,131,910.00	49.7	321,126.00	14.1	824,450.00	36.2
Illinois.....	8,921,401	2,408,778.00	27.0	2,230,350.00	25.0	4,282,273.00	48.0
Indiana.....	5,038,963	2,816,686.80	55.3	2,136,306.41	42.0	1,335,969.79	2.7
Iowa.....	5,118,361	2,217,361.00	43.3	1,311,000.00	25.6	1,590,000.00	31.1
Kansas.....	5,117,675	2,354,130.50	46.0	1,432,949.00	28.0	1,330,595.50	26.0
Kentucky.....	3,818,311	1,302,208.76	34.1	958,598.85	25.1	1,557,503.39	40.8
Louisiana.....	2,963,932	1,380,419.00	46.6	744,560.00	25.1	838,953.00	28.3
Maine.....	1,711,586	782,195.00	45.7	484,379.00	28.3	445,012.00	26.0
Maryland.....	1,810,058	289,609.28	16.0	452,514.50	25.0	1,067,934.22	59.0
Massachusetts.....	3,350,474	1,582,874.00	47.2	847,600.00	25.3	920,000.00	27.5
Michigan.....	6,452,568	3,226,281.00	50.0	1,613,142.00	25.0	1,613,142.00	25.0
Minnesota.....	5,425,551	2,533,732.38	46.7	1,421,494.30	26.2	1,470,224.32	27.1
Mississippi.....	3,540,227	2,832,181.60	80.0	354,022.70	10.0	354,022.70	10.0
Missouri.....	6,173,740	2,890,666.00	46.8	919,152.29	14.9	2,363,921.71	38.3
Montana.....	3,769,734	2,714,208.00	72.0	113,092.00	3.0	942,434.00	25.0
Nebraska.....	3,964,364	1,982,182.00	50.0	991,091.00	25.0	991,091.00	25.0
Nevada.....	2,302,356	1,350,356.00	58.7	100,000.00	4.3	852,000.00	37.0
New Hampshire.....	969,462	465,404.39	48.0	242,464.77	25.0	261,592.84	27.0
New Jersey.....	3,220,879	951,379.00	29.6	1,809,500.00	56.0	460,000.00	14.4
New Mexico.....	2,941,700	1,676,769.00	57.0	529,506.00	18.0	735,425.00	25.0
New York.....	11,227,921	3,748,600.00	33.1	3,756,621.00	33.2	3,822,700.00	33.7
North Carolina.....	4,840,941	1,930,365.00	39.9	1,210,236.00	25.0	1,700,340.00	35.1
North Dakota.....	2,938,967	1,469,483.50	50.0	734,741.75	25.0	734,741.75	25.0
Ohio.....	7,865,012	3,539,255.40	45.0	2,359,503.60	30.0	1,966,253.00	25.0
Oklahoma.....	4,685,180	2,342,590.00	50.0	1,171,295.00	25.0	1,171,295.00	25.0
Oregon.....	3,097,814	1,452,741.00	46.9	867,977.00	28.0	777,096.00	25.1
Pennsylvania.....	9,590,788	4,554,082.00	47.5	2,397,703.00	25.0	2,639,003.00	27.5
Rhode Island.....	1,014,572	474,772.00	47.0	285,760.07	28.0	254,039.93	25.0
South Carolina.....	2,770,954	940,954.00	34.0	488,000.00	17.6	1,342,000.00	48.4
South Dakota.....	3,047,643	1,523,821.50	50.0	761,910.75	25.0	761,910.75	25.0
Tennessee.....	4,302,991	2,105,453.50	48.9	1,121,789.75	26.1	1,075,747.75	25.0
Texas.....	12,291,253	6,858,253.00	55.8	1,795,000.00	14.6	3,638,000.00	29.6
Utah.....	2,132,691	1,096,345.50	50.0	533,172.75	25.0	533,172.75	25.0
Vermont.....	948,007	466,042.22	49.2	240,610.51	25.4	241,254.27	25.4
Virginia.....	3,765,387	1,916,178.16	50.9	956,020.53	25.4	893,188.31	23.7
Washington.....	2,106,412	1,553,206.00	50.0	776,693.00	25.0	776,693.00	25.0
West Virginia.....	2,280,335	1,140,167.00	50.0	570,085.00	25.0	570,083.00	25.0
Wisconsin.....	4,941,837	1,818,970.00	36.8	1,379,513.00	27.9	1,743,354.00	35.3
Wyoming.....	2,287,712	1,686,368.00	73.7	29,416.00	1.3	571,928.00	25.0
District of Columbia.....	973,842	-----	-----	181,051.07	18.6	792,790.93	81.4
Hawaii.....	949,778	598,778.00	63.0	-----	-----	351,000.00	37.0
Total.....	200,000,000	94,139,083.22	47.1	47,703,317.10	23.8	58,157,599.68	29.1

Projects financed with the new funds were placed under construction in the fall months of 1934 and increased to a large volume with the opening of the 1935 construction season. On June 30, 1935, there remained only \$5,018,643 unobligated from 1934 funds and \$28,241,383 from 1935 funds, as shown by tables 7 and 8, and the amounts obligated were divided among the three classes of projects in the several States as shown.

TABLE 7.—*Status of obligation of apportioned 1934 Public Works highway funds, as provided by sec. 204 of the National Industrial Recovery Act, as of June 30, 1935*

State	Total apportionment	Obligated to projects—			Balance unobligated
		On the Federal-aid system outside of municipalities	On extensions of the Federal-aid system into and through municipalities	On secondary or feeder roads	
Alabama.....	\$8,370,133	\$3,938,300.93	\$2,366,921.07	\$1,989,824.33	\$75,086.67
Arizona.....	5,211,960	3,832,516.57	752,981.17	576,272.95	50,189.31
Arkansas.....	6,748,335	3,320,123.42	1,949,177.00	1,395,749.89	83,284.69
California.....	15,607,354	7,911,568.39	4,206,563.85	3,478,739.49	10,482.27
Colorado.....	6,874,530	3,437,265.00	1,691,030.53	1,718,632.00	27,602.47
Connecticut.....	2,865,740	1,403,217.56	802,407.00	659,120.00	995.44
Delaware.....	1,819,088	877,525.21	460,282.30	481,113.40	167.09
Florida.....	5,231,834	2,435,141.90	1,440,783.89	1,284,727.07	71,181.14
Georgia.....	10,091,185	4,906,398.58	2,508,673.57	2,225,582.09	450,530.76
Idaho.....	4,486,249	2,158,872.26	1,152,434.93	1,094,529.68	80,412.13
Illinois.....	17,570,770	4,398,271.90	7,372,059.36	5,772,761.93	27,676.81
Indiana.....	10,037,843	4,957,775.29	4,255,300.34	696,645.24	128,122.13
Iowa.....	10,055,660	5,027,830.00	2,614,433.23	2,412,650.83	745.94
Kansas.....	10,089,604	5,035,923.90	2,522,401.00	2,522,401.00	8,878.10
Kentucky.....	7,517,359	3,695,818.78	1,897,787.49	1,818,412.78	105,339.95
Louisiana.....	5,828,591	2,675,339.39	1,701,743.07	1,423,380.39	28,128.15
Maine.....	3,369,917	1,551,597.68	951,302.53	842,403.50	24,613.29
Maryland.....	3,564,527	1,695,373.73	646,473.56	891,102.08	331,577.63
Massachusetts.....	6,597,100	1,101,716.00	4,978,604.12	469,741.41	47,038.47
Michigan.....	12,736,227	5,997,341.23	3,481,531.06	3,148,167.22	109,187.49
Minnesota.....	10,656,569	4,478,513.42	3,663,878.72	2,344,284.06	169,892.80
Mississippi.....	6,978,675	3,421,093.27	1,671,170.59	1,709,381.43	177,029.71
Missouri.....	12,180,306	5,157,488.68	3,867,042.97	2,921,557.45	234,216.90
Montana.....	7,439,748	4,407,750.22	1,108,288.77	1,751,646.86	172,068.15
Nebraska.....	7,828,961	3,914,481.00	1,917,390.47	1,957,240.00	39,849.53
Nevada.....	4,545,917	2,905,727.57	473,901.01	1,134,166.80	32,121.62
New Hampshire.....	1,909,839	692,118.65	740,334.62	477,385.73	-----
New Jersey.....	6,346,039	3,138,919.21	3,010,962.24	55,098.73	141,058.82
New Mexico.....	5,792,935	2,846,648.00	1,595,456.19	1,272,129.00	78,701.81
New York.....	22,330,101	10,273,759.61	8,132,659.08	3,551,060.14	372,622.17
North Carolina.....	9,522,293	4,421,394.69	2,341,579.00	2,347,302.86	412,016.45
North Dakota.....	5,804,448	2,858,348.80	1,428,599.71	1,395,139.26	122,360.23
Ohio.....	15,484,592	7,269,116.38	4,331,665.58	3,804,002.44	79,897.60
Oklahoma.....	9,216,798	4,608,029.86	2,302,448.03	2,298,421.75	7,898.36
Oregon.....	6,106,896	3,023,562.66	1,491,183.47	1,520,866.38	71,283.49
Pennsylvania.....	18,891,004	6,634,762.26	4,789,914.06	7,326,867.91	139,459.77
Rhode Island.....	1,998,708	979,367.00	518,990.77	439,716.00	60,634.23
South Carolina.....	5,459,165	2,693,771.69	1,364,791.00	1,350,172.41	50,429.90
South Dakota.....	6,011,479	2,955,054.29	1,309,456.24	1,502,870.00	244,098.47
Tennessee.....	8,492,619	4,183,363.15	2,123,155.00	2,059,177.20	126,923.65
Texas.....	24,244,024	11,562,316.62	6,391,389.60	5,988,778.30	301,539.48
Utah.....	4,194,708	2,361,852.07	778,276.12	1,048,677.00	5,902.81
Vermont.....	1,867,573	921,854.08	487,129.24	438,631.41	19,958.27
Virginia.....	7,416,757	3,608,391.15	1,898,681.63	1,736,770.24	172,913.98
Washington.....	6,115,867	3,022,410.42	1,970,844.77	1,080,673.00	41,938.81
West Virginia.....	4,474,234	2,013,405.00	1,341,312.78	1,113,220.70	6,295.52
Wisconsin.....	9,724,881	4,691,114.92	2,572,507.70	2,416,978.30	44,280.05
Wyoming.....	4,501,327	2,246,419.91	1,118,858.53	1,122,741.51	13,307.08
District of Columbia.....	1,918,469	-----	946,444.55	972,024.45	-----
Hawaii.....	1,871,062	1,674,551.35	-----	177,717.69	18,792.96
Total.....	394,000,000	183,323,503.65	113,441,203.51	92,216,650.29	5,018,642.55

TABLE 8.—*Status of obligation of apportioned 1935 Public Works highway funds, as provided by the Hayden-Cartwright Act of June 18, 1934, as of June 30, 1935*

State	Total apportionment	Obligated to projects—			Balance unobligated
		On the Federal-aid system outside of municipalities	On extensions of the Federal-aid system into and through municipalities	On secondary or feeder roads	
Alabama.....	\$4,259,842	\$1,730,831.76	\$515,691.15	\$922,998.22	\$1,090,320.87
Arizona.....	2,641,935	1,328,956.84	243,308.16	890,907.21	178,762.79
Arkansas.....	3,428,049	1,447,703.32	597,839.24	705,079.59	677,426.85
California.....	7,932,206	3,422,068.43	2,107,875.95	1,776,642.54	625,619.08
Colorado.....	3,486,006	2,415,213.35	169,410.60	871,502.00	29,880.05
Connecticut.....	1,454,868	554,725.61	286,496.07	235,769.00	377,877.32
Delaware.....	923,395	458,528.48	91,830.00	225,543.76	147,492.76
Florida.....	2,661,343	1,085,224.72	257,076.78	1,007,468.24	311,573.26
Georgia.....	5,113,491	1,814,344.77	584,658.11	501,535.86	2,212,952.26
Idaho.....	2,277,486	882,877.19	216,565.94	645,405.70	532,637.17
Illinois.....	8,921,401	2,408,778.00	1,629,851.62	3,999,583.61	883,187.77
Indiana.....	5,088,963	2,698,122.90	1,845,332.95	109,126.18	436,380.97
Iowa.....	5,118,361	2,086,648.60	1,025,235.00	1,589,875.00	416,602.40
Kansas.....	5,117,675	2,354,130.50	1,432,949.00	1,350,595.50	-----
Kentucky.....	3,818,311	1,223,831.01	678,496.75	1,516,907.79	399,075.45
Louisiana.....	2,963,932	1,140,713.29	607,523.18	820,647.53	395,048.00
Maine.....	1,711,586	780,542.75	477,471.72	437,259.15	16,312.38
Maryland.....	1,810,058	253,219.97	-----	595,765.90	961,072.13
Massachusetts.....	3,350,474	995,238.97	298,282.56	530,432.80	1,556,519.67
Michigan.....	6,452,568	3,011,161.48	1,516,000.00	1,613,142.00	312,264.52
Minnesota.....	5,425,551	2,387,270.15	738,320.07	1,380,456.60	919,504.18
Mississippi.....	3,540,227	2,498,515.11	233,200.36	205,413.11	609,098.42
Missouri.....	6,173,740	2,890,666.00	919,152.29	2,363,921.71	-----
Montana.....	3,769,734	2,671,621.92	72,142.80	886,999.42	138,969.86
Nebraska.....	3,964,364	1,926,812.54	852,565.53	924,940.64	260,045.29
Nevada.....	2,302,356	1,338,009.12	57,842.23	597,352.06	309,152.59
New Hampshire.....	969,462	441,404.39	232,399.42	249,411.61	46,246.58
New Jersey.....	3,220,879	600,774.15	749,388.92	107,524.70	1,763,191.23
New Mexico.....	2,941,700	1,676,769.00	249,529.20	719,271.01	296,130.79
New York.....	11,327,921	3,503,681.69	3,410,690.00	3,612,338.61	801,210.70
North Carolina.....	4,840,941	1,305,283.86	1,143,691.89	1,545,690.96	846,274.29
North Dakota.....	2,938,967	885,776.14	336,445.99	284,816.64	1,431,928.23
Ohio.....	7,865,012	2,946,033.00	1,888,317.24	1,519,992.91	1,510,668.85
Oklahoma.....	4,685,180	2,179,830.87	901,915.89	996,412.65	607,020.59
Oregon.....	3,097,814	1,383,798.86	775,726.37	777,096.00	161,192.77
Pennsylvania.....	9,590,788	4,357,459.16	1,766,369.87	2,501,400.28	965,558.69
Rhode Island.....	1,014,572	464,572.00	141,760.07	249,377.60	158,862.33
South Carolina.....	2,770,954	490,600.50	275,166.84	1,275,504.85	729,681.81
South Dakota.....	3,047,643	1,399,995.31	265,267.12	595,542.98	786,837.59
Tennessee.....	4,302,991	2,059,254.78	860,348.46	799,753.66	853,634.10
Texas.....	12,291,253	6,205,849.09	1,358,195.53	3,550,602.77	1,176,605.61
Utah.....	2,132,691	929,074.55	530,866.11	532,172.75	140,577.59
Vermont.....	948,007	456,585.01	213,220.57	240,451.45	37,749.97
Virginia.....	3,765,387	1,760,241.51	871,627.68	844,613.05	283,904.76
Washington.....	3,106,412	1,543,022.85	755,870.96	775,338.42	32,179.77
West Virginia.....	2,280,335	771,614.92	258,676.10	394,680.80	855,363.18
Wisconsin.....	4,941,837	1,775,710.73	1,356,431.36	1,623,472.57	186,222.34
Wyoming.....	2,287,712	1,641,416.00	16,916.00	550,850.91	78,529.09
District of Columbia.....	973,842	-----	181,051.07	504,116.38	288,674.55
Hawaii.....	949,778	273,416.37	-----	-----	676,361.63
Total.....	200,000,000	84,857,921.52	35,964,990.72	50,935,704.68	28,241,383.08

The amounts paid to the several States for work done under the National Industrial Recovery Act, described as 1934 funds, and the Hayden-Cartwright Act, described as 1935 funds, are given in table 9. These amounts do not include \$14,175,000 from 1934 funds and \$20,625,000 from 1935 funds, as shown in the footnote of table 9, advanced to the States to provide revolving funds for direct payment of sums due for work done, nor do they include amounts due for work completed in a number of States for which, at the time, the Federal Government had not made reimbursement.

TABLE 9.—Amounts paid to the States from 1934 and 1935 Public Works highway funds provided by section 204 of the National Industrial Recovery Act, and the Hayden-Cartwright Act of June 18, 1934, to June 30, 1935

State	1934 funds	1935 funds	State	1934 funds	1935 funds
Alabama.....	\$6,931,469.53	\$835,720.72	New Hampshire.....	\$1,808,364.34	\$381,547.18
Arizona.....	4,831,774.08	912,237.23	New Jersey.....	5,321,260.24	129,813.52
Arkansas.....	5,557,843.03	844,391.60	New Mexico.....	4,546,657.67	1,321,203.11
California.....	13,715,032.65	638,263.03	New York.....	18,795,868.35	1,933,724.70
Colorado.....	6,483,968.20	1,935,406.48	North Carolina.....	7,569,167.89	947,345.32
Connecticut.....	2,412,116.87	357,230.33	North Dakota.....	4,306,854.86	235,846.43
Delaware.....	1,543,273.59	478,094.86	Ohio.....	14,555,886.80	1,075,254.00
Florida.....	4,774,483.91	912,777.98	Oklahoma.....	8,456,248.22	1,100,214.08
Georgia.....	7,824,108.54	810,934.67	Oregon.....	5,458,824.91	805,017.90
Idaho.....	4,126,093.70	489,359.24	Pennsylvania.....	15,858,935.45	2,586,088.58
Illinois.....	14,168,547.33	512,272.10	Rhode Island.....	1,775,611.05	296,332.19
Indiana.....	7,678,680.96	38,151.79	South Carolina.....	4,565,689.32	561,873.18
Iowa.....	9,464,102.79	1,440,225.34	South Dakota.....	4,502,596.75	251,468.78
Kansas.....	9,692,323.21	2,392,902.52	Tennessee.....	7,727,350.30	1,059,711.02
Kentucky.....	6,891,132.78	882,102.80	Texas.....	21,882,778.95	3,147,197.55
Louisiana.....	4,808,383.01	579,200.15	Utah.....	3,885,833.03	895,456.15
Maine.....	3,136,300.29	525,423.09	Vermont.....	1,638,755.71	297,273.37
Maryland.....	2,354,829.23	262,696.74	Virginia.....	5,674,659.43	726,456.41
Massachusetts.....	4,927,132.55	251,815.34	Washington.....	5,733,888.60	868,995.57
Michigan.....	11,569,048.96	1,161,863.97	West Virginia.....	3,631,441.91	289,320.30
Minnesota.....	8,749,859.02	2,008,743.42	Wisconsin.....	8,921,109.86	863,458.84
Mississippi.....	4,974,648.28	718,245.64	Wyoming.....	4,166,034.05	562,419.00
Missouri.....	10,593,796.41	1,257,797.79	District of Columbia.....	1,820,067.07	492,386.79
Montana.....	6,744,092.72	1,505,492.18	Hawaii.....	1,551,816.84	-----
Nebraska.....	6,554,222.94	1,343,639.60			
Nevada.....	4,118,805.97	867,979.25			
			Total ¹	338,837,772.16	44,791,371.83

¹ In addition \$14,175,000 of 1934 funds and \$20,625,000 of 1935 funds had been advanced to 33 States, the District of Columbia, and Hawaii to provide revolving funds from which payments were made directly.

PROGRESS OF FEDERAL-AID ROAD CONSTRUCTION

During the fiscal year a considerable mileage of road built under the Federal-aid plan was brought to completion, in spite of the diminished amount of such funds. At the close of the year Federal-aid funds for all prior years had been absorbed by assignment to projects in the current program. In doing this, advantage was taken by the States of the provision that Public Works highway grants could be used in lieu of State funds to match Federal-aid money.

Initial Federal-aid improvements were completed during the fiscal year on 1,866 miles of the Federal-aid highway system; advanced stages of improvement were constructed on 803 miles; and 12 miles previously improved were reconstructed. The total Federal-aid construction completed was therefore 2,681 miles. The result of the year's work in this single class of activity was much less than the similar mileage improved during the preceding year, which was 14,780 miles.

The improvements classed as completed and included in the above mileage figures were not only physically completed but have also been paid for by the Federal Government to the full extent of its obligation.

The distribution of the completed mileage by States, its total cost, and the Federal-aid involved are shown in table 10. For the country as a whole, the total cost was \$68,651,782, of which \$26,720,304 was paid from Federal-aid funds and the balance from Federal emergency and State funds. Table 11 shows the types of road comprising this improvement.

TABLE 10.—Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage construction, and reconstruction completed and paid for during the fiscal year 1935¹

State	Total cost	Federal aid	Mileage		
			Initial	Stage	Total
Alabama.....	\$2,501,895.01	\$1,238,792.53	38.1	79.0	117.1
Arizona.....	218,613.80	173,488.57	.5	8.7	9.2
Arkansas.....	1,316,840.86	586,614.36	91.4	35.0	126.4
California.....	2,029,733.83	452,616.12	25.2	3.4	28.6
Colorado.....	1,209,249.51	561,459.27	50.5	12.0	62.5
Connecticut.....	1,980,469.05	865,310.68	13.3	-----	13.3
Delaware.....	123,577.77	27,824.92	-----	7.2	7.2
Florida.....	2,396,864.34	1,075,939.48	51.1	4.0	55.1
Georgia.....	819,325.22	279,859.48	31.5	19.0	50.5
Idaho.....	553,134.07	226,731.05	10.9	47.4	58.3
Illinois.....	9,174,102.41	3,789,801.21	232.3	23.5	255.8
Indiana.....	3,746,149.04	1,581,502.34	68.5	-----	68.5
Kentucky.....	412,112.68	166,211.38	7.1	16.4	23.5
Louisiana.....	1,949,408.46	904,703.29	7.7	-----	7.7
Maryland.....	172,238.75	20,284.20	2.4	-----	2.4
Massachusetts.....	3,366,646.11	728,047.15	45.9	4.9	50.8
Michigan.....	2,359,732.36	871,600.87	76.6	32.1	108.7
Minnesota.....	1,503,853.54	504,332.38	9.3	53.3	62.6
Mississippi.....	4,653,854.55	2,293,409.81	137.2	93.6	230.8
Missouri.....	307,799.33	73,274.28	.9	2.4	3.3
Montana.....	1,490,369.66	832,357.27	84.3	75.4	159.7
New Hampshire.....	204,887.10	85,805.63	2.4	2.3	4.7
New Jersey.....	2,938,442.43	837,835.57	27.7	-----	27.7
New Mexico.....	47,997.80	23,998.90	.2	-----	.2
New York.....	5,566,088.20	1,868,735.38	151.9	.8	152.7
North Carolina.....	428,302.64	207,649.10	29.6	-----	29.6
North Dakota.....	142,333.37	52,383.69	22.2	37.7	59.9
Ohio.....	1,274,885.93	224,741.83	8.7	-----	8.7
Oklahoma.....	788,387.58	372,244.77	45.5	-----	45.5
Oregon.....	642,222.63	273,907.41	14.3	18.4	32.7
Pennsylvania.....	2,005,135.52	531,609.42	63.3	-----	63.3
South Carolina.....	1,698,519.43	616,146.04	97.5	65.9	163.4
South Dakota.....	501,452.16	256,386.80	71.8	25.4	97.2
Tennessee.....	1,180,685.45	556,567.38	24.8	² 19.4	44.2
Texas.....	1,913,020.87	775,025.61	66.3	36.3	102.6
Utah.....	1,140,334.99	456,292.74	43.6	56.7	100.3
Vermont.....	40,373.04	2,715.08	1.8	-----	1.8
Virginia.....	2,677,316.51	1,035,989.54	128.4	22.3	150.7
Washington.....	475,176.37	84,810.39	5.4	-----	5.4
West Virginia.....	1,406,555.76	411,312.94	41.9	-----	41.9
Wisconsin.....	53,529.72	4,000.00	1.3	-----	1.3
Wyoming.....	135,151.72	64,000.00	6.2	12.8	19.0
Hawaii.....	1,105,012.92	690,985.60	26.7	-----	26.7
Total.....	68,651,782.49	26,720,304.46	1,866.2	² 815.3	2,681.5

¹ No projects completed and paid for during the fiscal year in States not listed.² Includes 11.6 miles of reconstruction.

A few projects which had been completed were not classified as completed as the final payment by the Federal Government had not been made. In this report these projects are classified with those under construction and approved for construction at the close of the year. Altogether, the projects in these three stages, representing the active Federal-aid improvement program at the end of the year, involved only 255 miles, as compared with a total of 2,921 miles the previous year. The large decrease is the result of the complete exhaustion of available Federal-aid funds.

Of the total of 255 miles in the current program at the end of the year, 190 miles were in course of initial improvement and 65 miles were in course of stage construction, active or planned.

TABLE 11.—Mileage of Federal-aid roads, by types of construction, completed and final payment made during the fiscal year 1935¹

State	Graded and drained		Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland-cement concrete	Block	Bridges and approaches	Totals	
	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated	Initial							Stage	Total
Alabama.....	14.6						1.7		27.5		14.7	57.8		0.8	38.1	79.0
Arizona.....	4								8.7					.1	.5	9.2
Arkansas.....	18.6		29.7	8.3					62.8			6.0		1.0	91.4	35.0
California.....	13.5			6.3						5.3		3.4		.1	25.2	28.6
Colorado.....			53.3						8.2			9.2		1.0	50.5	62.5
Connecticut.....	4								0.6					2.9	13.3	13.3
Delaware.....	7.2														7.2	7.2
Florida.....	35.0											18.4		1.7	51.1	4.0
Georgia.....	24.8											25.6		.1	31.5	19.0
Idaho.....			16.3						42.0					3.5	232.3	58.3
Illinois.....	18.1											47.8		4.6	68.5	265.8
Indiana.....	7.0										7.7	16.4		.1	7.7	23.5
Kentucky.....	8.4													1.3	7.7	16.4
Louisiana.....	5.3		1.1											.1	2.4	7.7
Maryland.....														1.7	45.9	4.9
Massachusetts.....	2.6								23.6			2.3		1.7	45.9	50.8
Michigan.....			26.0						17.0			69.1		.5	76.6	32.1
Minnesota.....									62.5			62.5		3.5	53.3	62.6
Mississippi.....	112.6		4.4						19.3			81.7		3.5	137.2	230.8
Missouri.....			2.8											.4	2.4	3.3
Montana.....	29.8		17.9						111.6			4.0		.4	84.3	75.4
New Hampshire.....								.7							2.4	4.7
New Jersey.....	8.0													.4	27.7	27.7
New Mexico.....														.2	2.2	2.2
New York.....	12.3		37.3						20.4			78.4		.9	151.9	152.7
North Carolina.....			21.1											.0	29.6	29.6
North Dakota.....	34.9		24.3						.7						22.2	59.9
Ohio.....															8.7	8.7
Oklahoma.....	20.1											3.8			8.7	45.5
Oregon.....												16.0		.4	45.5	45.5
Pennsylvania.....	4								15.8			4.7		.1	14.3	32.7
South Carolina.....									8.8			25.1		.2	63.3	63.3
South Dakota.....	39.4		20.9						25.4			17.5		.2	97.5	65.9
Tennessee.....	22.6		32.3											1.1	71.8	163.4
Texas.....	57.1													2.4	24.8	97.2
Utah.....			6.0						85.1			2.4		.9	43.6	102.6
Vermont.....			11.9											.2	1.8	1.8
Virginia.....	9.8		1.6									19.5		.9	128.4	150.7
Washington.....	5.4		2.0						1.6					.1	5.4	5.4
West Virginia.....	29.2		3.0											.1	41.9	41.9
Wisconsin.....															1.3	1.3
Wyoming.....	6.2								12.8					.2	6.2	19.0
Hawaii.....															26.7	26.7
Total.....	552.3		101.3		111.8		291.0		384.8		71.1	884.3		33.0	1,866.2	2,681.5
					51.2		82.5				12.9		.7		815.3	

¹ No mileage completed and final payment made during the fiscal year in States not listed.

The distribution, by States, of the Federal-aid mileage in the three stages of progress toward completion is shown in table 12, together with estimated total costs and the amounts of Federal aid allotted. As in the case of the completed projects the difference between the total cost and the Federal aid has been supplied from Federal emergency-construction funds and State funds. For the country as a whole, the estimated cost of the projects in progress toward completion at the end of the year was \$7,126,347; the Federal aid allotted was \$2,902,276.

The classification of the projects in the active program by types of surface improvement is shown in table 13.

TABLE 12.—Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage improvement, finally inspected, under construction, and approved for construction, June 30, 1935¹

State	Estimated total cost	Federal aid allotted ²	Mileage		
			Initial	Stage	Total
Florida.....	\$60,870.23	\$30,435.11	6.6	-----	6.6
Idaho.....	285,791.82	100,207.19	11.2	2.5	13.7
Illinois.....	844,052.38	295,835.53	12.0	20.6	32.6
Indiana.....	1,075,119.20	468,901.51	36.5	-----	36.5
Louisiana.....	526,881.94	256,601.57	-----	.4	.4
Michigan.....	84,600.00	37,000.48	.5	.3	.8
Minnesota.....	888,670.49	333,114.93	34.6	-----	34.6
Mississippi.....	174,457.73	87,228.86	-----	8.2	8.2
New York.....	1,083,919.43	304,629.71	35.7	-----	35.7
North Dakota.....	350,769.16	350,553.58	1.9	-----	1.9
Ohio.....	90,780.00	45,390.00	5.3	-----	5.3
Oklahoma.....	833,060.90	339,104.72	18.3	21.0	39.3
Pennsylvania.....	528,840.88	162,417.62	19.0	-----	19.0
Texas.....	298,532.44	90,855.62	8.3	11.7	20.0
Total.....	7,126,346.60	2,902,276.43	189.9	64.7	254.6

¹ No projects in this status in States not listed and Hawaii.

² Does not include Federal aid allotted to Public Works projects.

TABLE 13.—Mileage of Federal-aid roads, by types of construction, initial and stage, finally inspected under construction and approved for construction, June 30, 1935¹

State	Graded and drained	Un-treated gravel	Un-treated macadam	Low cost bituminous mix	Bituminous concrete	Portland-cement concrete	Bridges and approaches	Total		
								Initial	Stage	Total
Florida.....	6.6	-----	-----	-----	-----	-----	-----	6.6	-----	6.6
Idaho.....	-----	11.1	-----	2.5	-----	-----	0.1	11.2	2.5	13.7
Illinois.....	-----	-----	-----	-----	32.5	-----	.1	12.0	20.6	32.6
Indiana.....	-----	-----	-----	-----	36.5	-----	-----	36.5	-----	36.5
Louisiana.....	-----	-----	-----	-----	.2	-----	.2	-----	.4	.4
Michigan.....	-----	-----	-----	-----	.5	-----	.3	.5	.3	.8
Minnesota.....	-----	-----	-----	-----	34.6	-----	-----	34.6	-----	34.6
Mississippi.....	.2	-----	-----	-----	8.0	-----	-----	-----	8.2	8.2
New York.....	5.8	20.7	-----	-----	9.0	-----	.2	35.7	-----	35.7
North Dakota.....	-----	1.6	-----	-----	-----	-----	.3	1.9	-----	1.9
Ohio.....	-----	-----	-----	-----	5.3	-----	-----	5.3	-----	5.3
Oklahoma.....	13.0	-----	-----	-----	-----	26.2	.1	18.3	21.0	39.3
Pennsylvania.....	-----	-----	7.9	-----	5.1	6.0	-----	19.0	-----	19.0
Texas.....	8.2	-----	-----	-----	-----	11.8	-----	8.3	11.7	20.0
Total.....	33.8	33.4	7.9	2.5	10.4	165.3	1.3	189.9	64.7	254.6

¹ No projects in this status in States not listed and Hawaii.

PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION

The Public Works highway program, initiated in June 1933 with \$400,000,000 provided by the National Recovery Act and supplemented in June 1934 with \$200,000,000 authorized by the Hayden-Cartwright Act has resulted in a completed mileage sufficient to encircle the earth, and at the close of the year the mileage included in the current program, either under construction or planned, exceeded the diameter of the earth.

From the beginning of construction in August 1933 up to the end of the fiscal year 1935, construction has been begun on 33,129 miles of road and completed on 24,600 miles, leaving 8,529 miles under construction on June 30, 1935. On the same date projects approved for construction included 1,427 miles, so that there was included in the 2 years' program a total of 34,556 miles.

The total cost of projects completed under the program has been \$397,355,775, of which \$335,830,226 was from 1934 Public Works highway funds, and \$30,071,390 was from 1935 similar funds. The estimated total cost of the projects under construction at the end of the year was \$185,049,282, of which \$50,310,307 was 1934 funds, and \$118,520,398 was 1935 funds. The projects approved for construction at the same time amounted to \$27,826,927, of which \$2,840,824 was from 1934 funds and \$23,166,829 from 1935 funds. The total for the 2-year active program, not including projects approved for construction, was \$582,405,057. The above total amounts include small amounts of Federal-aid funds and State funds.

Of the 24,600 miles of completed projects, 13,338 miles were located on the Federal-aid highway system outside of municipalities. This improvement cost \$201,669,124, of which \$178,805,890 was paid from Public Works funds, and the remainder from Federal-aid funds and from Federal emergency-construction and State funds.

On extensions of the Federal-aid system into and through municipalities there were completed 1,904 miles, costing \$103,763,295. Of the total cost of this mileage, the Public Works funds provided \$99,605,210, and the balance was provided from the above-mentioned sources.

The remaining completed mileage—9,358 miles, costing \$91,923,356—consisted of secondary or feeder roads. The cost of these was met to the extent of \$87,490,517 from Public Works funds and the balance was paid from State funds. Federal-aid and emergency-construction funds were not available for this portion of the work because the roads improved are in no case included in the Federal-aid system.

The distribution, by States, of the mileage completed to June 30, 1935, in each of the three classes of projects is given in tables 14 and 15, together with total costs of the roads built and the amounts of the funds used in each of the fiscal years 1934 and 1935.

Of the 8,530 miles under construction at the end of the year, 4,003 miles were on the Federal-aid system outside of municipalities, 509 miles on extensions of the system into and through cities, and 4,018 miles on secondary or feeder roads. The estimated costs of each of these groups of projects, the sources of the funds employed, and the distribution by States are shown in tables 16 and 17.

TABLE 14.—Total cost and mileage of 1934 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act, completed to June 30, 1935, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$6, 205, 589. 83	\$3, 370, 573. 59	\$2, 827, 592. 07	326. 0
Arizona.....	4, 501, 873. 17	3, 832, 516. 57	78, 138. 13	297. 3
Arkansas.....	3, 044, 050. 54	2, 517, 988. 43	499, 568. 46	152. 8
California.....	10, 463, 432. 19	7, 752, 827. 88	8, 238. 65	311. 6
Colorado.....	3, 458, 657. 71	3, 347, 940. 85	87, 057. 48	156. 7
Connecticut.....	794, 425. 68	791, 923. 12	-----	14. 5
Delaware.....	875, 222. 73	868, 470. 17	-----	33. 4
Florida.....	3, 025, 254. 26	2, 214, 247. 01	756, 396. 29	115. 7
Georgia.....	4, 158, 574. 97	3, 921, 287. 59	65, 840. 00	285. 3
Idaho.....	2, 097, 380. 44	2, 027, 113. 60	-----	173. 1
Illinois.....	2, 438, 123. 40	2, 392, 590. 47	-----	39. 3
Indiana.....	3, 574, 648. 62	3, 451, 916. 23	-----	112. 9
Iowa.....	4, 806, 144. 05	4, 720, 930. 00	-----	259. 1
Kansas.....	5, 135, 668. 69	5, 004, 394. 25	113, 490. 85	402. 7
Kentucky.....	3, 623, 147. 32	3, 379, 305. 06	-----	244. 5
Louisiana.....	2, 664, 382. 38	2, 295, 364. 99	-----	76. 2
Maine.....	1, 463, 772. 98	1, 433, 663. 50	-----	44. 0
Maryland.....	792, 730. 48	791, 495. 03	-----	14. 8
Massachusetts.....	1, 466, 324. 25	1, 049, 029. 03	385, 643. 88	37. 4

¹ No projects of this class completed in the District of Columbia.

TABLE 14.—Total cost and mileage of 1934 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act, completed to June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES—Contd.

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Michigan.....	\$5,175,046.24	\$4,921,541.23	\$49,000.00	231.6
Minnesota.....	4,333,008.47	4,235,784.24	57,982.87	747.7
Mississippi.....	4,649,133.81	2,521,708.60	2,087,522.91	245.5
Missouri.....	4,853,071.14	4,295,899.47	100,748.60	198.1
Montana.....	4,872,999.11	4,463,620.91	373,577.49	377.7
Nebraska.....	5,004,657.89	3,888,841.49	248,543.24	356.5
Nevada.....	2,754,513.50	2,683,175.23	43,327.07	260.3
New Hampshire.....	638,683.78	612,389.01	-----	10.8
New Jersey.....	2,189,130.63	2,025,845.49	139,466.42	37.4
New Mexico.....	2,992,412.26	2,748,086.29	143,929.42	274.2
New York.....	11,245,771.06	9,011,257.80	461,500.00	219.5
North Carolina.....	4,274,856.34	3,580,995.46	680,062.84	557.8
North Dakota.....	3,005,644.11	2,611,832.03	370,075.02	961.5
Ohio.....	7,431,049.76	7,040,235.46	51,410.00	191.3
Oklahoma.....	4,337,923.71	4,201,026.95	6,235.56	297.9
Oregon.....	3,284,391.98	2,942,972.75	217,337.94	182.8
Pennsylvania.....	6,463,235.70	6,190,664.69	3,826.93	127.4
Rhode Island.....	968,094.74	899,627.39	62,867.28	20.5
South Carolina.....	2,424,177.24	2,359,621.33	62,876.51	208.2
South Dakota.....	2,320,377.33	2,451,549.34	458,415.98	485.6
Tennessee.....	4,645,729.84	4,004,620.87	593,951.35	180.9
Texas.....	11,770,771.03	11,174,335.63	-----	1,005.8
Utah.....	2,467,363.33	2,324,852.07	48,000.00	195.2
Vermont.....	951,975.39	911,183.87	-----	44.8
Virginia.....	3,566,117.71	3,322,846.03	235,430.47	146.1
Washington.....	2,855,483.04	2,794,488.77	3,356.82	102.7
West Virginia.....	1,943,070.51	1,901,842.01	12,956.18	72.1
Wisconsin.....	4,434,758.01	4,220,288.15	39,690.00	209.0
Wyoming.....	2,227,399.17	2,054,028.48	140,768.57	457.3
Hawaii.....	829,029.22	526,724.18	232,492.95	19.3
Total.....	184,029,189.74	162,035,432.63	11,747,258.23	11,522.8

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$1,777,249.49	\$1,768,479.78	-----	43.9
Arizona.....	632,961.16	623,659.51	-----	13.2
Arkansas.....	1,699,959.32	1,599,133.99	\$95,457.30	42.5
California.....	4,459,926.89	3,849,724.09	-----	52.5
Colorado.....	1,768,937.14	1,675,081.08	-----	35.3
Connecticut.....	828,471.21	802,407.00	23,450.79	10.2
Delaware.....	468,789.18	460,282.30	-----	6.7
Florida.....	1,793,761.56	1,437,885.39	282,545.85	18.7
Georgia.....	2,232,507.32	2,200,119.62	-----	68.3
Idaho.....	1,149,665.60	1,107,063.23	-----	18.3
Illinois.....	6,418,737.15	6,122,745.55	-----	66.4
Indiana.....	3,174,027.17	3,034,021.12	-----	63.5
Iowa.....	2,098,436.48	2,013,667.98	-----	51.1
Kansas.....	2,554,892.04	2,401,598.40	-----	37.1
Kentucky.....	1,468,314.08	1,416,933.57	-----	32.4
Louisiana.....	748,870.30	744,920.59	-----	18.5
Maine.....	830,660.76	825,162.11	172.41	16.4
Maryland.....	390,020.65	384,016.57	-----	3.6
Massachusetts.....	2,143,777.41	2,102,232.49	37,100.00	13.4
Michigan.....	3,239,170.40	3,104,881.06	-----	39.0
Minnesota.....	3,189,479.97	3,140,755.80	2,500.00	98.3
Mississippi.....	911,532.05	897,960.23	12,459.50	28.7
Missouri.....	2,920,631.89	2,844,980.94	-----	51.7
Montana.....	1,025,022.12	1,012,209.09	939.47	34.0
Nebraska.....	1,951,800.54	1,917,390.47	-----	33.0
Nevada.....	479,799.69	473,901.01	-----	9.4
New Hampshire.....	672,133.04	668,775.82	1,484.17	15.6
New Jersey.....	2,952,932.93	2,828,272.05	103,846.83	22.5
New Mexico.....	1,471,683.93	1,471,119.76	-----	33.8
New York.....	7,588,170.47	7,168,742.06	39,000.00	58.0
North Carolina.....	2,128,779.90	2,125,249.40	1,701.23	75.0
North Dakota.....	1,078,034.52	1,070,768.53	686.33	45.8
Ohio.....	4,710,282.60	4,238,313.72	-----	59.5
Oklahoma.....	2,178,496.66	2,098,728.20	779.60	44.7
Oregon.....	1,470,358.96	1,424,030.60	13,625.38	27.7
Pennsylvania.....	4,362,458.61	4,197,457.50	-----	58.6

² No projects of this class completed in Hawaii.

TABLE 14.—Total cost and mileage of 1934 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act, completed to June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Rhode Island.....	\$519,839.48	\$518,990.77	.....	7.4
South Carolina.....	1,095,075.84	1,092,876.53	\$405.01	34.5
South Dakota.....	1,070,769.37	1,070,366.12	.....	35.7
Tennessee.....	1,759,229.54	1,740,185.92	.....	24.8
Texas.....	5,216,863.22	5,093,601.29	.....	117.5
Utah.....	699,529.23	649,145.73	.....	16.7
Vermont.....	529,077.38	460,327.69	6,553.48	13.7
Virginia.....	1,282,757.36	1,250,265.23	10,812.54	25.1
Washington.....	1,942,398.47	1,922,046.25	.....	32.1
West Virginia.....	1,042,645.05	1,005,009.18	.....	16.8
Wisconsin.....	2,477,252.65	2,401,817.95	25,898.24	51.6
Wyoming.....	974,383.29	971,191.34	.....	22.3
District of Columbia.....	696,280.55	696,280.55	.....	4.5
Total.....	98,216,914.62	94,124,775.19	659,318.13	1,750.0

PROJECTS ON SECONDARY OR FEEDER ROADS

Alabama.....	\$1,486,623.66	\$1,482,576.10	.....	109.2
Arizona.....	549,547.58	531,272.95	.....	43.8
Arkansas.....	1,249,714.14	1,243,181.47	.....	149.1
California.....	3,592,883.65	2,984,134.18	.....	164.3
Colorado.....	1,696,998.30	1,605,434.83	.....	138.3
Connecticut.....	179,776.83	160,281.50	.....	3.1
Delaware.....	269,715.25	265,665.61	.....	14.1
Florida.....	1,297,524.39	1,284,727.07	.....	74.8
Georgia.....	1,623,724.69	1,604,794.36	.....	123.1
Idaho.....	1,263,231.37	1,094,529.68	.....	144.3
Illinois.....	3,073,727.65	3,035,675.87	.....	160.0
Indiana.....	425,393.70	386,212.34	.....	44.1
Iowa.....	2,295,545.56	2,241,349.10	.....	297.8
Kansas.....	2,088,099.23	2,085,241.57	.....	150.4
Kentucky.....	1,874,533.90	1,750,680.26	.....	207.1
Louisiana.....	1,045,811.69	1,035,963.10	.....	48.0
Maine.....	926,000.11	842,403.50	.....	69.9
Maryland.....	829,678.97	781,556.28	.....	57.6
Massachusetts.....	477,469.65	469,741.41	.....	15.2
Michigan.....	3,105,699.56	2,900,940.22	.....	205.4
Minnesota.....	2,204,027.13	2,194,840.21	.....	158.5
Mississippi.....	1,165,847.02	1,165,847.02	.....	123.7
Missouri.....	2,761,470.20	2,686,006.24	.....	497.7
Montana.....	1,760,235.26	1,751,640.86	.....	225.9
Nebraska.....	1,972,044.00	1,957,240.00	.....	263.6
Nevada.....	1,139,425.65	1,113,353.49	.....	109.6
New Hampshire.....	491,947.70	448,385.73	.....	24.2
New Jersey.....	56,527.92	55,098.73	.....	.5
New Mexico.....	1,235,197.98	1,235,197.98	.....	205.0
New York.....	3,326,621.17	3,035,560.14	.....	83.9
North Carolina.....	2,191,064.04	2,187,037.40	.....	228.8
North Dakota.....	1,014,150.22	1,013,517.73	.....	309.0
Ohio.....	4,012,658.13	3,754,142.44	.....	296.3
Oklahoma.....	2,159,942.55	2,032,584.07	.....	260.0
Oregon.....	1,641,441.88	1,501,340.67	.....	108.1
Pennsylvania.....	6,428,967.73	6,260,218.79	.....	541.3
Rhode Island.....	449,748.30	439,716.00	.....	33.1
South Carolina.....	1,087,287.82	1,086,654.80	.....	115.5
South Dakota.....	1,270,093.71	1,270,006.65	.....	380.1
Tennessee.....	1,679,297.63	1,612,242.88	.....	126.9
Texas.....	6,409,709.55	5,954,261.56	.....	773.5
Utah.....	1,109,863.65	954,654.55	.....	149.2
Vermont.....	505,615.68	438,631.41	.....	36.4
Virginia.....	1,634,274.65	1,567,018.81	.....	202.5
Washington.....	1,108,378.74	1,080,673.00	.....	67.6
West Virginia.....	770,892.33	726,068.35	.....	42.0
Wisconsin.....	2,298,476.16	2,158,518.02	.....	167.6
Wyoming.....	1,064,861.09	1,047,457.51	.....	145.4
District of Columbia.....	972,024.45	972,024.45	.....	7.7
Hawaii.....	178,208.97	177,717.69	.....	4.9
Total.....	83,452,001.19	79,670,018.58	.....	7,948.1

TABLE 15.—Total cost and mileage of 1935 Public Works highway projects financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, completed to June 30, 1935, and Federal funds allotted thereto by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$35,889.47	\$35,889.47		14.2
Arizona.....	471,297.49	458,904.66		55.3
Arkansas.....	363,850.82	335,091.20	\$28,632.77	12.3
California.....	516,028.33	476,000.00		52.5
Colorado.....	1,651,494.55	1,628,991.40		86.2
Delaware.....	330,607.95	317,536.98		12.2
Florida.....	261,419.89	264,419.89		9.9
Georgia.....	424,650.91	424,650.91		33.7
Idaho.....	155,805.70	154,028.23		25.4
Illinois.....	143,134.96	142,889.96		1.0
Indiana.....	35,317.13	35,317.13		
Iowa.....	333,105.29	314,620.00		58.2
Kansas.....	780,967.83	780,018.60		234.7
Kentucky.....	198,470.48	196,985.36		36.0
Louisiana.....	40,586.82	40,686.82		.6
Maine.....	93,719.61	93,719.61		3.4
Maryland.....	74,648.81	74,648.81		.7
Michigan.....	81,400.00	81,400.00		2.6
Minnesota.....	1,448,083.98	1,365,524.47		162.4
Mississippi.....	490,683.24	490,683.24		23.7
Montana.....	1,566,794.43	1,566,280.97		186.7
Nebraska.....	148,532.78	137,283.57		12.9
Nevada.....	605,805.48	604,881.16		62.2
New Hampshire.....	89,621.01	89,272.86		1.8
New Jersey.....	42,612.52	15,000.00		
New Mexico.....	812,459.42	812,459.42		89.7
New York.....	296,087.80	230,230.00		4.5
North Carolina.....	679,374.10	392,190.26	287,183.84	44.9
North Dakota.....	245,708.08	218,195.17	27,254.64	160.9
Ohio.....	88,100.00	88,100.00		3.9
Oklahoma.....	384,142.78	384,142.78		20.2
Oregon.....	330,811.09	279,917.09	50,000.00	11.1
Pennsylvania.....	594,435.02	593,079.55		12.5
South Carolina.....	111,964.67	111,964.67		8.8
South Dakota.....	160,756.21	160,756.21		70.5
Tennessee.....	333,219.48	333,219.48		11.3
Texas.....	983,794.20	983,266.67		111.9
Utah.....	677,675.01	553,524.55	85,000.00	78.7
Vermont.....	35,225.08	34,775.08		3.2
Virginia.....	514,995.80	469,944.82	44,821.84	19.0
Washington.....	200,639.96	200,520.77		3.7
West Virginia.....	195,860.50	195,860.50		7.2
Wisconsin.....	154,752.05	151,270.63		5.8
Wyoming.....	452,293.16	452,284.00		58.5
Total.....	17,639,933.89	16,770,456.95	522,892.99	1,814.9

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$98,283.79	\$98,283.79		2.2
Arizona.....	47,141.90	37,302.77		1.0
Arkansas.....	70,342.15	70,342.15		1.9
California.....	275,475.69	258,050.00		7.7
Colorado.....	169,410.60	169,410.60		4.6
Connecticut.....	10,077.96	9,362.04		
Delaware.....	51,542.45	51,542.45		.6
Florida.....	102,826.90	102,826.90		2.7
Georgia.....	35,648.19	35,648.19		1.7
Idaho.....	11,841.45	11,571.90		1.8
Indiana.....	14,011.76	14,011.76		.3
Iowa.....	75,627.57	71,035.00		6.3
Kansas.....	180,411.35	176,992.33		5.2
Kentucky.....	27,428.21	27,428.21		1.8
Louisiana.....	61,390.74	61,390.74		1.7
Michigan.....	104,400.00	104,400.00		.6
Minnesota.....	290,146.65	288,822.11		12.5
Mississippi.....	95,558.48	95,558.48		3.3

¹ No projects of this class completed in States not listed, the District of Columbia, and Hawaii.² No projects of this class completed in States not listed and Hawaii.

TABLE 15.—Total cost and mileage of 1935 Public Works highway projects financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, completed to June 30, 1935, and Federal funds allotted thereto by States—Continued

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Missouri.....	\$18,790.55	\$18,790.55		0.2
Montana.....	32,919.00	32,919.00		
Nebraska.....	320,655.36	320,655.36		7.9
Nevada.....	49,331.47	49,331.47		.8
New Hampshire.....	102,288.40	102,288.40		1.3
New Jersey.....	3,316.01	3,316.01		.4
New Mexico.....	180,097.17	180,097.17		5.2
New York.....	338,700.00	338,700.00		2.4
North Carolina.....	541,177.44	536,087.26	\$5,090.18	16.7
North Dakota.....	1,163.70	1,163.70		.8
Ohio.....	163,767.25	163,065.24		5.6
Oklahoma.....	199,101.74	199,101.74		3.6
Oregon.....	103,906.99	103,906.99		3.5
Pennsylvania.....	504,119.54	505,373.22		10.8
South Dakota.....	1,360.87	1,360.87		1.1
Tennessee.....	116,430.62	116,430.62		1.1
Texas.....	167,664.48	167,664.48		11.3
Utah.....	76,132.28	63,066.11		3.5
Vermont.....	37,526.82	36,000.00		.7
Virginia.....	220,169.76	215,043.32	5,126.44	5.4
Washington.....	303,461.88	305,761.08		8.3
West Virginia.....	28,109.01	28,109.01		.9
Wisconsin.....	123,788.47	123,788.47		3.9
Wyoming.....	2,784.76	2,784.00		.2
District of Columbia.....	181,051.07	181,051.07		2.0
Total.....	5,546,380.48	5,480,434.56	10,216.62	153.5

PROJECTS ON SECONDARY OR FEEDER ROADS¹

Alabama.....	\$92,973.82	\$92,973.82		7.0
Arizona.....	217,196.18	186,412.63		21.5
California.....	38,646.85	37,900.00		6.1
Colorado.....	555,225.53	277,323.58		93.7
Connecticut.....	12,888.94	12,888.94		.4
Delaware.....	158,976.51	155,213.26		37.4
Florida.....	322,933.99	322,933.99		13.7
Idaho.....	144,223.51	135,239.87		19.8
Iowa.....	328,193.43	315,850.00		115.6
Kansas.....	141,391.73	141,391.73		77.4
Kentucky.....	279,409.82	275,369.30		31.1
Louisiana.....	101,176.02	101,176.02		2.5
Maine.....	320,207.73	319,278.85		28.5
Maryland.....	41,222.90	41,222.90		1.9
Michigan.....	39,700.00	39,700.00		.3
Minnesota.....	558,120.92	484,888.55		100.9
Mississippi.....	10,000.00	10,000.00		6.5
Missouri.....	240,144.63	239,272.45		151.1
Montana.....	405,178.29	405,178.29		38.3
Nebraska.....	456,960.33	456,960.33		157.3
Nevada.....	353,854.51	352,874.33		75.8
New Hampshire.....	45,227.90	43,003.83		1.5
New Mexico.....	262,434.99	262,434.99		36.2
New York.....	354,223.99	209,298.61		9.1
North Carolina.....	458,052.48	458,052.48		61.1
North Dakota.....	46,073.64	46,073.64		13.4
Ohio.....	101,950.00	101,950.00		15.5
Oklahoma.....	50,770.15	50,770.15		11.3
Oregon.....	457,474.13	419,957.23		44.4
Pennsylvania.....	226,160.04	225,636.53		13.4
South Carolina.....	99,102.42	99,102.42		8.9
South Dakota.....	78,372.54	78,372.54		17.3
Tennessee.....	124,457.87	124,457.87		5.7
Texas.....	448,005.99	448,005.99		77.3
Utah.....	243,836.42	192,800.00		46.2
Vermont.....	57,539.15	57,503.82		3.1
Virginia.....	22,310.23	22,310.23		9.3
Washington.....	226,285.16	226,228.74		33.1
Wisconsin.....	48,583.45	48,583.45		2.8
Wyoming.....	135,377.42	135,376.00		11.4
District of Columbia.....	166,491.42	166,491.42		2.5
Total.....	8,471,355.08	7,820,498.78		1,410.3

¹ No projects of this class completed in States not listed and Hawaii.

TABLE 16.—Total cost and mileage of 1934 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act, under construction June 30, 1935, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$929,126.70	\$530,261.54	\$398,865.16	52.4
Arkansas.....	760,736.85	643,215.22	117,520.63	20.8
California.....	920,981.81	158,740.56	.....	5.2
Colorado.....	132,907.59	82,636.81	36,500.00	4.2
Connecticut.....	802,607.64	611,294.44	191,213.20	16.3
Delaware.....	4,973.04	4,973.04	.....	.....
Florida.....	258,441.11	220,894.89	37,546.22	2.3
Georgia.....	1,061,740.78	978,717.13	83,023.65	34.4
Idaho.....	143,741.95	131,758.66	11,983.29	4.7
Illinois.....	2,002,681.43	2,002,681.43	.....	16.6
Indiana.....	1,428,619.62	1,427,908.10	.....	28.2
Iowa.....	325,120.40	306,900.00	.....	10.0
Kansas.....	31,529.65	31,529.65	.....	5.0
Kentucky.....	392,181.39	316,513.72	13,361.92	13.1
Louisiana.....	515,017.51	368,904.43	.....	2.8
Maine.....	117,934.18	117,934.18	.....	.6
Maryland.....	797,232.25	797,232.25	.....	16.5
Massachusetts.....	52,686.97	52,686.97	.....	.5
Michigan.....	1,075,800.00	1,075,800.00	.....	40.8
Minnesota.....	192,247.59	192,247.59	.....	19.7
Mississippi.....	1,549,626.51	893,810.26	655,816.25	85.9
Missouri.....	9-0,850.70	861,589.21	73,102.40	14.3
Montana.....	64,686.16	4,129.31	32,001.66	19.3
Nebraska.....	252,801.31	25,639.51	.....	6.1
Nevada.....	187,644.11	187,644.11	.....	25.5
New Hampshire.....	96,866.55	79,729.64	17,136.91	.3
New Jersey.....	1,135,261.50	1,113,073.72	12,676.78	10.8
New Mexico.....	114,088.04	98,561.71	.....	5.0
New York.....	1,490,230.00	1,262,471.81	.....	28.2
North Carolina.....	907,820.89	775,949.23	131,871.66	81.4
North Dakota.....	161,368.12	98,160.47	63,207.65	40.9
Ohio.....	192,470.00	186-0-0.92	4,989.08	4.5
Oklahoma.....	515,959.55	396,183.38	119,776.17	21.4
Oregon.....	161,687.91	80,589.91	.....	.5
Pennsylvania.....	630,718.27	442,031.34	30,620.92	5.6
Rhode Island.....	88,603.07	79,739.61	.....	1.3
South Carolina.....	315,630.36	315,630.36	.....	28.4
South Dakota.....	519,142.31	486,318.32	32,823.99	78.1
Tennessee.....	272,948.05	176,546.93	14,299.75	5.0
Texas.....	424,980.99	387,980.99	.....	29.2
Utah.....	37,409.68	37,000.00	.....	.8
Vermont.....	27,113.87	10,670.21	.....	.4
Virginia.....	249,657.81	233,865.48	11,757.70	15.0
Washington.....	227,921.65	227,921.65	.....	7.6
West Virginia.....	57,156.19	57,156.19	.....	.2
Wisconsin.....	445,826.77	445,826.77	.....	21.1
Wyoming.....	208,513.19	182,391.43	25,600.00	3.5
Hawaii.....	1,331,572.45	1,126,854.57	183,588.47	20.3
Total.....	24,595,194.47	20,326,435.65	2,299,443.46	854.5

¹ No projects of this class under construction in Arizona and the District of Columbia.PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$568,563.40	\$568,563.40	.....	20.4
Arkansas.....	249,166.70	248,966.70	.....	2.5
California.....	517,127.05	356,839.76	.....	.1
Florida.....	2,888.50	2,898.50	.....	.....
Georgia.....	315,541.40	308,553.05	\$6,987.45	7.7
Idaho.....	45,371.70	45,371.70	.....	.1
Illinois.....	1,202,053.81	1,202,053.81	.....	4.1
Indiana.....	1,075,628.48	1,073,164.60	.....	9.2
Iowa.....	645,327.36	600,765.25	.....	6.2
Kansas.....	71,884.18	71,884.18	.....	.6
Kentucky.....	458,136.59	450,553.92	.....	2.1
Louisiana.....	988,110.21	946,156.66	41,953.55	10.7
Maine.....	67,228.11	67,228.11	.....	1.0
Maryland.....	1,075,977.75	262,456.99	.....	.9
Massachusetts.....	2,901,347.79	2,876,371.63	24,976.16	3.4

² No projects of this class under construction in States not listed and Hawaii.

TABLE 16.—Total cost and mileage of 1934 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act, under construction June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Michigan.....	\$369,750.00	\$357,250.00		2.4
Minnesota.....	607,095.94	520,812.92		1.3
Mississippi.....	839,119.69	764,058.20	\$46,061.49	19.9
Missouri.....	1,067,899.45	1,022,062.03		6.8
Montana.....	93,359.73	66,067.94	27,291.79	4.5
New Hampshire.....	71,558.80	71,558.80		1.8
New Jersey.....	182,600.19	182,600.19		.3
New Mexico.....	123,326.38	123,326.38		1.2
New York.....	1,050,661.42	887,217.02		4.2
North Carolina.....	155,690.18	125,112.60	30,577.58	4.8
North Dakota.....	238,526.73	238,526.73		7.5
Oklahoma.....	171,034.81	167,849.07		2.1
Oregon.....	74,643.86	66,634.90		1.0
Pennsylvania.....	681,120.30	592,456.56		2.4
South Carolina.....	258,167.47	252,616.63	5,550.84	10.8
South Dakota.....	183,141.89	183,141.89		7.1
Tennessee.....	371,898.49	371,898.49		2.7
Texas.....	1,401,142.64	1,244,952.30		7.8
Utah.....	129,468.43	129,130.39		.4
Vermont.....	26,801.55	26,801.55		.9
Virginia.....	883,957.26	634,441.09	8,276.21	3.6
Washington.....	48,798.52	48,798.52		1.0
West Virginia.....	307,661.19	307,661.19		3.5
Wisconsin.....	113,025.39	113,025.39		.1
Wyoming.....	141,559.33	141,009.00		1.8
District of Columbia.....	250,164.00	250,164.00		.2
Total.....	20,026,656.67	17,971,392.94	191,675.07	169.1

PROJECTS ON SECONDARY OR FEEDER ROADS *

Alabama.....	\$507,248.23	\$507,248.23		32.2
Arkansas.....	152,928.42	152,568.42		12.2
California.....	563,450.52	494,605.31		16.7
Colorado.....	185,664.57	110,000.00		10.1
Connecticut.....	504,634.08	498,838.50		11.5
Delaware.....	215,682.00	215,447.79		2.5
Georgia.....	620,787.73	620,787.73		41.3
Illinois.....	2,727,238.31	2,727,238.31		166.6
Indiana.....	310,432.90	310,432.90		43.4
Iowa.....	182,999.54	171,301.73		24.1
Kansas.....	393,660.62	393,660.62		12.6
Kentucky.....	67,732.52	67,732.52		12.0
Louisiana.....	260,029.86	260,029.86		11.3
Maryland.....	99,745.80	99,745.80		8.8
Michigan.....	241,227.00	241,227.00		19.0
Minnesota.....	149,443.85	149,443.85		4.5
Mississippi.....	543,534.41	543,534.41		39.4
Missouri.....	280,804.39	235,551.21		16.3
New Hampshire.....	29,000.00	29,000.00		1.3
New Mexico.....	36,931.02	36,931.02		8.2
New York.....	640,500.00	515,600.00		15.7
North Carolina.....	160,265.46	160,265.46		8.2
North Dakota.....	303,198.16	303,198.16		100.6
Ohio.....	32,860.00	32,860.00		5.6
Oklahoma.....	282,377.22	265,837.68		19.1
Oregon.....	19,525.71	19,525.71		.2
Pennsylvania.....	1,119,999.94	1,066,649.12		96.9
South Carolina.....	227,517.61	227,517.61		33.7
South Dakota.....	232,863.35	232,863.35		69.9
Tennessee.....	429,039.85	429,039.85		23.9
Texas.....	16,516.74	16,516.74		.8
Utah.....	108,127.25	94,022.45		12.1
Virginia.....	104,247.26	104,247.26		3.4
West Virginia.....	387,152.35	387,152.35		15.1
Wisconsin.....	331,847.48	258,460.28		16.5
Wyoming.....	33,501.60	33,494.00		8.6
Total.....	12,502,715.75	12,012,475.23		924.2

* No projects of this class under construction in States not listed, the District of Columbia, and Hawaii.

TABLE 17.—Total cost and mileage of 1935 Public Works highway projects financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, under construction on June 30, 1935, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$1,235,513.03	\$1,235,513.03		71.6
Arizona.....	982,993.70	870,052.18		42.4
Arkansas.....	1,142,590.59	973,714.66	\$168,255.93	69.2
California.....	2,266,719.22	2,119,795.23		55.9
Colorado.....	825,069.05	786,221.95		40.7
Connecticut.....	670,945.98	654,725.61	116,220.37	7.1
Delaware.....	133,550.00	133,550.00		3.2
Florida.....	606,335.03	606,335.03		27.9
Georgia.....	1,149,032.86	1,149,032.86		70.7
Idaho.....	459,597.31	445,173.06	13,544.24	28.6
Illinois.....	1,987,890.38	1,987,890.38		50.5
Indiana.....	2,443,414.04	2,279,625.42	18,274.51	135.1
Iowa.....	2,004,889.57	1,715,528.60		108.1
Kansas.....	1,614,717.21	1,546,923.37		120.2
Kentucky.....	801,217.07	792,538.75	4,534.97	43.6
Louisiana.....	1,105,850.67	1,098,700.05		26.1
Maine.....	494,534.43	494,534.43		9.5
Maryland.....	178,571.16	178,571.16		4.8
Massachusetts.....	1,041,709.99	989,888.41	51,821.58	19.9
Michigan.....	2,371,800.00	2,350,736.48	21,063.52	95.0
Minnesota.....	737,717.12	737,117.12		100.2
Mississippi.....	1,321,253.57	1,323,253.57		74.2
Missouri.....	1,936,319.39	1,877,065.61		70.5
Montana.....	1,017,215.99	975,696.17	41,519.82	52.3
Nebraska.....	1,872,142.32	1,748,711.97		98.9
Nevada.....	499,452.95	498,785.75		74.2
New Hampshire.....	356,384.03	352,131.53		10.4
New Jersey.....	650,905.68	675,606.68		4.4
New Mexico.....	562,945.51	562,945.51		40.0
New York.....	6,055,080.00	3,246,551.69	58,928.31	109.2
North Carolina.....	598,824.90	545,824.90	53,000.00	75.3
North Dakota.....	521,041.33	409,315.43	111,725.90	162.7
Ohio.....	3,182,256.00	2,854,513.00	137,130.00	64.6
Oklahoma.....	1,521,275.03	1,428,536.88	30,238.15	58.5
Oregon.....	1,142,678.66	1,103,851.77	9,600.36	54.9
Pennsylvania.....	3,800,016.42	3,757,563.61		75.5
Rhode Island.....	471,988.57	464,572.00		13.0
South Carolina.....	351,415.73	351,415.73		27.3
South Dakota.....	987,435.21	966,352.61	21,082.60	157.3
Tennessee.....	1,313,145.64	1,313,145.64		50.7
Texas.....	4,727,034.13	4,564,419.90	162,614.23	343.8
Utah.....	468,962.67	360,550.00	53,499.15	28.3
Vermont.....	364,218.26	353,388.49		17.3
Virginia.....	1,264,677.22	1,101,175.87	160,966.74	62.2
Washington.....	1,332,783.10	1,212,203.56		16.0
West Virginia.....	456,667.87	456,667.87		17.0
Wisconsin.....	1,611,152.33	1,531,644.27		66.4
Wyoming.....	1,030,753.30	1,030,740.00		193.3
Total.....	63,672,684.22	58,012,797.79	1,233,480.38	3,148.1

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$282,641.23	\$282,641.23		5.7
Arizona.....	107,876.87	95,500.39		.6
Arkansas.....	328,005.98	326,803.48		8.1
California.....	2,883,600.74	1,749,825.95		13.3
Connecticut.....	193,691.99	142,520.92	\$51,171.07	1.6
Delaware.....	40,287.55	40,287.55		1.8
Florida.....	154,249.88	154,249.88		1.4
Georgia.....	415,349.19	405,048.89		13.5
Idaho.....	206,182.04	204,994.04		1.2
Illinois.....	1,016,233.62	1,016,233.62		7.0
Indiana.....	996,082.11	996,082.11		19.1
Iowa.....	848,067.63	795,665.00		17.1
Kansas.....	1,260,279.49	1,244,976.69		14.2
Kentucky.....	437,249.52	435,366.36		6.6
Louisiana.....	273,259.85	273,172.19		6.9

¹ No projects of this class under construction in Hawaii and the District of Columbia.² No projects of this class under construction in States not listed, the District of Columbia, and Hawaii.

TABLE 17.—Total cost and mileage of 1935 Public Works highway projects financed with funds provided by the Hayden-Cartwright Act of June 18, 1935, under construction on June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Maine.....	\$197,218.30	\$197,218.30	.....	2.0
Massachusetts.....	230,205.73	230,205.73	.....	2.4
Michigan.....	1,316,500.00	1,291,100.00	.....	15.4
Minnesota.....	445,116.77	436,916.77	.....	16.5
Mississippi.....	106,745.37	106,745.37	.....	6.9
Missouri.....	157,129.26	157,129.26	.....	4.4
Montana.....	31,670.98	31,670.98	.....	2.1
Nebraska.....	531,566.36	531,566.36	.....	8.9
Nevada.....	8,510.76	8,510.76	.....	.6
New Hampshire.....	79,386.37	79,176.37	.....	2.1
New Jersey.....	879,675.15	641,127.27	\$19,000.00	4.8
New Mexico.....	69,432.03	69,432.03	.....	1.7
New York.....	3,065,679.55	3,009,990.00	.....	21.7
North Carolina.....	472,005.07	472,005.07	.....	11.8
North Dakota.....	157,735.14	157,735.14	.....	7.8
Ohio.....	1,661,797.00	1,533,452.00	6,030.00	15.4
Oklahoma.....	573,543.63	573,543.63	.....	6.4
Oregon.....	591,819.38	591,819.38	.....	9.9
Pennsylvania.....	1,006,691.49	972,115.31	.....	12.7
Rhode Island.....	141,760.07	141,760.07	.....	1.5
South Carolina.....	171,375.71	171,375.71	.....	4.5
South Dakota.....	159,511.02	159,511.02	.....	3.3
Tennessee.....	388,241.06	388,241.06	.....	4.1
Texas.....	734,017.70	713,845.68	20,000.00	14.6
Utah.....	371,312.27	315,800.00	.....	9.0
Vermont.....	163,645.98	149,376.31	.....	2.4
Virginia.....	428,767.06	368,145.59	23,375.34	5.6
Washington.....	406,596.64	406,596.64	.....	6.0
West Virginia.....	14,491.67	14,491.67	.....	.7
Wisconsin.....	994,290.48	994,290.48	.....	15.0
Wyoming.....	14,133.72	14,132.00	.....	1.2
Total.....	25,013,629.41	23,092,394.26	119,576.41	339.5

PROJECTS ON SECONDARY OR FEEDER ROADS²

Alabama.....	\$635,657.33	\$635,657.33	.....	44.1
Arizona.....	768,207.39	694,494.21	.....	63.5
Arkansas.....	533,651.48	531,638.74	.....	75.2
California.....	1,361,983.23	1,283,365.22	.....	41.9
Colorado.....	621,244.72	504,962.72	.....	66.7
Connecticut.....	222,880.06	222,880.06	.....	4.5
Delaware.....	81,141.70	70,330.50	.....	17.4
Florida.....	580,943.62	580,943.62	.....	34.4
Georgia.....	342,922.74	342,922.74	.....	29.6
Idaho.....	510,165.83	510,165.83	.....	59.6
Illinois.....	3,004,914.00	3,004,914.00	.....	145.3
Indiana.....	78,287.21	78,287.21	.....	6.6
Iowa.....	1,425,508.86	1,222,625.00	.....	246.5
Kansas.....	1,181,056.87	1,181,056.87	.....	72.1
Kentucky.....	1,263,275.22	1,191,634.94	.....	156.7
Louisiana.....	589,699.79	589,699.79	.....	27.5
Maine.....	155,426.77	117,980.30	.....	8.1
Maryland.....	378,167.35	378,167.35	.....	15.5
Massachusetts.....	415,063.21	415,063.21	.....	10.4
Michigan.....	1,458,017.00	1,458,017.00	.....	63.0
Minnesota.....	929,772.62	824,872.62	.....	95.7
Mississippi.....	62,278.91	62,278.91	.....	11.3
Missouri.....	1,435,426.48	1,426,306.28	.....	286.4
Montana.....	438,840.01	438,840.01	.....	46.2
Nebraska.....	430,844.61	430,844.61	.....	67.8
Nevada.....	244,477.73	244,477.73	.....	24.5
New Hampshire.....	210,542.17	206,407.78	.....	7.6
New Jersey.....	107,524.70	107,524.70	.....	1.7
New Mexico.....	383,701.28	383,701.28	.....	47.4
New York.....	3,964,270.00	3,403,050.00	.....	267.8
North Carolina.....	966,921.63	966,921.63	.....	117.5

² No projects of this class under construction in Hawaii.

TABLE 17.—Total cost and mileage of 1935 Public Works highway projects financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, under construction on June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON SECONDARY OR FEEDER ROADS—Continued

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
North Dakota.....	\$41,994.39	\$41,994.39		8.4
Ohio.....	1,440,226.44	1,390,842.91		90.3
Oklahoma.....	1,002,140.73	854,359.84		34.6
Oregon.....	411,551.66	357,138.77		21.7
Pennsylvania.....	2,325,212.07	2,275,713.75		103.5
Rhode Island.....	212,562.56	212,562.56		6.7
South Carolina.....	1,114,812.40	1,076,462.78		125.2
South Dakota.....	288,987.69	288,987.69		63.7
Tennessee.....	568,686.82	568,686.82		27.4
Texas.....	2,876,616.78	2,876,596.78		167.2
Utah.....	371,555.10	314,372.75		59.0
Vermont.....	197,198.91	182,947.63		13.7
Virginia.....	590,165.00	582,891.97		61.2
Washington.....	556,609.68	549,109.68		24.1
West Virginia.....	301,156.98	301,156.98		11.7
Wisconsin.....	1,490,418.47	1,361,660.19		43.7
Wyoming.....	332,065.94	332,063.00		67.0
District of Columbia.....	337,624.96	337,624.96		2.7
Total.....	39,238,401.00	37,415,205.54		3,094.3

Of the 1,427 miles in projects approved for construction on June 30, 675 miles were located on the Federal-aid highway system outside of cities; 135 miles were made up of municipal extensions of the system; and 617 miles consisted of secondary or feeder roads. The distribution of these projects and other information concerning them are given in tables 18 and 19.

TABLE 18.—Total cost and mileage of 1934 Public Works highways financed with funds provided by sec. 204 of the National Industrial Recovery Act, approved for construction on June 30, 1935, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$37,465.80	\$37,465.80		
Arkansas.....	159,288.77	158,918.77		4.0
Colorado.....	77,584.98	6,627.34		5.5
Delaware.....	4,158.00	4,082.00		
Georgia.....	6,393.86	6,393.86		
Illinois.....	3,000.00	3,000.00		.1
Indiana.....	77,950.96	77,950.96		
Louisiana.....	11,069.97	11,069.97		.1
Maryland.....	106,646.45	106,646.45		1.1
Minnesota.....	50,481.59	50,481.59		5.4
Mississippi.....	5,574.32	5,574.32		
Nevada.....	70,539.91	34,908.23		25.8
North Carolina.....	64,450.00	64,450.00		
North Dakota.....	198,227.80	148,356.30	\$49,871.50	65.9
Ohio.....	44,210.00	42,800.00		.7
Oklahoma.....	16,345.48	10,819.53		.1
Pennsylvania.....	2,291.36	2,126.23		
South Carolina.....	18,520.00	18,520.00		
South Dakota.....	21,653.14	17,186.63	4,466.51	5.9
Tennessee.....	2,195.35	2,195.35		
Virginia.....	127,423.27	51,679.64	9,722.83	4.8
West Virginia.....	57,990.03	54,406.80		.5
Wisconsin.....	79,906.70	25,000.00		2.0
Hawaii.....	20,972.60	20,972.60		.1
Total.....	1,264,340.34	961,632.37	64,660.84	122.0

¹ No projects of this class in this status in States not listed and the District of Columbia.

TABLE 18.—Total cost and mileage of 1934 Public Works highways financed with funds provided by sec. 204 of the National Industrial Recovery Act, approved for construction on June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$29,877.89	\$29,877.89		
Arizona.....	129,321.66	129,321.66		0.1
Arkansas.....	101,076.31	101,076.31		.2
Colorado.....	15,949.45	15,949.45		.8
Illinois.....	47,260.00	47,260.00		.6
Indiana.....	148,114.62	148,114.62		1.6
Kansas.....	48,918.42	48,918.42		1.3
Kentucky.....	35,577.81	30,000.00		
Louisiana.....	10,665.82	10,665.82		
Maine.....	58,912.31	58,912.31		.7
Michigan.....	19,400.00	19,400.00		.7
Minnesota.....	2,310.00	2,310.00		
Mississippi.....	9,152.16	9,152.16		.3
Montana.....	30,011.74	30,011.74		2.3
New Mexico.....	1,010.05	1,010.05		
New York.....	76,700.00	76,700.00		
North Carolina.....	91,217.00	91,217.00		.1
North Dakota.....	119,304.45	119,304.45		7.4
Ohio.....	121,000.00	93,351.86		1.1
Oklahoma.....	57,563.80	35,870.76		.7
Oregon.....	517.97	517.97		
South Carolina.....	26,797.84	19,297.84	\$7,500.00	
South Dakota.....	55,948.23	55,948.23		1.5
Tennessee.....	11,070.59	11,070.59		.7
Texas.....	52,836.01	52,836.01		.5
Virginia.....	14,212.90	13,975.31		.1
West Virginia.....	39,253.65	28,642.41	10,611.24	.6
Wisconsin.....	57,664.33	57,664.33		.8
Wyoming.....	6,658.19	6,658.19		.4
Total.....	1,418,303.20	1,345,035.38	18,111.24	22.5

PROJECTS ON SECONDARY OR FEEDER ROADS²

Arizona.....	\$66,269.29	\$45,000.00		6.2
Colorado.....	3,197.17	3,197.17		.6
Illinois.....	9,847.75	9,847.75		8.3
Kansas.....	43,498.81	43,498.81		1.6
Louisiana.....	127,387.43	127,387.43		3.9
Maryland.....	13,941.95	9,800.00		1.5
Nevada.....	28,163.30	20,813.31		11.2
North Dakota.....	78,423.37	78,423.37		26.2
Ohio.....	17,000.00	17,000.00		2.0
South Carolina.....	36,000.00	36,000.00		5.9
Tennessee.....	17,894.47	17,894.47		.5
Texas.....	28,743.13	18,000.00		9.9
Virginia.....	74,549.90	65,504.17		1.7
Wyoming.....	42,657.78	41,790.00		22.0
Total.....	587,574.35	534,156.48		101.5

¹ No projects of this class in this status in States not listed, the District of Columbia, and Hawaii.

TABLE 19.—Total cost and mileage of 1935 Public Works highways financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, approved for construction on June 30, 1935, and Federal funds allotted thereto, by States

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES 1

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$459,429.26	\$459,429.26	-----	15.5
Arkansas.....	138,897.46	138,897.46	-----	5.8
California.....	873,410.05	826,273.20	-----	21.3
Dalaware.....	7,441.50	7,441.50	-----	-----
Florida.....	214,469.80	214,469.80	-----	1.7
Georgia.....	240,661.00	240,661.00	-----	4.6
Idaho.....	331,023.33	283,675.90	-----	13.7
Illinois.....	280,271.00	277,997.66	-----	.3
Indiana.....	601,199.50	383,180.35	-----	21.8
Iowa.....	60,517.39	56,500.00	-----	4.0
Kansas.....	27,300.37	27,188.53	-----	1.3
Kentucky.....	260,116.82	234,306.90	-----	11.2
Louisiana.....	1,326.42	1,326.42	-----	.1
Maine.....	192,303.41	192,288.71	-----	6.8
Massachusetts.....	5,350.56	5,350.56	-----	-----
Michigan.....	579,025.00	579,025.00	-----	26.6
Minnesota.....	286,751.73	284,628.56	-----	36.3
Mississippi.....	694,396.44	684,578.30	-----	34.6
Missouri.....	1,127,079.33	1,013,600.39	-----	41.0
Montana.....	129,644.78	129,644.78	-----	.2
Nebraska.....	40,817.00	40,817.00	-----	.4
Nevada.....	259,726.99	234,342.21	-----	34.5
New Jersey.....	10,167.47	10,167.47	-----	-----
New Mexico.....	303,654.41	301,364.07	-----	18.6
New York.....	26,900.00	26,900.00	-----	-----
North Carolina.....	377,705.56	367,268.70	-----	19.0
North Dakota.....	323,136.54	258,265.54	\$64,871.00	91.7
Ohio.....	4,070.00	3,420.00	-----	.1
Oklahoma.....	367,151.21	367,151.21	-----	11.1
Pennsylvania.....	8,497.72	8,816.00	-----	.3
South Carolina.....	27,220.10	27,220.10	-----	-----
South Dakota.....	283,886.49	272,886.49	11,000.00	31.1
Tennessee.....	412,889.66	412,889.66	-----	9.1
Texas.....	310,726.03	658,162.52	-----	47.1
Utah.....	22,528.72	15,000.00	-----	1.1
Vermont.....	82,679.65	68,421.44	-----	1.7
Virginia.....	233,021.50	189,120.82	42,426.89	8.6
Washington.....	130,298.52	130,298.52	-----	.3
West Virginia.....	119,086.55	119,086.55	-----	4.2
Wisconsin.....	95,747.24	92,795.83	-----	4.8
Wyoming.....	158,392.71	158,392.00	-----	20.9
Hawaii.....	273,416.37	273,416.37	-----	1.6
Total.....	10,882,335.59	10,074,666.78	118,297.89	553.0

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES 2

Alabama.....	\$134,766.13	\$134,766.13	-----	2.0
Arizona.....	138,364.63	110,505.00	-----	.1
Arkansas.....	200,919.11	200,693.61	-----	4.3
California.....	105,954.28	100,000.00	-----	1.6
Connecticut.....	134,613.11	134,613.11	-----	1.3
Georgia.....	149,961.03	143,961.03	-----	3.0
Illinois.....	613,618.00	613,618.00	-----	2.6
Indiana.....	835,239.08	835,239.08	-----	10.3
Iowa.....	166,512.39	158,535.00	-----	1.4
Kansas.....	10,979.98	10,979.98	-----	-----
Kentucky.....	242,923.86	215,702.18	-----	3.9
Louisiana.....	272,960.25	272,960.25	-----	3.6
Maine.....	286,017.87	280,253.42	-----	3.2
Massachusetts.....	38,076.83	38,076.83	-----	.7
Michigan.....	120,500.00	120,500.00	-----	1.6
Minnesota.....	12,581.19	12,581.19	-----	1.3
Mississippi.....	30,896.51	30,896.51	-----	1.3
Missouri.....	747,677.05	743,232.48	-----	5.4
Montana.....	7,552.82	7,552.82	-----	.7
Nebraska.....	343.81	343.81	-----	-----
New Hampshire.....	50,934.65	50,934.65	-----	.3
New Jersey.....	119,047.71	104,945.64	-----	-----
New York.....	62,000.00	62,000.00	-----	-----

1 No projects of this class in this status in States not listed and the District of Columbia.

2 No projects of this class in this status in States not listed, the District of Columbia, and Hawaii.

TABLE 19.—Total cost and mileage of 1935 Public Works highways financed with funds provided by the Hayden-Cartwright Act of June 18, 1934, approved for construction on June 30, 1935, and Federal funds allotted thereto, by States—Con.

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
North Carolina.....	\$135,599.56	\$135,599.56	-----	3.8
North Dakota.....	177,547.15	177,547.15	-----	12.0
Ohio.....	191,200.00	191,200.00	-----	1.3
Oklahoma.....	129,270.52	129,270.52	-----	2.0
Oregon.....	116,472.40	80,000.00	-----	.2
Pennsylvania.....	288,956.14	288,881.34	-----	.9
South Carolina.....	103,791.13	103,791.13	-----	1.2
South Dakota.....	104,395.23	104,395.23	-----	5.6
Tennessee.....	355,676.78	355,676.78	-----	3.1
Texas.....	569,417.84	476,685.47	-----	12.6
Utah.....	185,933.96	152,000.00	-----	4.8
Vermont.....	29,577.46	27,844.26	-----	.9
Virginia.....	308,594.12	288,438.77	-----	7.5
Washington.....	43,513.24	43,513.24	-----	.2
West Virginia.....	216,075.42	216,075.42	-----	3.4
Wisconsin.....	238,352.41	238,352.41	-----	3.9
Total.....	7,676,863.65	7,392,161.90	-----	112.0

PROJECTS ON SECONDARY OR FEEDER ROADS¹

Alabama.....	\$194,367.07	\$194,367.07	-----	12.0
Arizona.....	10,000.37	10,000.37	-----	.9
Arkansas.....	173,729.35	173,440.85	-----	24.4
California.....	474,025.01	455,377.32	-----	14.8
Colorado.....	89,215.70	89,215.70	-----	.6
Florida.....	125,376.15	103,590.73	-----	6.8
Georgia.....	158,613.12	158,613.12	-----	5.9
Illinois.....	994,669.61	994,669.61	-----	19.1
Indiana.....	30,388.97	30,838.97	-----	5.7
Iowa.....	152,358.51	51,400.00	-----	16.3
Kansas.....	8,146.00	8,146.00	-----	-----
Kentucky.....	52,920.99	49,903.55	-----	4.7
Louisiana.....	129,771.72	129,771.72	-----	5.4
Maryland.....	176,375.65	176,375.65	-----	2.6
Massachusetts.....	115,369.59	115,369.59	-----	5.5
Michigan.....	115,425.00	115,425.00	-----	12.9
Minnesota.....	70,695.43	70,695.43	-----	7.7
Mississippi.....	133,134.20	133,134.20	-----	14.1
Missouri.....	698,342.98	698,342.98	-----	110.6
Montana.....	42,981.12	42,981.12	-----	5.2
Nebraska.....	37,135.70	37,135.70	-----	4.6
New Mexico.....	73,134.74	73,134.74	-----	2.6
North Carolina.....	120,716.85	120,716.85	-----	5.4
North Dakota.....	196,748.61	196,748.61	-----	44.5
Ohio.....	27,200.00	27,200.00	-----	6.2
Oklahoma.....	91,282.66	91,282.66	-----	8.7
Rhode Island.....	36,815.04	36,815.04	-----	1.4
South Carolina.....	99,939.65	99,939.65	-----	8.3
South Dakota.....	228,182.75	228,182.75	-----	71.1
Tennessee.....	106,608.97	106,608.97	-----	5.5
Texas.....	316,776.54	226,000.00	-----	18.3
Utah.....	34,437.15	25,000.00	-----	2.9
Virginia.....	257,744.14	239,410.85	-----	22.0
West Virginia.....	93,523.82	93,523.82	-----	9.9
Wisconsin.....	247,493.39	213,228.93	-----	6.2
Wyoming.....	83,413.14	83,411.91	-----	22.9
Total.....	5,997,510.59	5,700,000.36	-----	515.7

¹ No projects of this class in this status in States not listed, the District of Columbia, and Hawaii.

The classification of the mileage of Public Works highway projects by surface types is shown for each of the States and each class of project completed in table 20. Similar information concerning projects under construction at the end of the fiscal year is given in table 21, and projects approved for construction at the close of the year are shown in table 22.

TABLE 20.—Mileage of 1934 and 1935 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act and the Hayden-Cartwright Act of June 18, 1934, completed, by types of construction, by States, June 30, 1935

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES

State	Graded and drained		Sand-clay		Gravel		Macadam		Low cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land-cement concrete	Block	Bridges and approaches	Total		Grade-separation structures (mileage shown with bridges)	
	Miles		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Miles	Miles	Miles	Miles
Alabama	18.3		35.3	44.9	13.6	44.9			128.7		30.1	67.8		1.5	340.2	1		
Arizona	23.0				113.1				245.3		7.4	.8		3.0	352.6	4		
Arkansas	13.9				64.7				9.0		25.6	49.5		2.4	165.1	3		
California	18.2			30.0	49.0	30.0	15.7		90.3	5.4	114.1	38.5		2.9	364.1	7		3
Colorado	5.3			3.8	222.5				2.7	7.7		9.8		2.6	242.9	17		
Connecticut	5.3										.3	30.9		.1	14.5			
Delaware	19.8								31.0		33.1	33.1		.3	125.6	6		
Florida	21.6		45.4	79.7	39.9	79.7	41.4		30.2		5.0	47.4		2.1	319.0	1		2
Georgia	7.5				103.0				81.6		.5	5.4		2.1	198.5	2		
Idaho	2.2											30.9	1.8	5.4	40.3			
Illinois	18.1				6.0				5.0		1.0	86.9		1.3	312.9	4		
Indiana	109.8		248.8		70.9							128.7		2.9	317.3	9		
Iowa	293.3				37.1							52.3	3.3	2.6	637.4	1		
Kansas	39.6				103.0				53.4		13.8	69.7		1.0	280.5	2		
Kentucky	9.1				2.3	7.6			.5			53.2		2.2	76.8			
Louisiana						17.3						1.8		.6	47.4			
Maine						.4						5.2		.1	15.5			
Maryland												8.9		.1	37.4			
Massachusetts												5.2		.6	234.2			
Michigan	28.9				75.7							128.5		1.1	910.1	1		
Minnesota	125.7				567.4				44.4			60.2		.5	269.2	14		
Mississippi	154.1				19.3	47.0	53.6					68.8		3.8	981.4	4		
Missouri	11.1				30.7	12.8						145.7		1.0	198.1	7		
Montana	30.6				429.8				92.4		9.6	9.2		2.4	564.4	11		1
Nebraska	93.5		117.2		110.8				56.4		.6	99.8	.9	1.6	369.4	2		
Nevada									210.4		.9	36.1		.7	322.5	3		
New Hampshire	4						5.2			2.5		3.1		.9	12.6			
New Jersey												30.9		.1	37.4			
New Mexico	12.4				32.3	171.6			111.6		32.8	1.1		2.1	863.9	3		
New York	12.7				2.4							164.0		.9	224.0	7		
North Carolina	14.8				18.4	113.0	46.8		53.3		21.4	27.8		1.1	602.7	3		
North Dakota	463.3		52.7		568.8				89.7			113.5	18.6	3.4	1,122.4	4		
Ohio	1.1				15.6					15.7		27.3		3.6	1,195.2	4		

Oklahoma.....	182.8	31.6	22.9	1	5.9	108.8	34.0	38.8	4.9	2.9	318.1	4			
Oregon.....	27.0	16.4	11.2			8.7	9.2	13.8		1.5	186.9	3			
Pennsylvania.....	9.8					8.5	1.8	90.5		1.1	189.9	2			
Rhode Island.....						3.0		10.2			21.5	6			
South Carolina.....	14.6	167.0				16.9	15.6	15.6		.9	177.0	3			
South Dakota.....	25.1	174.0				101.4	17.3	107.9		1.5	596.1	3			
Tennessee.....	49.4	138.7	132.1		7.4	11.3	51.2	117.0	2.1	7.6	1,117.7	14			
Texas.....	650.3	33.3				180.7	23.7	35.5			273.9	3			
Utah.....		9.1				28.5	4.2	7.3			48.0	3			
Vermont.....	12.1	1.8	39.6		78.1	5.0	4.2	17.3		2.4	165.1	13			
Virginia.....	20.8	42.3		4		.5		41.8		1.0	106.4	5			
Washington.....	23.6	41.7			10.0		1	44.9		.5	79.3	3			
West Virginia.....	7.3	41.7				37.0	12.3	115.4		1.1	214.8	7			
Wisconsin.....	17.3	161.1	4.4			332.2		.3		.5	515.8	1			
Wyoming.....						19.2					19.3				
Hawaii.....															
Total.....	2,822.1	420.5	483.4	3,357.9	694.8	104.7	289.1	2,003.6	243.5	536.1	2,270.2	31.6	74.2	13,337.7	210

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES

Alabama.....					1.3	13.4	5.9	18.1	0.8	0.2	46.1	4
Arizona.....						5.9	3.9	3.7			14.2	2
Arkansas.....	0.2					0.6	10.1	29.8		.4	44.4	1
California.....						4.0	40.1	15.5		.6	60.2	2
Colorado.....					1.1	2.0	13.4	16.1		.5	39.9	3
Connecticut.....						.5	6.0	3.7			10.2	
Delaware.....							2.2	5.1			7.3	
Florida.....	1.4				3.9		2.5	15.2		.4	21.4	4
Georgia.....	1.9				28.1		1.5	19.2	.7	1.2	70.0	6
Idaho.....						7.5	4.8	2.2			20.1	3
Illinois.....							16.9	40.7	7.7	1.1	66.4	13
Indiana.....						1.5	29.7	31.9			63.8	1
Iowa.....	8.0					.9	37.2	37.2	4.4	1.7	57.4	10
Kansas.....	7.2					5.6	4.7	19.5	4.2	.6	32.3	4
Kentucky.....	1.4						11.5	14.6		.2	34.2	
Louisiana.....	3.5						14.9	14.9		.2	20.2	1
Maine.....							2.5	4.4		.1	16.4	
Maryland.....							3.6	4.0	.8		3.6	
Massachusetts.....							13.1	24.5	.6	1.0	13.4	1
Michigan.....							9.2	39.6			3	
Minnesota.....	15.0					7.5	9.2	24.6	1.3		110.8	14
Mississippi.....	11.1				2.2		11.4	11.4	1.2	.2	32.0	3
Missouri.....	1.6						11.0	32.5		.9	51.9	5
Montana.....						3.0	5.7	3.6		.2	34.0	4
Nebraska.....						18.7	2.4	27.3	2.9	.2	40.9	2
Nevada.....	4.0					2.7	5.1	2.4			10.2	
New Hampshire.....							1.4	14.5			16.9	
New Jersey.....							4.2	20.0	.7	1	22.9	2
New Mexico.....	.7						1.4	5.0		1.0	39.0	5
New York.....	8.0					9.2	16.6	34.2	.7	.9	60.4	14

TABLE 20.—Mileage of 1934 and 1935 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act and the Hayden-Carwright Act of June 18, 1934, completed, by types of construction, by States, June 30, 1935—Continued

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Graded and drained		Sand-clay		Gravel		Macadam		Low cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Grade-separation structures (mileage shown with bridges)	
	Miles		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Miles	Number	High-way-highway	Number
North Carolina.....	1.3		2.2	12.0	0.7	6.6		4.4	3.1	1.4	24.8	34.2		0.4	91.7	9	
North Dakota.....	6.7		8.4		8.4		0.6	18.7	3.2	1.0	9.4	21.9	20.3	.2	46.6	2	
Ohio.....	9.9		1.6		1.6			11.9	19.8	1.0	29.3	29.3	.5	.8	65.1	1	
Oklahoma.....	4.7		1.2		1.7		.5	8.5	14.1	4.2	39.1	39.1	3.3	.4	31.2	3	1
Oregon.....	.6						.2	3.0	23.0	3.6	2.7	1.1		.8	69.4	4	
Pennsylvania.....								3.2	7.8		8.5				7.4		
Rhode Island.....	1.5		13.4		1.6			6.3	24.8	1.3	14.3			.1	34.5	3	
South Carolina.....	3.5				1.3			8.3	1.1		25.9			.6	36.8	2	
South Dakota.....	3.5				9.4	25.2	3.9	24.1	38.0		14.7		1.6	1.4	128.8	10	
Tennessee.....	25.2				.9			1.5	2.7		14.7			.4	20.2	1	
Texas.....					.4			1.4	1.8		8.0			.2	14.4		
Utah.....								1.4	7.7		4.8			.6	30.5	5	
Vermont.....								1.4	1.4		8.5			.6	40.4	4	1
Virginia.....	1.5		1.5	1.8	3.6	.7	1.0	7.7	6.1		25.6			.6	17.7	1	
Washington.....	1.5				5.8		.7	2.0	8.8		37.1			.1	55.5	2	
West Virginia.....	2.1							8.7	7.2		4.2			.1	22.5		
Wisconsin.....									3.8		2.7				6.5		
Wyoming.....																	
District of Columbia.....																	
Total.....	113.6		12.3	40.2	117.1	75.4	3.8	49.7	128.1	48.5	402.4	836.4	53.4	22.6	1,903.5	158	28

PROJECTS ON SECONDARY OR FEEDER ROADS

Alabama.....	9.4	23.8	22.0	40.6	6.2	8.7	0.8	3.0			0.3			1.4	116.2	3	
Arizona.....	16.5			9.0				39.2						.6	65.3	2	
Arkansas.....				145.0										.9	149.1		
California.....	22.9			17.6	11.8			98.3		18.2				1.6	170.4		
Colorado.....	11.2			220.2										.6	232.0		
Connecticut.....										3.5				.1	3.5		
Delaware.....				49.6						.9					51.5		1

Florida	23.8	7.4	72.0	20.9	34.0	22.1	22.1	4.6	4.2	4.0	88.5	1
Georgia	8.7	7.6	135.3		4.1	4.6	4.6	1.0	4.2	1.0	123.1	2
Idaho	11.8		157.7			28.5	28.5	3.0		3.0	164.1	
Illinois			32.2	1.4		6.7	6.7	23.0		2.8	160.0	12
Indiana			150.2			7.3	7.3	3.1		.1	44.1	
Iowa	219.6		13.0			29.6	29.6	12.6		1.4	413.4	2
Kansas	143.4	61.7	108.2			1.3	1.3	7.4		1.0	237.8	1
Kentucky	114.4		10.7	14.6				3.0		.5	238.2	1
Louisiana	1.1		95.8	1.9				23.5		.6	80.5	1
Maine			13.1	2.1				0.1		.1	98.4	6
Maryland	1.4	3.0	152.8		7.8	3.6	20.2	5.7		.1	59.5	
Massachusetts			138.3			3.7	11.5	18.8		.4	15.2	
Michigan	14.4		61.5	5.2		3.9		18.9		.5	205.7	
Minnesota	151.5		229.9			8		5.2		.3	299.4	
Mississippi	36.7	25.5	237.1			8		.5		1.3	130.2	
Missouri	415.0		129.0			9.0		17.2		2.1	648.8	1
Montana						55.9		1.1		.5	264.2	1
Nebraska	160.2	233.6			.7	24.3		17.2		.5	185.4	1
Nevada								.5		.2	25.7	
New Hampshire												
New Jersey			217.7	5.6				54.8		.4	241.2	
New Mexico	7.5	10.0	53.2	23.9		6.2		19.0		.5	93.0	
New York			238.9		9.5	17.6		1.2		.8	289.9	
North Carolina	77.7	82.0	236.7		11.4			8			322.4	
North Dakota	2.2		175.7	13.6		10.1	5.4	18.3	20.4	.8	311.8	1
Ohio	31.8		43.7	26.9	.4	11.7		36.3	.7	1.5	271.3	1
Oklahoma	11.7			32.6	21.7	44.4	2.4	2.4		1.7	152.5	1
Oregon		3.1		33.1	189.6	308.4	8.5	14.1		.4	554.7	1
Pennsylvania												
Rhode Island	14.5	98.9	328.7	3.6				3		.3	124.4	
South Carolina	68.5		50.6			4.7	38.8	16.9		.2	397.4	
South Dakota	6.3		157.1	119.9	.2	5.1	12.5	132.1	14.5	.6	132.6	
Tennessee	397.5		150.3		4.2	31.7	1.7	1.6	18.8	3.6	850.8	8
Texas	8.9		3.0	26.6		28.2	2.9	2.8		.1	195.4	1
Utah	3.7		86.4		16.5	31.5	3.4	1.0	2.8	.3	39.5	1
Vermont	3.7	56.1	29.7	26.6	5.2	51.5	2.9	1.7		1.0	211.8	
Virginia	8.0	42.3	86.4					1.7		.2	100.7	2
Washington			71.0		30.3	53.0	1.7	.4		.1	42.0	
West Virginia	2.8		135.0	8.1	1.0	13.3		43.2		.4	170.4	1
Wisconsin								6.0		.4	156.8	
Wyoming											10.2	
District of Columbia											4.9	
Hawaii												
Total	2,003.4	494.8	290.8	358.9	343.2	556.2	457.8	283.8	315.8	33.7	9,358.4	44

TABLE 21.—Mileage of 1934 and 1935 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act and the Hayden-Cartwright Act of June 18, 1934, under construction, by types of construction, by States, June 30, 1935

State	Graded and drained	Sand-clay				Gravel		Macadam		Low cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land-cement concrete	Block	Bridges and approaches	Total	Grade-separation structures (mileage shown with bridges)							
		Treated		Treated		Treated		Miles	Miles								Miles	Miles	Miles	Miles	Miles	Miles	Number	Number
		Un-treated	Miles	Un-treated	Miles	Un-treated	Miles																	
Alabama	9.0														124.0	1								
Arizona	14.1	5.9	45.7	8.4	18.9	1.1			18.5		6.1	9.0			42.4	1								
Arkansas				14.6					13.3						90.0	1								
California	2.5			34.2	20.1				1.6		6.0	23.8			61.1	1								
Colorado				44.2					12.9			18.6			44.5									
Connecticut										21.7		1.7			23.4									
Delaware	3.8											3.2			30.2									
Florida	8.5		8.4	13.5	14.4	10.3			15.0		15.1	14.5			105.1	2								
Georgia	2.4			30.6								2.2			67.1	2								
Idaho	43.3											18.8	2.4		67.1	12	1							
Illinois	97.8			4.8								58.6			163.3	7								
Indiana	52.2			12.2								53.0			118.1	1								
Iowa	105.0	1.0							7.9		9.8	9.3	1.0		125.2	2								
Kentucky	12.8			12.4					16.3			5.0			56.7	2								
Louisiana	1.4			1.0	2.6				8.2			14.7			28.9	4								
Maine					2.7							1.7			10.1	1								
Maryland	13.3			3.1								3.1			21.3	1								
Massachusetts												2.2			30.2									
Michigan	48.1			43.1					2		6.9	32.6			135.8	4								
Minnesota	15.9								67.4		13.6	4.7			119.9	2								
Mississippi	67.5		10.9	21.8	24.5						8.9	25.1			160.1	6								
Missouri	17.1			13.6								53.0			84.8	12								
Montana	12.5			20.4					37.9			40.4			71.6	3								
Nebraska	63.1														105.0									
Nevada					75.3				24.4						99.7									
New Hampshire															10.7									
New Jersey	4.6								8.7			15.1			15.2	1								
New Mexico	14.0			20.9								4.4			45.0									
New York	11.7	15.1	46.8	25.7	21.6						13.0	94.9			137.4	4	2							
North Carolina				111.7					34.5			1.0			156.7	2								
North Dakota	73.7								13.1						203.6									

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES¹

Ohio.....	2.2									12.4	32.6	16.4	.4	69.1
Oklahoma.....	43.0									5.2	23.4		2.0	79.9
Oregon.....	8.7									9.5	1.3		.3	55.4
Pennsylvania.....	.3									13.8	61.5		.3	81.1
Rhode Island.....										6.9	3.3			14.3
South Carolina.....	3.2									2.3			.1	55.7
South Dakota.....	81.2									54.4	19.7		1.0	235.4
Tennessee.....	10.0									7.1	23.8		1.0	55.7
Texas.....	86.9									5.1	85.2	.2	1.5	373.0
Utah.....										2.5	8.5		1.5	29.1
Vermont.....										1.2	3.3			17.7
Virginia.....	2.9									8.4	24.4			17.7
Washington.....	3.6									27.6	10.5		2	27.6
West Virginia.....										.1	15.2		1.5	17.2
Wisconsin.....	44.4									6.4	13.4		.1	57.5
Wyoming.....	12.4									15.8			.4	196.8
Hawaii.....										20.1			.2	20.3
Total.....	993.5	34.0	182.2	807.3	230.4	27.4	114.5	459.9	107.7	176.3	821.2	20.0	28.2	4,002.0
														88
Alabama.....	2.1										3.6			26.1
Arizona.....											.3			1
Arkansas.....											5.7		0.1	6
California.....											2.3		1.9	2
Connecticut.....														4
Delaware.....														1
Florida.....											1.8			1
Georgia.....											7		.2	1
Idaho.....											5.6			1
Illinois.....	1.0													1
Indiana.....	3										8.2	1.2	.7	10
Iowa.....	1.6										21.1		2.9	8
Kansas.....	1.4										18.6	1.1	1.4	5
Kentucky.....											9.3	1.0	.5	2
Louisiana.....	8.8										4.7		.2	8.7
Maine.....											8.2		.3	17.6
Maryland.....											1.9		.1	3.0
Massachusetts.....											.4	.1	.4	.9
Michigan.....	1										2.8		1.2	5.8
Minnesota.....	3.0										15.5		.1	17.8
Mississippi.....	10.2										4.9		.1	3
Missouri.....	.4										6.5		.1	26.8
Montana.....											10.0		.3	11.2
Nebraska.....											7.4		.6	6.6
Nevada.....													.6	8.9
New Hampshire.....													.1	3.9
New Jersey.....											4.6		.1	5.1
New York.....														3

¹No projects in this class in this status in Colorado and Hawaii.

TABLE 21.—Mileage of 1934 and 1935 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act and the Hayden-Cartwright Act of June 18, 1934, under construction, by types of construction, by States, June 30, 1935—Continued

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES—Continued

State	Graded and drained Miles	Sand-clay		Gravel		Macadam		Low cost bituminous macadam mix	Bituminous concrete	Portland-cement concrete	Block	Bridges and approaches	Total Miles	Grade-separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Rail-road-high-way	Number
New Mexico.....	4.5									0.5		0.1	2.9	1	6
New York.....	.4	0.7	2.4						3.4	13.3		.4	25.9	3	
North Carolina.....	1.3					2.8			1.7	8.2		.2	16.6	2	
North Dakota.....								11.0					13.3		
Ohio.....						0.2			4.9	4.1	6.6	.3	13.4		
Oklahoma.....	1.7								.3	5.6			8.5		
Oregon.....						.4			3.3	4.6			10.9		
Pennsylvania.....									2.8	2.8			15.1	2	
Rhode Island.....									.6	9.5	1.0		15.1		
South Carolina.....	.2							.8		4.8		.1	15.3	2	
South Dakota.....	3.2							2.3		4.4		.2	10.4	2	
Tennessee.....										3.4			6.8		
Texas.....	2.8								1.5	8.9	1.4	.7	22.4	5	
Utah.....									5.0	3.3			9.4	2	
Vermont.....								.5		2.3			3.3	1	
Virginia.....							3.1		3.3	1.3		.5	9.2	1	
Washington.....						.7			1.3	4.4			7.0	2	
West Virginia.....									.9	4.1			4.2	2	
Wisconsin.....	.5							.6		8.8		.4	13.1	1	1
Wyoming.....								3.0		3.0			3.0	1	
District of Columbia.....										.1		.1	.2		
Total.....	44.2	2.0	16.4	19.7	20.6	.9	22.5	40.8	11.6	234.3	12.2	15.8	508.6	75	15

PROJECTS ON SECONDARY OR FEEDER ROADS²

Alabama.....	9.5	4.5	14.0	21.6	15.0			11.0		0.3		0.4	78.3		
Arizona.....	4.4			13.1				43.6		1.1		.3	63.5	1	
Arkansas.....				86.8						3.0		.6	87.4		
California.....				1.3	12.7			30.9	0.3	9.2		.8	58.6	1	

TABLE 22.—Mileage of 1934 and 1935 Public Works highway projects financed with funds provided by section 204 of the National Industrial Recovery Act and the Hayden-Cartwright Act of June 18, 1934, approved for construction, by types of construction, by States, June 30, 1935

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Graded and drained	Sand-clay		Gravel		Macadam		Low cost bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Grade-separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated						Rail-road-high-way	High-way
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Number	Number
Alabama.....														
Arkansas.....			13.5						1.9				15.6	
California.....	8.3		3.0						4.4				9.8	
Colorado.....			6.5					5.1	2.3				21.3	1
Florida.....	1.7												5.5	
Georgia.....			3.0						1.3				1.7	
Idaho.....			13.5										4.6	
Illinois.....													13.7	
Indiana.....	13.5												4.4	
Iowa.....	3.5								3				21.8	3
Kansas.....	1.2							.1	8.3				4.0	
Kentucky.....	6.5		1.2						.5				11.2	
Louisiana.....									3.5				2	
Maine.....					6.8				.2				6.8	
Maryland.....													1.1	
Michigan.....			2.9						2.0				26.6	
Minnesota.....	7		3.4					3.4	32.2				41.7	
Mississippi.....	3.6		11.5	15.0					4.1				34.6	
Missouri.....	7.8		16.3					.1	16.8				41.0	
Montana.....													.2	
Nebraska.....									.3				.1	
Nevada.....								60.3					60.3	
New Mexico.....			18.6										18.6	
North Carolina.....			3.5						2.2				19.0	
North Dakota.....	21.2		6.9										157.6	
Ohio.....													.8	
Oklahoma.....	6.8												11.2	
South Carolina.....													.2	
South Dakota.....	6.8		10.0					16.1					37.0	
									4.0				.1	

It will be noted that the completed projects included 412 structures separating the grades of railroads and highways at intersections and 38 highway-highway grade-separation structures. In course of construction at the close of the year were 196 other railroad-highway grade-separation structures and 18 structures eliminating level intersections of highways. To these will be added the 24 railroad-highway and 7 highway-highway structures shown in table 22 as approved for construction to make up the total of 695 grade-crossing-eliminating structures included in the Public Works highway program up to the end of the year.

The number of projects of this character included in the program is evidence of the importance attributed to the elimination of accident hazards in preparing the program of work. In addition to the grade crossings eliminated by structures, many more have been avoided by relocation of the highways as part of the improvement to be made; and the ends of safety are also served by the widening of existing surfaces, the easing of curves and grades, the lengthening of sight distances, and other marked betterments that result from the improvements planned and in course of realization.

Other major objectives to which, subject always to the primary employment purpose, special effort has been directed include the closing of the remaining unimproved gaps in the Federal-aid highway system; and the provision of road facilities to aid in the better coordination of transportation, especially roads to local railroad stations and roads that will be capable of taking over the service heretofore rendered by nonpaying railroad branch lines.

Landscaping of a reasonable mileage of roadsides was one of the special objects sought in planning the program and the States were required to use at least 0.5 percent of the 1934 funds and 1 percent of the 1935 funds for this purpose. The total program—completed, under improvement, and planned—has included 582 roadside-improvement projects. These projects involve 1,831 miles that have or are to be improved at an average estimated cost of \$1,654 per mile. The majority of these projects are located on main arteries of travel at the approaches to the more important communities. Experience with this work has been valuable in developing proper methods of treatment and a trained personnel to supervise future work.

CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Special appropriations for the survey, construction, reconstruction, and maintenance of main roads through unappropriated or unreserved public lands, nontaxable Indian lands, and other Federal reservations except national forests have been made by five congressional acts passed up to the end of the fiscal year 1935.

As reported last year, the first two of these appropriations, aggregating \$5,000,000, were made by the Emergency Employment Act of December 20, 1930, and the Emergency Relief and Construction Act of 1932. To this sum the National Industrial Recovery Act added \$5,000,000, the act approved June 19, 1934, \$2,500,000, and the Hayden-Cartwright Act \$2,500,000 for each of the fiscal years 1936 and 1937.

Of the total of \$17,500,000 authorized, \$10,000,000 was apportioned in prior fiscal years, \$2,500,000 was apportioned on July 5, 1934, and \$2,500,000 for the fiscal year 1936 was apportioned on June 4, 1935. Funds for 1937 have not been apportioned. A deduction of \$125,000 for administrative purposes was made from the first \$5,000,000 only. The States benefiting and the amounts of their apportionments are shown in table 23. The same table also shows the progress made toward expenditure of the funds in the several States. The size of the unobligated balance at the end of the fiscal year results from the new apportionment made on June 4.

TABLE 23.—*Status of appropriations for roads through public lands and Federal reservations, June 30, 1935*

State	Total sum apportioned	Sums allotted to projects—				Total allotted	Unobligated balance
		Not yet under construction	Under construction	Completed and finally inspected	Completed and final payment made		
Arizona.....	\$2,174,530	\$183,952.84	\$191,912.10	\$447,992.83	\$987,490.47	\$1,811,348.24	\$363,181.76
California.....	1,380,414	46,043.01	293,363.73	586,362.23	52,956.96	925,768.97	454,645.03
Colorado.....	562,610	-----	231,884.04	176,751.00	435,601.72	461,592.00	101,018.00
Idaho.....	805,790	-----	78,787.70	133,745.89	435,601.72	648,135.31	157,654.69
Montana.....	806,760	-----	137,901.00	-----	530,411.00	668,312.00	138,448.00
Nevada.....	3,254,815	19,209.80	507,216.30	582,700.79	1,554,040.14	2,663,167.03	591,647.97
New Mexico.....	1,202,724	-----	2,645.81	375,034.86	408,663.19	786,343.86	416,380.14
North Dakota.....	152,605	-----	26,941.57	26,237.63	33,606.04	56,785.24	65,819.76
Oklahoma.....	150,475	-----	23,053.96	19,811.02	84,448.02	127,313.00	23,162.00
Oregon.....	1,004,415	-----	189,329.87	-----	640,754.13	830,084.00	174,331.00
South Dakota.....	295,206	-----	133,010.00	-----	65,715.00	198,725.00	96,481.00
Utah.....	1,648,901	35,000.00	244,850.55	110,000.00	969,114.45	1,358,995.00	289,906.00
Washington.....	228,593	-----	52,420.20	-----	134,032.80	186,453.00	42,140.00
Wyoming.....	1,207,162	-----	117,101.00	-----	833,111.53	950,212.53	256,949.47
Total.....	14,875,000	284,205.65	2,230,447.83	1,872,274.02	7,316,307.68	11,703,235.18	3,171,764.82

RESTORATION OF FLOOD-DAMAGED ROADS

No addition has been made during the past year to the appropriations previously made for relief of States on account of damage to roads by floods. The Hayden-Cartwright Act authorized the Secretary of Agriculture to expend for that purpose not to exceed \$10,000,000 of available funds in any emergency that might arise.

Of the various appropriations, those made to Vermont and New Hampshire and reported as expended in the last annual report are still the only ones completely expended. Of the appropriation to Kentucky, nearly \$127,000 was paid during the year, and the unobligated balance was reduced by about \$185,000.

In Missouri all available funds have been assigned to projects, and additional funds have been assigned to projects in Louisiana. There was no change in the status of the appropriations to Arkansas and Mississippi. The appropriations to these four States have no definite time of availability. Of the remaining appropriations, Florida's is unaltered in status since the previous year's report, and the availability of Alabama's unobligated balance of \$1,137,416 lapsed on June 30, 1935. The status of these several appropriations on June 30, 1935, is shown in table 24.

TABLE 24.—*Flood relief appropriated, amounts paid to States, and the unobligated balance of the appropriation on June 30, 1935*

State	Appropriated	Paid to States	Unobligated balance
Vermont.....	\$2,654,000.00	\$2,654,000.00	-----
New Hampshire.....	653,300.00	653,300.00	-----
Kentucky.....	1,889,994.00	1,361,185.71	\$444,415.39
Total.....	5,197,294.00	4,668,485.71	444,415.39
Arkansas.....	1,800,000.00	1,477,693.56	322,306.44
Louisiana.....	967,582.00	786,271.13	115,390.36
Mississippi.....	628,000.00	345,296.57	282,733.43
Missouri.....	258,418.00	119,428.31	-----
Total.....	3,654,000.00	2,728,659.57	720,430.23
Alabama.....	¹ 1,618,500.00	481,083.81	² 1,137,416.19
Georgia.....	¹ 505,167.50	465,228.21	² 20,835.35
South Carolina.....	¹ 801,361.00	799,101.00	-----
Florida.....	80,307.00	77,296.48	-----
Total.....	3,005,335.50	1,822,769.50	1,158,251.54
Grand total.....	11,856,629.50	9,219,914.78	2,323,097.16

¹ Does not include fund allowable for administration.² Availability for obligation expired June 30, 1935.³ Availability for obligation expired June 30, 1934.

The mileage of road improved under the flood-relief acts up to the end of the fiscal year and the corresponding total cost and Federal payment are given in table 25. Similar information for roads completed and paid for during the past year is presented in table 26, and for roads under construction and approved for construction in table 27.

TABLE 25.—Total cost, flood relief, and mileage improved to June 30, 1935

State	Total cost	Flood relief	Miles	
			Initial	Total
Vermont.....	\$5,651,965.83	\$2,654,000.00	61.2	61.2
New Hampshire.....	1,408,479.45	653,300.00	29.1	29.1
Kentucky.....	3,155,028.01	1,295,097.04	222.2	222.2
Total.....	10,215,473.29	4,602,337.04	312.5	312.5
Arkansas.....	843,914.04	405,711.21	49.8	49.8
Mississippi.....	11,433.59	3,563.66	.3	.3
Total.....	855,347.63	409,274.87	50.1	50.1
Alabama.....	319,797.49	155,615.15	41.7	41.7
Georgia.....	414,095.59	199,950.06	5.1	5.1
South Carolina.....	1,737,926.92	801,361.00	22.3	22.3
Total.....	2,471,820.00	1,156,926.21	69.1	69.1
Grand total.....	13,542,640.92	6,168,598.12	431.7	431.7

TABLE 26.—Total cost, flood relief, and mileage of roads which were completed and paid for during the fiscal year 1935

State	Total cost	Flood relief	Miles		
			Initial	Stage	Total
Kentucky.....	\$203,260.45	\$81,613.09	12.9	14.8	27.7
Georgia.....	18,653.74	8,873.83	.4	-----	.4
South Carolina.....	345,492.21	163,939.02	3.9	-----	3.9
Total.....	364,145.95	172,812.85	4.3	-----	4.3
Grand total.....	567,406.40	254,425.94	17.2	14.8	32.0

TABLE 27.—Total cost, flood relief, and mileage of roads finally inspected, under construction and approved for construction on June 30, 1935

State	Total cost	Flood relief	Miles		
			Initial	Stage	Total
Kentucky.....	\$367,728.80	\$159,281.57	25.3	6.2	31.5
Louisiana.....	131,841.02	65,920.51	10.5	-----	10.5
Missouri.....	291,568.03	130,865.95	3.0	6.3	9.3
Total.....	423,409.05	196,786.46	13.5	6.3	19.8
Georgia.....	70,249.18	31,178.18	.8	-----	.8
South Carolina.....	68,092.45	29,800.00	.2	-----	.2
Total.....	138,341.63	60,978.18	1.0	-----	1.0
Grand total.....	929,479.48	417,046.21	39.8	12.5	52.3

The mileage of the several surface types represented in flood-relief roads completed and fully paid for during the fiscal year 1935 is given in table 28, and the total mileages completed, and under construction or approved for construction at the close of the fiscal year are given in tables 29 and 30, respectively.

TABLE 28.—Mileage of various types of flood-relief roads completed and paid for during the fiscal year 1935

State	Graded and drained	Sand-clay untreated	Gravel untreated	Bridges and approaches	Total		
					Initial	Stage	Total
Kentucky.....	4.0	-----	23.6	0.1	12.9	14.8	27.7
Georgia.....	-----	0.4	-----	-----	.4	-----	.4
South Carolina.....	2.9	.3	-----	.7	3.9	-----	3.9
Total.....	2.9	.7	-----	.7	4.3	-----	4.3
Grand total.....	6.9	.7	23.6	.8	17.2	14.8	32.0

TABLE 29.—Mileage of the various types of flood-relief roads improved to June 30, 1935

State	Graded and drained	Sand-clay untreated	Gravel, untreated	Gravel, surface treated	Macadam, surface treated	Bituminous macadam	Portland-cement concrete	Bridges and approaches	Total
Vermont.....	-----	-----	7.0	9.2	-----	6.1	32.5	6.4	61.2
New Hampshire.....	-----	-----	-----	2.9	4.9	2.3	18.4	.6	29.1
Kentucky.....	207.0	-----	13.6	-----	-----	-----	-----	1.6	222.2
Total.....	207.0	-----	20.6	12.1	4.9	8.4	50.9	8.6	312.5
Arkansas.....	16.1	-----	31.1	-----	-----	-----	.3	2.3	49.8
Mississippi.....	-----	-----	-----	-----	-----	-----	.3	-----	.3
Total.....	16.1	-----	31.1	-----	-----	-----	.6	2.3	50.1
Alabama.....	17.4	15.9	7.6	-----	-----	-----	-----	.8	41.7
Georgia.....	-----	.4	-----	-----	3.3	-----	.6	.8	5.1
South Carolina.....	12.9	.3	-----	-----	-----	-----	5.3	3.8	22.3
Total.....	30.3	16.6	7.6	-----	3.3	-----	5.9	5.4	69.1
Grand total.....	253.4	16.6	59.3	12.1	8.2	8.4	57.4	16.3	431.7

TABLE 30.—Mileage of the various types of flood-relief roads finally inspected, under construction and approved for construction on June 30, 1935

State	Graded and drained	Untreated gravel	Treated macadam	Portland-cement concrete	Bridges and approaches	Total		
						Initial	Stage	Total
Kentucky.....	25.1	6.2	-----	-----	0.2	25.3	6.2	31.5
Louisiana.....	-----	10.5	-----	-----	-----	10.5	-----	10.5
Missouri.....	-----	6.6	-----	2.4	.3	3.0	6.3	9.3
Total.....	-----	17.1	-----	2.4	.3	13.5	6.3	19.8
Georgia.....	-----	-----	0.3	.4	.1	.8	-----	.8
South Carolina.....	.1	-----	-----	-----	.1	.2	-----	.2
Total.....	.1	-----	.3	.4	.2	1.0	-----	1.0
Grand total.....	25.2	23.3	.3	2.8	.7	39.8	12.5	52.3

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, became even more important in the fall and winter of 1934 when the effect of the drought on the rural population reached its peak. In the worst stricken areas road work was carried on by an arrangement under which the Public Works Administration granted amounts necessary to pay costs of materials and equipment, limited to not more than 30 percent of the total expenditure, and the Federal Emergency Relief Administration supplied from its relief rolls and paid the necessary workers.

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

Work of this sort has been carried on in 10 States on 8,727 miles of road. The number of projects in each State, the estimated cost and amount payable from Public Works funds, and the mileage of road involved are given in table 31.

TABLE 31.—*Number and estimated cost and mileage of National recovery work-relief projects undertaken to June 30, 1935, and Public Works funds involved*

State	Projects	Estimated total cost	Public Works funds	Mileage
	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Miles</i>
Colorado.....	3	600,000.00	180,000.00	173.5
Florida.....	1	1,000,000.00	300,000.00	(1)
Kansas.....	18	2,100,000.00	630,000.00	611.8
Minnesota.....	39	3,221,200.11	786,937.44	566.6
New Mexico.....	6	970,000.00	291,000.00	309.9
North Dakota.....	42	3,457,742.65	900,000.00	1,421.2
Oklahoma.....	6	1,900,000.00	570,000.00	442.7
South Dakota.....	55	4,036,055.45	990,000.00	1,873.7
Texas.....	64	8,180,437.20	2,454,131.07	1,170.8
Wisconsin.....	44	4,448,020.47	883,418.44	2,156.6
Total.....	278	29,913,455.88	7,985,486.95	8,726.8

¹ Repairs to roads and bridges damaged by floods.

LOAN-AND-GRANT HIGHWAY PROJECTS

Under the provisions of section 203 of the National Industrial Recovery Act, the Public Works Administration continued the policy adopted in the preceding year of financing or aiding, by loans or grants or both, in the financing of the construction of roads in a number of States. The road-building activity thus provided for was additional to all other projects initiated under the grants specifically authorized for highway construction by sections 204 and 205 of the act.

The detailed administration of this work was transferred to the Bureau of Public Roads by the Public Works Administration in 1934, and by the end of the fiscal year 1935 allotments amounting to over \$33,000,000 were under supervision. The status of the work is given in table 32.

BUREAU OF PUBLIC ROADS

TABLE 32.—Status on June 30, 1935, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit

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		Miles	Estimated total cost	Grant	Loan	Other
	Grant	Loan					
Alabama.....	\$72,200.00		6.4	\$62,882.00	\$18,471.58	\$14,410.42	
California.....	1,510,300.00	\$52,500.00	14.0	4,462,635.11	1,239,716.80		\$3,222,918.31
Connecticut.....	1,087,744.73		68.7	6,440,485.62	1,042,403.95		3,538,081.67
Illinois.....	2,386,700.00		90.1	7,499,137.80	2,226,778.05		5,272,359.75
Indiana.....	204,300.00		34.5	752,308.36	196,792.94		555,515.42
Iowa.....	336,109.73		715.0	805,446.52	235,703.24		569,743.28
Kansas ¹	1,523,803.36	3,592,000.00	361.6	4,132,152.23	1,227,802.40	2,581,278.12	323,071.71
Louisiana.....	5,122,353.96	353,700.00	47.4	301,609.66	460,482.89		132,038.12
Maryland.....	5,411,866.00	4,000,000.00	105.1	5,121,662.71	1,411,040.39	3,378,551.20	3,306,073.25
Massachusetts.....	1,608,987.99		29.0	5,484,222.19	1,578,142.94		29,818.00
Michigan.....	10,000.00	2,000,000.00	463.9	2,428,806.51	707,288.95	1,490,628.03	221,888.63
Minnesota.....	2,981,022.04	400,000.00	55.0	331,375.88	96,412.75	231,963.13	
Mississippi.....	531,000.00		49.6	2,188,717.45	608,897.08		1,579,820.37
Missouri.....	1,026,000.00	1,250,000.00	697.4	1,984,510.06	482,503.36	1,225,376.49	276,625.21
Montana.....	1,829,000.00		59.5	40,120.22	11,500.00		28,620.22
Nebraska.....	11,500.00		30.9	1,550,572.65	440,550.94	483,018.83	622,002.88
New York ³	1,490,700.00	2,170,933.10	11.8	237,026.20	69,800.47		167,225.73
Ohio ⁴	87,902.77	85,102.77	28.0	63,888.00	19,166.40	44,721.60	1,654,521.57
South Carolina.....	98,000.00	69,000.00	213.9	3,044,736.92	896,924.15	493,291.20	4,101,242.46
Texas ⁵	2,036,393.31	1,218,600.00	813.5	5,636,881.20	1,535,638.74		3,274,671.73
Washington ⁶	2,340,994.13		312.9	6,649,173.77	1,374,502.04		49,289.03
West Virginia.....	2,000,000.00		119.5	398,554.65	116,889.65	232,375.97	
Wisconsin.....	454,800.00	306,250.00					
Total.....	33,148,174.66	20,167,774.56	4,399.9	55,886,723.71	15,640,414.71	10,630,775.66	29,585,553.34

¹ Grant to be increased \$550.
² Grant to be reduced \$474,000.
³ Loan and grant to be reduced \$1,642,083.
⁴ Grant to be increased \$2,800.
⁵ Loan to be canceled, \$325,000.
⁶ Grant to be increased \$200,100.

NATIONAL FOREST ROAD CONSTRUCTION

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 of Public Roads 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 of Public Roads 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.

Work conducted during the past year has been done partly with funds remaining at the beginning of the year from the allocations made during the preceding year by the Public Works Administration, of \$15,000,000 for forest highways, and \$10,000,000 for forest development roads. These allocations were made under authority of the National Industrial Recovery Act. In December 1934 the forest highway funds were reduced by withdrawal of \$400,000 to be used for other road purposes. At the beginning of the year additional funds became available through the Hayden-Cartwright Act, which authorized an appropriation of \$24,000,000 for the various classes of road work in federally controlled areas. Of this amount, the allotment for forest highways was \$7,000,000 and that for forest development roads \$3,000,000. Similar amounts have been made available under the Hayden-Cartwright Act for the fiscal year 1936.

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, 1935, of 17,363 miles, classified as shown in table 33.

TABLE 33.—Classification of the mileage of the forest highway system as revised to June 30, 1935

State	Mileage of forest highway system			
	Class 1	Class 2	Class 3	Total
Western:				
Alaska.....			484.9	484.9
Arizona.....	327.8	245.0	495.9	1,068.7
California.....	584.0	1,344.5	531.5	2,460.0
Colorado.....	511.0	1,166.0	76.0	1,753.0
Idaho.....	722.2	176.6	184.5	1,083.3
Montana.....	628.3	335.8	240.0	1,204.1
Nevada.....	104.8	206.1	148.3	459.2
New Mexico.....	164.0	518.0	-----	682.0
Oregon.....	720.8	324.5	318.6	1,363.9
South Dakota.....	227.0	-----	86.0	313.0
Utah.....	96.6	536.3	110.2	743.1
Washington.....	386.5	135.4	247.9	769.8
Wyoming.....	387.3	37.0	217.7	642.0
Total.....	4,860.3	5,025.2	3,141.5	13,027.0

TABLE 33.—Classification of the mileage of the forest highway system as revised to June 30, 1935—Continued

State	Mileage of forest highway system			
	Class 1	Class 2	Class 3	Total
Eastern:				
Alabama.....	4.0		31.0	35.0
Arkansas.....	192.3	144.3	90.5	427.1
Florida.....	39.7	135.0	36.3	211.0
Georgia.....	41.8	37.5	68.7	148.0
Illinois.....			24.0	24.0
Kentucky.....	41.0	58.0	13.0	112.0
Louisiana.....	48.3	118.7	38.0	205.0
Maine.....			11.0	11.0
Michigan.....	49.9	108.5	150.3	308.7
Minnesota.....	89.5	89.1	133.1	311.7
Mississippi.....	32.0	13.0	78.0	123.0
Missouri.....			5.0	5.0
Nebraska.....			28.8	28.8
New Hampshire.....	41.5	60.5	49.0	151.0
North Carolina.....	102.0	105.3	48.3	255.6
Oklahoma.....	31.5		70.5	102.0
Pennsylvania.....	134.0	250.9	39.0	423.9
Puerto Rico.....			21.0	21.0
South Carolina.....		26.0	11.0	37.0
Tennessee.....	83.8	105.0	79.0	267.8
Texas.....			21.0	21.0
Vermont.....	7.0		12.0	19.0
Virginia.....	79.0	127.9	210.0	416.9
West Virginia.....	137.0	182.0	62.0	381.0
Wisconsin.....	5.0	148.9	136.1	290.0
Total.....	1,169.3	1,710.6	1,466.6	4,336.5
Grand total.....	6,019.6	6,735.8	4,608.1	17,363.5

During the past year improvements were completed on 1,232 miles of the forest highway system, bringing the total mileage improved to date with Federal funds to 6,231 miles. Of the mileage improved during the year, 1,150 miles were in the Western States and Alaska, and the remaining 82 miles were in the forests of 16 Eastern States. Of the total mileage improved to date, 5,706 miles are in the West, and 525 miles are in the East.

The mileage of forest highway projects completed during the year and to date by States is shown in table 34.

TABLE 34.—Mileage of completed forest-highway projects, by States

State	Mileage of forest-highway projects completed		State	Mileage of forest-highway projects completed	
	During 1935	Total to June 30, 1935		During 1935	Total to June 30, 1935
Western:			Eastern—Continued.		
Alaska.....	25.1	248.1	Florida.....	5.0	61.6
Arizona.....	119.2	526.5	Georgia.....		21.4
California.....	142.9	757.9	Illinois.....	1.5	1.5
Colorado.....	117.0	496.6	Michigan.....	20.5	38.9
Idaho.....	103.2	640.3	Minnesota.....	5.0	108.8
Montana.....	110.4	571.1	Nebraska.....	8.7	8.7
Nevada.....	34.2	152.9	New Hampshire.....		13.2
New Mexico.....	104.9	298.1	North Carolina.....	3.2	49.6
Oregon.....	171.8	970.1	Oklahoma.....	15.4	15.4
South Dakota.....	14.6	61.2	Pennsylvania.....	3.0	6.0
Utah.....	48.0	329.7	South Carolina.....		15.6
Washington.....	45.8	307.7	Tennessee.....		37.4
Wyoming.....	112.9	346.3	Virginia.....	5.2	21.0
Total.....	1,150.0	5,706.5	West Virginia.....	2.6	6.2
Eastern:			Total.....	82.2	524.7
Alabama.....		5.1	Grand total.....	1,232.2	6,231.2
Arkansas.....	12.1	114.3			

On June 30, 1935, work was in progress under the supervision of the Bureau of Public Roads on 738 miles of road at a total estimated cost of \$7,274,505. Work estimated to cost \$5,768,608 had been planned but not yet started; and there was a balance of authorized funds not yet obligated to definite projects amounting to \$2,786,021.

ROAD CONSTRUCTION IN NATIONAL PARKS

During the fiscal year 1935 construction was completed on a total of 99 miles of roads in national parks, making a total of 930 miles thus far improved. Under an agreement of several years' standing construction of these roads is supervised by the Bureau of Public Roads.

The mileage constructed during the fiscal year and to date in the several parks is shown in table 35.

TABLE 35.—*Mileage of national-park roads improved under the supervision of the Bureau of Public Roads*

National park or monument	Completed during fiscal year 1935	Total completed to June 30, 1935	National park or monument	Completed during fiscal year 1935	Total completed to June 30, 1935
	<i>Miles</i>	<i>Miles</i>		<i>Miles</i>	<i>Miles</i>
Acadia.....	0.6	8.4	Morristown.....	1.7	1.7
Bryce Canyon.....	5.7	21.9	Mount Rainier.....	1.8	63.1
Carlsbad Caverns.....	8.4	8.4	National Capital Parks.....	1.1	1.8
Colonial National Monument.....	9.4	20.4	Petersburg.....	3.5	3.5
Crater Lake.....	4.2	45.8	Petrified Forest.....	0	26.3
Devil's Tower National Monument.....	0	3	Rocky Mountain.....	4.2	43.1
General Grant.....	0	6.4	Scotts Bluff.....	0	.6
Glacier.....	1.3	55.7	Sequoia.....	3.4	42.7
Grand Canyon.....	3.3	154.4	Shenandoah.....	0	40.1
Great Smoky Mountains.....	0	4.0	Wind Cave.....	.6	15.9
Hawaii.....	10.7	35.6	Yellowstone.....	22.5	178.6
Lassen Volcanic.....	4.9	35.3	Yosemite.....	11.6	76.7
Mesa Verde.....	0	20.4	Zion.....	0	18.9
			Total.....	98.9	930.0

Bureau activities continued in all parks and monuments during the year. Nearly all of the newly acquired military parks, battlefields, and cemeteries have at least one project under construction, and some of the larger areas have considerable road construction under way.

In the Western States the Red Lodge-Cooke City National Park approach road to Yellowstone National Park and the Cameron-Desert View approach road to Grand Canyon National Park are practically completed. Both of these projects will be finished during the present construction season.

Carlsbad Caverns National Park road improvements show completed mileage for the first time. A project 8.4 miles in length was completed in that park during the past year.

The road program in Shenandoah National Park is progressing rapidly. Three sections of road aggregating approximately 30 miles between Front Royal and Panorama are at present under construction. The section between Panorama and Swift Run Gap was surfaced during the fiscal year and is being visited by tourists from many Eastern States.

On one section of the Shenandoah-Great Smoky Mountains Parkway, connecting Shenandoah National Park in Virginia with the Great Smoky Mountains National Park in North Carolina and Tennessee, construction is ready to begin, and plans and surveys have been completed for several other sections. The parkway will be about 450 miles long, 210 miles in Virginia and 240 miles in North Carolina. When completed, this road will extend along the crest of the Blue Ridge Mountains and will be a beautiful scenic drive.

The Green Mountain Parkway in Vermont and the Natchez Trace in Tennessee and Mississippi are two other large eastern projects that were being surveyed at the end of the year.

On June 30, 1935, over \$16,000,000 of road work had been placed under contract from funds provided by the National Industrial Recovery Act. Of this amount, approximately \$9,500,000 is involved in work under construction in the West and \$6,500,000 in the East. In addition to this amount, about \$2,300,000 of work has been begun under the Hayden-Cartwright Act, of which approximately \$1,800,000 represents work in the West and \$500,000 work in the East.

INTER-AMERICAN HIGHWAY

A report on the proposed Inter-American highway was made by the Bureau in November 1934 and has been published as Senate Document No. 224. This report covers a reconnaissance survey of the proposed route through Panama and the republics of Central America, and includes detailed discussion of the engineering and economic considerations presented by this project. It is illustrated with photographs and numerous plan and profile maps.

In March 1935 the Bureau reopened the office at Panama City, Republic of Panama, that it had maintained with the cooperation of the Central Road Board of Panama during the reconnaissance-survey operations, and assigned to it a senior highway engineer and a senior economist. In May a field party began location surveys in the western portion of Panama, to fix the exact route that the highway will follow between Concepcion and the Costa Rican border. Construction of this section will complete the highway in Panama.

A representative of the Bureau visited the seven countries through which the highway will pass—Panama, Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala, and Mexico—during the latter half of the fiscal year, and interviewed high government officials regarding their plans for developing the highway, particularly with reference to their cooperation with the United States Government in construction activities, for which the Congress in 1934 appropriated \$1,000,000.

TRANSPORTATION, ECONOMIC, AND STATISTICAL INVESTIGATIONS

NEW JERSEY TRAFFIC SURVEY

A survey of traffic upon the entire State highway system of New Jersey and a limited mileage of county routes was completed and a report made to the State highway department. A digest of the report has been published in Public Roads. The report contains a traffic classification of all State highways and recommendations for pavement and right-of-way widths for the entire State system.

It was shown that each mile of the State highway system is used, on an average, by 4,659 vehicles a day, a fact which places the New Jersey system among the most intensely used highway systems in the country. A heavy traffic was found entering the State at Hudson River and Delaware River crossings, and 16.3 percent of this traffic was found to pass through New Jersey. In a special study of motor-truck traffic it was discovered that owner-operated trucks constituted 79 percent of truck traffic, contract-hauler trucks 17.7 percent, common-carrier trucks 2.2 percent, and Government-operated trucks 1.1 percent. Sixty-six out of each 100 trucks had both their origin and destination within the State. Seventy-two percent of owner-operated trucks were engaged in intrastate traffic, as compared with but 37 percent of contract haulers and 32 percent of common-carrier trucks. Manufactured products were carried by 56 percent of the loaded trucks, agricultural products by 20 percent, and 11 percent were engaged in retail delivery. Trucks up to 1½ tons capacity constituted 55.5 percent of the total number; those of capacities of from 1½ to 5 tons, 23.3 percent; and those of 5 tons capacity and over, 21.2 percent.

FLORIDA TRAFFIC SURVEY

A report of a survey of traffic upon the State highway system of Florida was submitted to the State road department and published by that department. A digest of the report was published by the Bureau. The report contained data for use in planning future highway improvements in the State and much information in regard to the amount and character of two of the most important highway movements—the tourist traffic and the movement of citrus fruits. Tourist expenditures in Florida were estimated to be approximately 90 million dollars

annually, one-third spent by those stopping in hotels and another third spent by home owners. Expenditures per party per day were found to vary from an average of \$8.81 per day for those stopping at hotels to the \$2.63 per day for camping parties. It was estimated that the fuel tax paid by tourists to the State of Florida amounts to about \$2,600,000 a year.

Fifteen percent of the 215,600 outgoing trucks crossing the Florida State line during the year carried citrus fruits. About 88 percent of the total interstate truck shipments of citrus fruit were shown to be destined to Georgia, South Carolina, Alabama, North Carolina, Tennessee, the District of Columbia, and Virginia. Georgia and South Carolina accounted for more than half the total.

CONNECTICUT TRAFFIC SURVEY

Field work on a survey of traffic in Connecticut terminated in October 1934, and the report is practically completed. As a special phase of this survey, the speed at which nearly 90,000 vehicles were traveling was determined by stop watch at 78 points on the rural highways. The average observed passenger-car speed slightly exceeded 40 miles per hour, while trucks averaged a little below 35 miles per hour. The effect of weather, road types, and other variables will be analyzed in a separate report.

ARKANSAS TRAFFIC SURVEY

Field work on a survey of traffic in Arkansas was completed in June 1935 and preparation of a report begun. This survey, conducted in cooperation with the State Highway Commission of Arkansas, will provide data on the usage of the entire State highway system and serve as a basis in planning future improvement.

TRAFFIC CAPACITY AND INTERSECTION STUDIES

Studies of the speed of vehicles in relation to traffic density and highway capacity have been initiated. Field observations conducted during the summer on a number of important highways of various types in the vicinity of Boston, Mass., provided detailed records of individual-vehicle speeds over a wide range of traffic volume. From these records effort will be made to determine the traffic capacity of highways, the effect of slow vehicles upon such capacity, and the range of speed under given circumstances of traffic density.

Studies of the effect of control methods on traffic delay at intersections have been continued during the year.

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, particularly with regard to presenting and explaining the five acts of the Uniform Vehicle Code to legislative bodies and civic groups in various States. The progress being made in the adoption of this uniform legislation, which is one of the most important elements in the Nation-wide campaign to promote highway safety, is evidenced in table 36, showing the status of adoption to date of substantial parts of the code. The nine States and the District of Columbia in which legislation has been enacted in 1934 and 1935 are indicated by figures in parentheses.

TABLE 36.—States with motor-vehicle laws containing substantial parts of the Uniform Vehicle Code, as of June 30, 1935

Act 1, uniform motor-vehicle administration, registration, certificate of title, and antitheft act ¹	Act 2, uniform motor-vehicle operators' and chauffeurs' license act	Act 3, uniform motor-vehicle civil-liability act	Act 4, uniform motor-vehicle safety-responsibility act	Act 5, uniform act regulating traffic on highways ²
Arizona California Colorado Delaware District of Columbia Florida Georgia Idaho Indiana Louisiana Maryland Michigan Missouri Montana Nevada New Mexico North Carolina North Dakota Oklahoma Oregon Pennsylvania South Dakota Utah Virginia West Virginia Wisconsin	Arizona California ³ Colorado Connecticut ³ Delaware ³ District of Columbia ³ Idaho (1935) ³ Indiana Kansas Kentucky (1934) Maine Maryland ³ Massachusetts ³ Michigan Minnesota Montana (1935) Nebraska Nevada New Hampshire ³ New Jersey ³ New York ³ North Carolina (1935) ³ North Dakota (1935) Oregon ³ Pennsylvania ³ Rhode Island ³ South Carolina Utah ³ Virginia ³ Vermont ³ Washington ³ West Virginia ³ Wisconsin	California Colorado Connecticut Delaware Idaho Illinois Indiana Iowa Kansas Massachusetts Michigan Minnesota Montana Nebraska New York Nevada North Dakota Ohio Oregon Pennsylvania Rhode Island South Dakota Texas Vermont Washington Wyoming	Arizona (1935) California Colorado (1935) Connecticut Delaware District of Columbia (1935) Indiana Iowa Maine Maryland Michigan Minnesota Nebraska New Hampshire New Jersey New York North Carolina North Dakota Ohio (1935) Oregon (1935) Pennsylvania Rhode Island South Dakota Vermont Virginia Wisconsin	Arizona California Colorado Delaware Idaho Louisiana Maine Michigan Minnesota Nebraska New Hampshire New Jersey New Mexico North Carolina North Dakota Oregon Pennsylvania South Dakota Utah Virginia Washington Wisconsin

¹ All States have some form of registration laws. The States listed in this column have laws conforming more closely to the provisions of act 1 of the code than do the other States.

² All States have some form of rules of the road and equipment requirement laws. The States listed in this column have laws conforming more closely to the provisions of act 5 of the code than do the other States.

³ Has full standard licensing system, including examination of new drivers, suspension and revocation of licenses for cause, and a strong centralized administration. Other States listed have licensing laws, but for various reasons are not considered standard.

STUDIES OF TAXATION

Reports on State finances, with special reference to highways, were completed for New Hampshire and Minnesota. Similar studies in New York, Colorado, Wyoming, and New Mexico, are nearing completion. These investigations are part of a series designed to establish the relation of highway taxes paid from different sources and by different groups of citizens to highway expenditures, and to lay down a broad basis for the adjustment of highway taxes on a rational plan.

MOTOR-VEHICLE TAXATION IN 1932

Practically complete data on motor-vehicle taxation were made available for the first time in the report, *Taxation of Motor Vehicles in 1932*, published in October 1934. The detailed public charges borne by motor-vehicle owners are itemized in this report as to taxing jurisdictions, types of vehicles, and classes of taxes and fees. Total fees and taxes in 1932 are shown to have been \$1,001,150,000, of which approximately \$92,000,000 were accounted for by Federal manufacturers' excise taxes, \$839,000,000 by State fees and taxes, and the remainder by public bridge and ferry tolls, county and municipal fees and taxes, and personal-property taxes.

RAILROAD LINE ABANDONMENT STUDIES

The arrangement made with the Interstate Commerce Commission and the American Railway Association, whereby the Bureau undertook to make studies of branch lines and sections of railroad that it was proposed to abandon, with a view to ascertaining the effect of such action on highway traffic in the immediate vicinity, was continued through the year. Thirty-six cases were studied, involving 1,042 miles that it was proposed to abandon, distributed among the States as shown in table 37.

TABLE 37.—*Sections of railroads that it was proposed to abandon inspected during fiscal year*

State	Projects	Railroad	Highways inspected	State	Projects	Railroad	Highways inspected
	Number	Miles	Miles		Number	Miles	Miles
Alabama.....	1	7. 10	41	New York.....	2	54. 50	121
Arkansas.....	1	26. 40	54	North Dakota.....	1	11. 10	15
Georgia.....	1	56. 66	111	Pennsylvania.....	2	22. 80	32
Indiana.....	2	69. 69	104	South Carolina.....	1	76. 50	125
Iowa.....	4	126. 60	219	South Dakota.....	3	65. 44	122
Kansas.....	2	59. 73	72	Tennessee.....	3	71. 63	182
Maine.....	1	36. 00	86	Vermont.....	1	19. 34	20
Maryland.....	1	25. 63	54	West Virginia.....	1	19. 97	30
Michigan.....	2	123. 73	174	Wisconsin.....	1	8. 91	27
Minnesota.....	1	17. 50	57	Wyoming.....	1	44. 73	87
Mississippi.....	2	41. 59	134	Total.....	36	1,041. 93	1,955
New Jersey.....	1	8. 36	25				
New Mexico.....	1	48. 02	63				

This work was done to determine which secondary or other roads should be built to serve communities now served by these railroads.

MAINTENANCE COST STUDIES

Agreements were made in April 1935 with the State highway departments of Connecticut, New Hampshire, and Rhode Island to study highway-maintenance costs in relation to traffic volume. Field work was begun shortly thereafter by counting traffic on selected road sections that afford an adequate sample of all types of construction. Careful records will be kept of maintenance expenditures on these road sections.

PAVEMENT LIFE STUDIES

A study of the actual service life of various types of highway and street pavement was begun in cooperation with the Iowa Engineering Experiment Station of Iowa State College. Records of State, county, and municipal highway departments are being studied to determine the age of pavements, including those in use and those that have been replaced, and to develop mortality curves for use in highway planning. Data have been collected on the highways of Wayne County, Mich.; the State trunk-line system of Michigan, the State roads of Massachusetts, Vermont, New Hampshire, Connecticut, and Rhode Island; and the street systems of Des Moines, Iowa, and Buffalo, N. Y.

TRAFFIC SAFETY SURVEYS

In Rhode Island and South Carolina cooperative traffic-safety surveys were conducted during the year as white-collar relief projects. Volume and type of traffic, speed of vehicles, and obedience of drivers to traffic-control devices were recorded in the field, and the data were subsequently analyzed in detail. A report on the Rhode Island survey has been made to State authorities and that on the South Carolina survey is in preparation.

At the request of the Federal Emergency Relief Administration, the Bureau detailed a traffic engineer to advise with the local directors in preparing reports on traffic-safety surveys in the cities of Chattanooga, Knoxville, Memphis, and Nashville, Tenn. Field work on these surveys, begun under the Civil Works Administration, had been completed, but assistance was needed in the analysis and interpretation of the data. The completed reports include an analysis of accident data, traffic volume, the obedience to traffic-control devices and regulations, and recommendations for the improvement of street traffic conditions.

HIGHWAY MANAGEMENT AND PRODUCTION COST STUDIES

PRODUCTION ON RELIEF PROJECTS

During the past year requirements in the administration of the enlarged emergency highway program, especially those pertaining to the employment of labor, have necessitated new studies to determine more definitely the amount of labor provided by a given expenditure and how this varies with such factors as type of construction, methods of operation, region in which the work is located, and the season when performed. Such information is essential to the proper planning of road work for employment relief and prerequisite to formulating adequate means and methods for a material reduction of the present rather large seasonal fluctuations in highway employment.

These studies already have produced much definite data as to the practical value of highway work as a relief measure. For example, the expenditure for drought-relief road work in the 18 southwestern counties of Kansas to January 1, 1935, amounted to \$1,458,906. As a return for this expenditure the drought-stricken farmers were provided not only with employment sufficient to give a measure of support to themselves, their families, and their livestock, but their work had been utilized so effectively that their communities had been provided with substantial road improvements involving 409 miles of grading and 209 miles of surfacing with gravel and selected materials. The grading required the movement of 5,061,584 cubic yards of earth, and the surfacing involved the placing of 229,979 cubic yards of gravel and other selected materials.

The expenditures for this work were distributed as follows:	Percent
Labor.....	54.8
Teams.....	18.3
Trucks.....	6.0
Supervision.....	3.7
Materials.....	9.4
Engineering.....	7.8
Total.....	100.0

Both teams and trucks were hired almost entirely from the local farmers. Foremen and much of the help employed by the resident engineers and most of the materials were obtained locally. Consequently, a large part of every dollar expended served to provide immediate and direct local relief.

EMPLOYMENT IN ROAD CONSTRUCTION

Studies have been continued of those types of highway construction in which mechanical equipment plays an important part to determine more definitely the returns that accrue to labor. On such work the expenditure for direct employment on the job may be as low as 14 to 20 percent of the daily cost. All available data, however, indicate that, in spite of this relatively small use of labor directly on the job, the proportion of the total expenditures that eventually reaches workers through more or less indirect channels is very large, seldom less than about 85 percent of the total cost of the improvement.

Studies have shown quite clearly that, on the average high-type road construction job, a large proportion of the primary expenditures for materials, transportation, equipment and supplies eventually accrues to labor. Materials require labor and equipment for their production and transportation. Supplies are used up and require labor and equipment for their production. Equipment wears out and requires labor for its repair and renewal. The benefits to labor and business by the construction of high-type road improvements are therefore not localized but widely diffused. These benefits are not confined simply to the immediate employees directly on the job but extend to such diverse industries, as rock quarries and sand pits, cement mills, asphalt and oil works, railroads, trucking and other transportation agencies, steel and lumber mills, powder works, coal and ore mines, and to all agencies that produce, transport, store, or deal in the many products required directly and indirectly in highway construction. A report resulting from these studies is being published.

Considerable time has been devoted to obtaining adequate records of the amount of employment provided by the current State and Federal highway-construction program. A monthly record is compiled of the number of persons employed in each State on work involving either State or Federal funds. Comparisons of the number of names on pay rolls with the size of the average working force indicate that the number of pay-roll names exceeds by 30 percent the

average number of individuals working throughout the pay-roll period. The percentage varies with the type of work. Weather, seasons of the year, efficiency of the job management, and industrial conditions appear to have an appreciable influence on the rate at which laborers change employment.

ESTIMATING STANDARDS

In estimating the cost of highway construction there is often considerable difference between the engineer's estimate and the bid of the low bidder. The estimates of the various bidders frequently cover a wide range. Highway engineers have need for more accurate methods of estimating costs as a basis for highway programs, and contractor's profits depend on the accuracy of their estimates.

Efforts have been made during the past year to develop standard forms, definitions, and subdivision of items that will permit the engineer and the contractor to prepare their estimates on a common basis. These proposed standards are now being tried on a number of jobs. Indications are that these standards, if generally adopted, will bring about a decided improvement in methods of estimating.

INDEX FIGURES

A study of highway-construction costs during the past 10 years for the country as a whole reveals wide variations in unit costs of labor and materials and a general downward cost trend. However, the reduced costs of the components have not been reflected directly in the cost per mile of highways constructed. More intense highway usage and public demand have brought about higher standards of construction, such as wider roadways, better alinement, reductions of grades, and general roadside beautification. This has tended to bring the cost per mile of highway construction to a more uniform level. Tables are in preparation which will show both cost and usage variations in terms of index numbers for the years 1927 to 1934.

UNIT COST AND PRODUCTION STUDIES

Administrative work in connection with the emergency highway program has made it necessary to curtail the usual unit cost and production studies during the past 2 years. Some phases of former studies have been completed and published. A limited amount of work is under way largely in connection with the development of improved standards for preparing cost estimates and determining the number of man-hours and equipment-hours involved in the numerous items of highway construction. More precise knowledge of the amount of human labor required in each road-building and maintenance operation and the extent to which the labor element varies with different methods and different kinds of equipment is an urgent need.

HIGHWAY ACCOUNTING METHODS

Efforts to further the development and installation of efficient accounting procedures by highway-building agencies have been continued. The Bureau has a direct interest in such procedures because of its cooperation with the States in road construction and also its service in supplying general information on highway income and expenditure and costs of construction and maintenance by types. Efficient statistical and accounting control is necessary for administrative reasons and also to provide the engineering organization with the proper means for determining costs and properly comparing the relative merits of new and old procedures, methods of operation, and types of organization. For accumulations of experience and data to be of the greatest possible value it is necessary that statistical methods, terms, and nomenclature be uniform so that the accomplishments of one State can be compared fairly with those of any other. As yet, such comparisons can be made only between a few States. The aim of the Bureau is to provide a system of accounts and records that will be economical in operation, will meet all of the accounting requirements of a State highway department, and provide quickly and in practical form complete statistical information on any desired activity in which the department is engaged, fully comparable with similar activities in any other State. Cooperative work of this type was continued during the year.

PHYSICAL RESEARCH

SUBSURFACE EXPLORATION

Subsurface exploration is a new line of research in which instruments and field technic for the location and identification of subsurface formations of rock and other materials of importance in highway work are being developed. This work was mentioned briefly in the last annual report. During the past year the two types of equipment being investigated, the resistivity apparatus and the seismic apparatus, have been given extensive field tests in Maryland, Virginia, and in the District of Columbia. Subsurface explorations have been made in connection with work of the Navy Department, the National Park Service, the Bureau of Mines, the bridge department of the District of Columbia, and the Bureau of Public Roads. In several places where subsequent excavation, test pits, or core borings permitted a comparison between the prediction made and the actual depth to rock the agreement was close. A description of the apparatus and its use has been published by the Bureau in Public Roads.

INVESTIGATION OF CONCRETE-PAVEMENT DESIGN

A major investigation relating to concrete-pavement design and information about the structural action of concrete pavements, is nearing completion. The investigation has been divided into four principal parts: (1) A study of the effects of temperature and of moisture on the structural action of concrete pavements; (2) the development of basic information on the design of slab cross sections; (3) a comparative study of the structural action of a number of typical joint designs under the action of applied loads; and (4) an experimental study of the Westergaard method of analysis of stresses in pavement slabs.

Most of the field work has been completed, and reports have been drawn up describing the project and giving the final results of the first two parts. Similar reports covering the last two parts are in preparation. These reports will provide reliable information on the structural action of concrete pavements and should aid in securing more economical pavement design.

MOTOR-VEHICLE IMPACT INVESTIGATIONS

The study of the elastic properties of concrete under static and impact forces is the present active research in the general field of motor-vehicle impact. In order to use the information previously developed by the Bureau about motor-vehicle impact, a study is being made of the effect on pavements of impact forces as compared with statically applied forces. The development of test apparatus for these studies has been a difficult problem, but it is thought that the instrumental difficulties have been overcome. Testing already completed indicates that the present equipment is satisfactory.

MEASUREMENT OF ROAD SURFACE ROUGHNESS

The use of a roughness indicator mounted on a standardized, single-wheel vehicle has already been reported. Damping the free period of oscillation of such a vehicle was found necessary. It is believed that satisfactory spring damping has been obtained with specially designed hydraulic damping devices. The complete surface-roughness measuring apparatus is being tested on roads of various degrees of roughness and under as wide a range of temperature as possible in order to determine its limitations.

HIGHWAY BRIDGE INVESTIGATIONS

The tests to determine the friction developed in the sliding expansion bearings in highway bridges, mentioned in last year's report as practically completed, have been finished. Certain additional tests suggested by the results of the original investigation have also been made. The complete results of the entire investigation are included in a nearly completed report.

INVESTIGATION OF CORRUGATED METAL CULVERTS

The investigation of corrugated metal culverts is primarily a study of an erosion test for bituminous-coated corrugated-metal culvert pipe. This erosion test has been developed in Connecticut, and is proposed by that State as a criterion for the acceptance of metal culvert pipe coated internally with asphalt. The Bureau study includes the test and specification as proposed and also the

effect of some of the variables involved. A testing machine has been built and arrangements made with three other agencies for a series of check tests to determine how closely various laboratories can be expected to check each other in making the present test.

THE STUDY OF FLEXIBLE TYPES OF HIGHWAY SURFACES

The Bureau has begun a systematic attack on another important problem. A study is being made of the manner in which flexible types of road surfacing act in supporting traffic loads. New information is sought with which to rationalize methods of determining the thickness of flexible pavements. This problem is complex, but its importance warrants thorough and painstaking study.

NONBITUMINOUS ROAD MATERIALS

The investigation of the effect of chemical composition of portland cement on the durability of concrete, started last year, is being continued. A number of cements of widely varying composition, in combination with sands of good and poor quality, are being subjected to an accelerated weathering test. The effect of varying the proportion of cement to sand as well as the effect of the length of the initial curing period prior to the weathering test are being studied. Although the investigation is incomplete, certain indications as to the comparative importance of the variables are: (1) That variations in the quantity of cement used, as controlled by variations in the water-cement ratio, are of greatest importance so far as durability is concerned; (2) that the effect of quality of sand is more pronounced in lean mixtures than in rich mixtures; and (3) that variations in the chemical composition of the cement are of minor importance as compared with the other two variables.

During the year considerable attention was given to the development of a suitable test for quality of coarse aggregates. Additional work on the Los Angeles abrasion test, referred to in the report of last year, has been reported. In this paper the results of tests on samples representing a large number of sources of crushed stone, gravel, and slag are given in conjunction with the service records of these materials in bituminous road construction. The satisfactory agreement between results in the Los Angeles test and service behavior indicates that this test meets the need that has existed for a more determinative test for the quality of aggregates.

A preliminary study of the results of tests to determine the effect of vibrating concrete placed in pavement slabs shows approximately the same results as were obtained in the tests reported in 1933. A detailed study is being made of the large volume of data.

During the past year concrete pavements were investigated in Alabama, Georgia, Mississippi, South Carolina, and Tennessee. Pavements built prior to 1930 were inspected for evidence of disintegration, and a record was made of the amount and degree of the disintegration found. Information was obtained as to the materials used in construction and the construction practices followed. These data are being analyzed in an effort to discover the causes of disintegration. The study of the many factors to be considered has not been completed, and no final conclusions have been drawn.

Work has been begun on a series of laboratory tests to determine the effect of "de-airing" on the quality of vitrified paving brick. De-airing is an improvement in manufacturing technique recently introduced. The process involves subjecting the clay to a high vacuum to remove air and thus increase the density of the brick.

The project is being carried on in cooperation with the National Paving Brick Manufacturers Association, and a parallel series of tests sponsored by the association is under way in the laboratory of the Ohio Engineering Experiment Station. Direct comparisons will be made between the quality of the de-aired brick now being manufactured in plants located in Pennsylvania, Ohio, Indiana, and Illinois, and the quality of brick from the same plants manufactured by the old process. Samples of light-burned, medium-burned, and hard-burned brick manufactured by each process are being subjected to several tests, including the standard rattler, compression, and flexure tests. Other special tests are designed to reveal improvements in quality effected by the new process.

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 laboratory examination of bituminous materials and aggregates, field studies

of problems in bituminous construction, and a continuation of the cooperative work with State highway departments and the asphalt industry in connection with the standardization of specifications and test methods for liquid asphaltic road materials.

Laboratory studies of the properties of asphalt cements, tars, emulsions, and other liquid asphaltic materials are in progress, seeking to provide new information about their physical and chemical properties, to determine the value of the commonly specified tests as indicators of probable service behavior, and to determine those properties that are indicative of quality in order that the requirements necessary for given conditions may be specified without reference to the source of the material or its method of manufacture. The materials studied are representative of the present production fields and of the products manufactured.

Progress reports on the work done on tars, emulsions, and liquid asphaltic materials are in preparation. The study of asphaltic cements begun recently was prompted by the growing tendency to include in specifications requirements of questionable value in the control of quality, which tend to restrict unduly the field of supply.

Variations in refinery practice, resulting from unbalanced demand for certain petroleum products, have resulted in the production of bituminous materials that show variation in service behavior that cannot be predicted from the results of present tests. It has become extremely important to devise tests or combinations of tests that will definitely indicate quality and probable service behavior.

Laboratory studies are being continued on bituminous mixtures of the hot and cold types to determine the factors governing service behavior. The study of the hot mixtures is a continuation of former work to develop suitable tests and test methods. The study includes cooperative work with the California Department of Public Works on mixtures of known behavior.

Mixtures of the low-cost type in which liquid bituminous materials are used are being tested on the small circular tracks, mentioned in previous reports. The tests are expected to yield information on resistance to weathering and the effect of such factors as the amount of moisture, the kind, quantity, and viscosity of bitumen, and the type and grading of aggregates. Reports on the completed phases of these studies are in preparation.

Studies of two experimental roads in cooperation with State highway departments were continued during the year but were discontinued at its close. These projects are in South Carolina and Nebraska. In South Carolina bituminous surfaces of several types constructed on sand-clay and marl bases were studied. In Nebraska poorly graded sand, known as "blow sand", combined with medium- and slow-curing asphaltic materials in the road-mix type of construction was investigated. The sand used in this project is typical of that found in a large area containing no other aggregate suitable for bituminous construction. Final reports on these two projects are being prepared.

Field studies of a number of low-cost types of bituminous construction were made during the year to obtain information on particular types of construction. Such studies included the penetration macadam built extensively in Pennsylvania during the last few years, the open-type, plant, and road-mix construction built extensively in Alabama on chert and other bases, and in Oklahoma on relatively thin bases constructed on soils of low capillarity.

Work in cooperation with the State highway departments and the asphalt industry to standardize specifications for liquid asphaltic road materials has been continued. During the past year regional meetings were held to discuss the results obtained with the tentative standard specifications previously proposed and to consider necessary modifications. This work will be continued.

SUBGRADE INVESTIGATIONS

Increasing interest in the use of information about subgrade soils has been shown by various State highway departments, and a number of them have established soil-testing laboratories. The Bureau has prepared a series of check samples that are sent to these laboratories on request for the purpose of standardizing the testing procedure. Procedures for the more commonly used tests have been prepared. These procedures have been adopted by the American Association of State Highway Officials and are being considered by the American Society for Testing Materials. Studies of routine test methods to ascertain the causes of discrepancies in test results obtained by different operators and the effect of test variables, such as temperature, humidity, etc., have been continued.

Tests of samples of caliche from bases of roads of good and poor service quality led to the publication of a report containing limiting test values for satisfactory varieties of this material. A similar report on limerocks has been prepared.

All investigations concerning soil stabilization have been combined under one project. A series of tests to determine the effect of physical and chemical admixtures on soils of the various subgrade groups is under way. These tests reveal the moisture content at which maximum compaction may be obtained and the densities that may be expected under various conditions of compaction and moisture. Tests on compacted samples are designed to show the resulting stability through measurement of percolation, expansion in the presence of water, and degree of softening when wetted. This series of tests will lead to the selection of mixtures to be investigated with use of a laboratory circular track. Promising developments from these tests will be investigated in the field.

When plastic soils are used in earth embankment construction, the best results are obtained only when moisture control and adequate compaction are provided. Certain soils are unsuitable for fill construction under any circumstances. Tentative specifications for the selection of embankment materials have been prepared and will be checked in practice. Continued investigation of the efficiency of different types of compacting equipment should furnish valuable information.

The low-cost-road field studies have included inspections and the tests of a number of samples from roads in service and correlation of test results and service behavior has resulted in a clearer understanding of the requirements for the improved soil road. A report, published in *Public Roads*, discussed the development and possibilities of this type of highway.

The large mileage of stabilized roads throughout the country emphasizes the necessity for suitable field apparatus for use in the selection of material and the control of the mixture. Considerable work has already been done on the drainage indicator for determining the percolation rate and capillary rise of soils. An extrusion test in conjunction with the drainage indicator gives promise of supplying valuable facts about the stability of graded mixtures. Further work on the sedimentation method for rapid mechanical analysis has led to the design of apparatus using a comparison microscope for determining grain sizes.

A cooperative investigation by the Bureau, the Missouri State Highway Commission, and the Missouri Agricultural Experiment Station was inaugurated in February 1935. Study is being made of the little-developed but highly important subject of surface chemistry of soils and base exchange in soil materials. It is indicated that a fuller understanding of the surface phenomena of soils will provide means for greatly altering the behavior of a given material. Progress is being made on the practical problem of utilizing wind-blown sand in highway construction. The use of soap as an electrolyzer in coating soil with bituminous material is a practical application resulting from a study of surface phenomena.

Three reports on specific projects, not previously mentioned, have been prepared for publication. They are: (1) A report on the microchemical method of analysis for the identification of chemicals that may be present in soils and ground waters and seem to be associated with concrete disintegration and warping; (2) a report on the analysis of data collected on the hydraulic fill at Four Mile Run on the Mount Vernon Memorial Highway, containing a comparison of computed and measured settlements; (3) a progress report on the Virginia demonstration road, discussing the effect of subgrade conditions, type of aggregate, reinforcement, crack-control methods, method of curing, and other variables as revealed by the condition surveys.

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.



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