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# REPORT OF THE CHIEF OF THE BUREAU OF PUBLIC ROADS, 1938

UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF PUBLIC ROADS,  
*Washington, D. C., September 15, 1938.*

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, 1938.

Sincerely yours,

THOMAS H. MACDONALD, *Chief.*

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## INTRODUCTION

Highway construction of all types administered by the Bureau during the year resulted in the improvement of 15,345 miles, the elimination of 711 grade crossings, reconstruction of 144 obsolete grade-crossing structures, and protection of 744 highway-railroad crossings by signs and signals. Both the amount of work done per mile of improvement, and the total mileage improved, have considerably exceeded the average rates over the past 10 years.

This year marks the initiation of Federal aid for secondary or farm-to-market roads and grants of funds for highway-railroad grade-crossing elimination as parts of the regular Federal highway program. These classes of work were begun in the emergency program to relieve unemployment and were included in the regular program by the act of June 16, 1936, which authorized \$25,000,000 for secondary roads, to be matched by the States, and a grant of \$50,000,000 to pay the full cost of constructing grade-crossing eliminations.

The greater part of the work administered by the Bureau was carried on in cooperation with and under the immediate supervision of the State highway departments. In this way, improvements were completed on 9,333 miles of the rural portion of the Federal-aid highway system, 2,037 miles of secondary or feeder roads, and 760 miles of roads and streets in municipalities. Improvements in Federally controlled areas, reconstruction of flooded-damaged roads, and construction of roads with funds allotted by other Federal agencies aggregated 3,215 miles.

### **MODERNIZATION OF FEDERAL-AID SYSTEM NOW MOST IMPORTANT FEATURE OF FEDERAL-AID PROGRAM**

The system of main highways in the United States is by far the most extensive of any in the world. Only the most out-of-the-way places cannot now be reached over a surfaced road. Many miles of main highways are broad, direct routes over which vehicles can travel continuously at the touring speed selected by the driver without the need for slowing down because of sharp curves, steep grades, or other obstacles and there is frequent opportunity to pass overtaken vehicles. However, there is a large mileage of roads that cannot be traveled with such facility and ease; roads on which the driver must accommodate himself to conditions that are definitely inferior to present-day standards.

This is a condition that has been unavoidable and that is being corrected as rapidly as the necessary funds can be obtained. When the States and the Federal Government began the improvement of highways the network connecting our cities was largely unimproved. These roads had been planned for horse-drawn vehicles and the pioneer automobilists made few long trips over them. That such a large part of the network of main highways can now be traveled with ease and comfort is due to the intelligent, long-time distribution of annually limited funds over a selected system. A degree of improvement was effected, which, though generally recognized as less than that which would ultimately be necessary, was still sufficient to serve the immediate need. As the need for further improvement of various sections has become evident it has been met as promptly and as fully as was consistent with the early completion of a desirable minimum improvement of the system as a whole. This policy, sometimes called stage construction, is the only one under which the Federal-aid system and the more extensive State systems could have been improved in a short space of time to a general condition which permits their present use by a traffic of 150 billion vehicle-miles annually.

There are few sections of the Nation's network of main highways that have not been initially, if inadequately, improved. State and Federal appropriations, in large part, are now being devoted to supplementary improvements on the less adequate sections.

Many of our most used and important roads are among those that must now be classed as very inadequately improved. These are the roads that were first recognized as of outstanding importance and as such were first improved with surfaces of the highest type designed according to the standards of early road builders. There was general acceptance of these standards as sufficiently advanced—in fact, there was much opposition on the grounds that they were too advanced. The great increase in highway use and the recent marked increase in vehicle speed have forced the adoption of much higher standards.

### **GREATEST NEEDS ON MAIN ROADS ARE WIDENING, LONGER SIGHT DISTANCES, AND REDUCTION OF CURVATURE**

Eliminating those curves that have become traffic hazards at the now normal driving speed and increasing sight distances by road straightening and by grading at the tops of hills are widespread needs on the existing main highways. These defects are found generally on roads in every part of the country and their danger to traffic is the consequence of an increase in vehicle speed far beyond what was visioned 15 or 20 years ago and far in excess of the legal limitations that existed in most States.

Greater surfaced width of road is of equal importance. There has always been the pressure to stretch highway funds beyond their limit to improve as many miles as possible. Surfaced width has been sacrificed for surfaced length. First 12- and 14-foot road surfaces were built, then widths were increased to 16 feet, and later to 18 feet, and for some years 20 feet has been the standard width for two-lane roads. The Federal Highway Act of 1921 demanded no greater width than 18 feet. Many of the older roads have been widened to this standard, generally as a part of a resurfacing operation. Here the wisdom of the stage-construction policy has been conspicuously demonstrated. The initial surfacing has caused a flow of traffic on the road with a corresponding flow of motor revenues for highways that is being used, in considerable part to remedy inadequate conditions. While many roads have been widened there is still much of this work to be done. The cost per mile of such work is not great unless it is accompanied by other improvements.

Within the last few years there has been a pronounced and desirable trend toward surfacing two-lane highways to widths greater than 20 feet to accommodate the greater volume of traffic moving at higher speeds. While many new surfaces are now being constructed 22 feet wide, a surfaced width of 24 feet will soon come to be generally recognized as a desirable standard for important two-lane highways.

Heavy expense for road widening only is not incurred until the traffic volume is so great that it cannot be accommodated safely by two traffic lanes. Provision of a third lane is sometimes resorted to and while this expedient involves only a moderate expense, it is not a satisfactory solution of traffic-congestion problems.

For great volumes of traffic, such as flow on the main highways adjacent to large cities and between some of the larger cities that are close together, the multiple-lane highway is the only satisfactory solution. Experience with the first four-lane roads quickly resulted in the almost unanimous conclusion that traffic flowing in opposite directions must be separated by a dividing strip of some sort if a heavy accident toll is to be avoided.

Divided four-lane roads are relatively expensive. They are necessary where population is dense and right-of-way costs are therefore high. The central strip or grass plot dividing the highway adds further to the cost. In the future, provision for pedestrians and other services must be made along these highways and will add still further to the cost.

While the cost of properly designed four-lane roads is high, the needed expenditures in this direction do not overshadow those needed for the other purposes that have been described. Highway-planning surveys being conducted in cooperation with 46 States are resulting in an accurate picture of the flow of traffic on the main highways. These data indicate that there is not a very large mileage of highways on which four or more traffic lanes are required for the reasonable accommodation of present traffic from the standpoint of total vehicles moving. There now exists more than 3,400 miles of such width, but on the greater portion of this mileage there is no provision for the physical separation of traffic moving in opposite directions. The normal increase of traffic will add to the need for four-lane highways and a considerable portion of the existing undivided four-lane highways must be further improved so as to accomplish a separation of opposing traffic lanes. It is evident, therefore, that the provision of facilities of this general class is lagging very far behind actual needs.

### CONSTRUCTION OF SECONDARY OR FARM-TO-MARKET ROADS

Since the Federal Government first undertook the construction of secondary or farm-to-market roads in the emergency program initiated in 1933, there has been completed under Bureau supervision more than 31,000 miles of such road. This is considerably in excess of the Federal-aid roads constructed in the first 7 years of operation of the Federal-aid plan.

Employment of labor was the immediate objective of the emergency program and to this end projects for improvement were selected without delay. The selection was not a particularly difficult problem with so many much-used secondary roads demanding improvement but more careful selection of these highways is necessary if they are to give the greatest service. Improvement of secondary roads as part of the regular Federal-aid program, begun in the past year, has supplied the opportunity to undertake the planning of a connected system and methods of financing a continuing program.

The highway-planning surveys, described on page 64, have as one of their most important objectives the supplying of all data needed in designating those secondary roads to be improved immediately and in annual programs to follow with definite provision for meeting all necessary costs.

The rural highway program of the future should be directed along two principal lines: (1) The maintenance and needed enlargement of the serviceability of the main highways, and (2) the extension of reasonable improvement to those secondary and feeder roads that directly contribute to the permanent use of rural lands. There is a close relation between these classes of roads both in usage and in the sources from which funds are drawn for their support. Expenditures made for one class will necessarily affect the amounts that can be made available for the other class. It is therefore of the greatest importance that the relative needs of each class be determined with all possible accuracy and that improvement of each class be planned with full consideration of these facts. Any other course must inevitably lead to unbalanced programs and economic loss resulting from inadequate highway service. The highway-planning surveys are producing the needed facts and the Bureau is cooperating with the States in developing highway programs, giving full attention to the designation of secondary road systems.

### HIGHWAY SAFETY

The safety of highway users is a first responsibility with all who plan and build the highways. Defects in the existing system are fully recognized and the speed with which they will be corrected depends primarily on the rate at which funds can be made available for the purpose. The program of highway modernization, including road straightening and widening, increasing sight distances, grade-crossing elimination, and construction of service roads and sidewalks should go forward with all possible speed. At the same time it must be realized that accomplishment of all these things will not constitute a solution of the accident problem. The present condition of the main highways is not conducive to accidents except when rendered so by risk-taking drivers. The data available on the causes of accidents indicate that improper acts by vehicle drivers are the element common to most accidents. The number of accidents and deaths can be materially lessened only by centering the attack on driving habits and a proper selection of drivers. Education and persuasion are being widely used and are well worth while but many of the most dangerous drivers will respond only to more positive measures.

A careful and detailed study of all available data on highway accidents has been made by the Bureau with the aid of experts in traffic control and law enforcement. There resulted a number of findings some of which are immediately useful in accident prevention and others point the way in further studies. Despite the availability of the vehicle code recommended by the National Conference on Street and Highway Safety there is still great lack of uniformity in essential features of State motor-vehicle and highway laws. There is undesirable variation in methods of recording and analyzing accident data. Accidents do not ordinarily result from single causes but from combinations of contributing causes. There is a relatively small group of definitely accident-prone drivers who experience a relatively large number of accidents. Drivers of 16 to 25 years in age have more than their share of accidents. Disciplining and control of delinquent drivers are in many instances, strikingly deficient. Highway police organizations are usually so small and so occupied with other duties as to be unable to operate effectively in motor-vehicle law enforcement and accident prevention. There are many improperly adjusted or inadequately maintained motor vehicles.

Improvement of the present situation will require concerted action by the numerous agencies concerned with traffic control and law enforcement. Immediate action should be taken toward the adoption by the States of the uniform motor-vehicle code recommended by the National Conference on Street and Highway Safety. There is urgent need for uniformity in speed laws, stopping and turning regulations, and other phases of traffic control. All States should provide for rigid examination of applicants for drivers' licenses. Motor vehicles should be inspected at regular intervals to insure that those poorly equipped and defective are kept off the road.

Expanded patrol forces are required for the enforcement of traffic laws; and violators, when arrested and convicted, must be punished without fear or favor. Mandatory revocation of the driving license should follow the more serious violations and the repetition of violation. Other steps to be taken include the skilled investigation of traffic accidents, the establishment of a uniform system of compulsory accident reporting, a national program of safety education, and a

highway-improvement program designed to eliminate as rapidly as possible all recognized dangerous conditions.

### FEASIBILITY OF SUPERHIGHWAYS TO BE STUDIED AND REPORTED

There has been wide public interest in the creation of a system of multiple-lane highways, built according to the highest standards of grade and alignment, with opposing traffic separated by a center parkway, bypassing all cities, with structures separating streams of traffic at all highway and rail crossings, and with access from side roads permitted only at carefully selected points. The large volumes of traffic that flow between densely populated areas, when not too widely separated, in many instances appear to justify the high cost of such improvement.

The Bureau is now making studies that should indicate rather definitely the need for such highways and the extent to which they may be expected to be self-supporting. The Federal-aid Highway Act of 1938 directs the Bureau to investigate the feasibility of building and the cost of superhighways, not exceeding three in number, running in a general direction from the eastern to the western portion of the United States, and not exceeding three in number, running in a general direction from the northern to the southern portion of the United States, including the feasibility of a toll system on such roads. A report is to be made to Congress not later than February 1, 1939.

The highway-planning surveys conducted by the Bureau in cooperation with 46 States are yielding data on the flow of traffic on the main highways of the Nation and the extent to which this traffic is a through movement and might be concentrated on special-service highways. The problem is one of determining the number of highway users that might be expected where tolls are charged and whether the expected revenue would support the cost of the highways.

### SOURCES OF FUNDS USED DURING THE FISCAL YEAR

In contrast with the preceding year when emergency highway and grade-crossing appropriations supplied the larger part of the funds available, the fiscal year 1938 marked an almost complete return to work supported by annual Federal-aid authorizations. The apportionment for the fiscal year was \$125,000,000 for improvement of the Federal-aid system, \$25,000,000 for secondary or farm-to-market roads, and \$50,000,000 for elimination of hazards at highway-railroad grade crossings. The States were required to match the first two of these funds but the grade-crossing funds were available to pay the full construction cost. The apportionment by States was shown in the last annual report.

The year began with \$293,739,309 available for programmed projects that had not been advanced to the contract stage. Of this amount \$33,189,957 was the remainder of the emergency funds provided to furnish employment through highway improvement.

On December 31, 1937, the \$200,000,000 authorized for the fiscal year 1939 was apportioned to the States after first deducting \$5,000,000 for administrative expenses of the Bureau as authorized by law. The apportionment is shown in table 1.

TABLE 1.—Apportionments of Federal aid for the fiscal year 1939 for roads on the Federal-aid highway system, for secondary or feeder roads, and for grade-crossing eliminations

| State            | Federal-aid system | Secondary or feeder | Grade crossings | Total       |
|------------------|--------------------|---------------------|-----------------|-------------|
| Alabama.....     | \$2,600,165        | \$520,033           | \$986,449       | \$4,106,647 |
| Arizona.....     | 1,785,984          | 357,197             | 315,619         | 2,458,800   |
| Arkansas.....    | 2,132,790          | 426,558             | 865,366         | 3,424,714   |
| California.....  | 4,735,268          | 947,054             | 1,825,553       | 7,507,875   |
| Colorado.....    | 2,271,785          | 454,357             | 632,565         | 3,358,707   |
| Connecticut..... | 785,963            | 157,193             | 417,706         | 1,360,862   |
| Delaware.....    | 609,375            | 121,875             | 243,750         | 975,000     |
| Florida.....     | 1,669,497          | 333,899             | 692,981         | 2,696,377   |
| Georgia.....     | 3,154,850          | 630,970             | 1,194,288       | 4,980,108   |
| Idaho.....       | 1,538,178          | 307,636             | 404,755         | 2,250,569   |
| Illinois.....    | 5,095,276          | 1,019,055           | 2,579,163       | 8,693,494   |
| Indiana.....     | 3,063,178          | 612,636             | 1,270,383       | 4,946,197   |
| Iowa.....        | 3,200,927          | 640,185             | 1,362,859       | 5,203,971   |
| Kansas.....      | 3,283,179          | 656,636             | 1,271,424       | 5,211,239   |
| Kentucky.....    | 2,299,072          | 459,814             | 894,871         | 3,653,757   |

TABLE 1.—*Apportionments of Federal aid for the fiscal year 1939 for roads on the Federal-aid highway system, for secondary or feeder roads, and for grade-crossing eliminations—Continued*

| State                     | Federal-aid system | Secondary or feeder | Grade crossings | Total       |
|---------------------------|--------------------|---------------------|-----------------|-------------|
| Louisiana.....            | \$1,791,188        | \$358,238           | \$777,845       | \$2,927,271 |
| Maine.....                | 1,089,359          | 217,872             | 338,735         | 1,645,966   |
| Maryland.....             | 1,018,447          | 203,689             | 506,840         | 1,728,976   |
| Massachusetts.....        | 1,725,964          | 345,193             | 1,021,971       | 3,093,128   |
| Michigan.....             | 3,784,165          | 756,833             | 1,620,378       | 6,161,376   |
| Minnesota.....            | 3,402,720          | 680,544             | 1,313,891       | 5,397,155   |
| Mississippi.....          | 2,196,926          | 439,385             | 777,444         | 3,413,755   |
| Missouri.....             | 3,774,930          | 754,986             | 1,496,333       | 6,026,249   |
| Montana.....              | 2,553,444          | 510,689             | 653,267         | 3,717,400   |
| Nebraska.....             | 2,579,115          | 515,823             | 871,434         | 3,966,372   |
| Nevada.....               | 1,590,172          | 318,034             | 243,750         | 2,151,956   |
| New Hampshire.....        | 609,375            | 121,875             | 243,750         | 975,000     |
| New Jersey.....           | 1,662,041          | 332,408             | 972,568         | 2,967,017   |
| New Mexico.....           | 1,993,177          | 398,635             | 419,200         | 2,811,012   |
| New York.....             | 6,105,009          | 1,221,002           | 3,345,530       | 10,671,541  |
| North Carolina.....       | 2,919,413          | 583,883             | 1,242,912       | 4,746,208   |
| North Dakota.....         | 1,939,847          | 387,969             | 776,153         | 3,103,969   |
| Ohio.....                 | 4,517,858          | 903,572             | 2,087,464       | 7,508,894   |
| Oklahoma.....             | 2,928,955          | 585,791             | 1,125,334       | 4,640,080   |
| Oregon.....               | 2,048,413          | 409,683             | 565,844         | 3,023,940   |
| Pennsylvania.....         | 5,291,737          | 1,058,347           | 2,826,864       | 9,176,948   |
| Rhode Island.....         | 609,375            | 121,875             | 243,750         | 975,000     |
| South Carolina.....       | 1,671,209          | 334,242             | 736,174         | 2,741,625   |
| South Dakota.....         | 2,029,328          | 405,866             | 674,361         | 3,109,555   |
| Tennessee.....            | 2,616,339          | 523,268             | 933,280         | 4,072,887   |
| Texas.....                | 7,787,739          | 1,557,548           | 2,674,043       | 12,019,330  |
| Utah.....                 | 1,410,802          | 282,160             | 321,103         | 2,014,065   |
| Vermont.....              | 609,375            | 121,875             | 243,750         | 975,000     |
| Virginia.....             | 2,299,875          | 453,975             | 935,084         | 3,638,934   |
| Washington.....           | 1,956,342          | 391,268             | 750,582         | 3,098,192   |
| West Virginia.....        | 1,357,927          | 271,585             | 652,386         | 2,281,898   |
| Wisconsin.....            | 3,030,337          | 606,067             | 1,220,638       | 4,857,042   |
| Wyoming.....              | 1,559,860          | 311,972             | 331,769         | 2,203,601   |
| District of Columbia..... | .....              | .....               | 243,750         | 243,750     |
| Hawaii.....               | 609,375            | 121,875             | 243,750         | 975,000     |
| Puerto Rico.....          | 609,375            | 121,875             | 360,341         | 1,091,591   |
| Total.....                | 121,875,000        | 24,375,000          | 48,750,000      | 195,000,000 |

## EMPLOYMENT ON ROAD WORK

Employment on highway work with Federal funds administered by the Bureau declined from 1,792,760 man-months in the fiscal year 1937 to 1,262,202 man-months in the past year. This was a direct result of the near exhaustion of the various special funds appropriated in previous years to provide employment. Employment provided by the emergency funds apportioned to all States dropped from 1,009,323 man-months in 1937 to 273,696 man-months in 1938. This was partly offset by an increase in the employment on regular Federal-aid highway and grade-crossing work which amounted to 538,579 man-months in 1937 and 778,488 man-months in 1938. Table 2 shows the employment in each of the fiscal years 1932 through 1938 by months. Table 3 shows the employment furnished in 1938 on each class of work administered by the Bureau and on State work done without Federal assistance.

TABLE 2.—Comparison of employment during the fiscal years 1932-38 on all Federal and Federal-aid highway construction and on all Federal and State road work, including State maintenance, by months

| Month                   | Men employed on all Federal and Federal-aid highway construction |           |           |           |           |           | Total men employed on all Federal and State highway construction and maintenance |           |           |           |           |           |           |           |
|-------------------------|--|-----------|-----------|-----------|-----------|-----------|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                         | 1932   | 1933      | 1934      | 1935      | 1936      | 1937      | 1938   | 1932      | 1933      | 1934      | 1935      | 1936      | 1937      | 1938      |
|                         | July.....  | 164,708   | 81,042    | 129,205   | 335,223   | 191,041   | 249,271  | 159,489   | 385,349   | 305,372   | 332,277   | 549,203   | 375,442   | 435,971   |
| August.....             | 151,418  | 89,346    | 111,211   | 297,224   | 178,796   | 247,841   | 163,331  | 389,949   | 333,403   | 329,813   | 531,034   | 352,846   | 433,533   | 331,853   |
| September.....          | 116,100  | 122,193   | 115,047   | 247,880   | 143,455   | 227,916   | 152,784  | 356,617   | 374,405   | 337,973   | 498,151   | 340,073   | 414,137   | 346,444   |
| October.....            | 88,869   | 124,106   | 154,016   | 210,079   | 135,680   | 206,113   | 143,617  | 330,104   | 373,246   | 384,029   | 450,322   | 323,374   | 389,966   | 330,942   |
| November.....           | 62,466   | 129,933   | 185,860   | 201,046   | 118,898   | 172,295   | 121,394  | 289,316   | 371,667   | 420,069   | 426,603   | 290,523   | 353,971   | 314,067   |
| December.....           | 35,991   | 98,271    | 174,358   | 147,101   | 103,493   | 128,314   | 85,365   | 244,971   | 290,465   | 362,031   | 323,700   | 252,229   | 288,243   | 235,530   |
| January.....            | 29,518   | 75,498    | 154,154   | 96,594    | 82,731    | 76,829    | 54,899   | 229,189   | 266,433   | 315,989   | 240,414   | 202,884   | 210,027   | 196,858   |
| February.....           | 26,673   | 78,215    | 156,814   | 81,257    | 70,418    | 57,844    | 49,713   | 218,218   | 255,256   | 306,090   | 221,406   | 200,451   | 190,336   | 177,675   |
| March.....              | 28,008   | 95,704    | 144,053   | 90,999    | 86,050    | 69,946    | 51,229   | 211,549   | 279,213   | 296,265   | 217,539   | 227,586   | 200,794   | 179,420   |
| April.....              | 42,205   | 122,256   | 187,657   | 123,063   | 132,834   | 88,361    | 67,829   | 245,843   | 294,882   | 345,278   | 282,740   | 287,478   | 226,286   | 213,802   |
| May.....                | 59,008   | 139,831   | 271,972   | 167,535   | 193,269   | 122,655   | 98,179   | 259,615   | 330,138   | 466,504   | 331,000   | 374,191   | 299,063   | 272,316   |
| June.....               | 71,772   | 152,276   | 336,414   | 193,263   | 237,330   | 145,375   | 114,373  | 280,636   | 359,605   | 545,013   | 362,339   | 423,466   | 313,149   | 294,240   |
| Total (man-months)..... | 876,736  | 1,308,671 | 2,120,761 | 2,191,264 | 1,673,935 | 1,792,760 | 1,262,202  | 3,441,356 | 3,839,095 | 4,441,331 | 4,434,451 | 3,680,543 | 3,755,491 | 3,267,683 |

TABLE 3.—Direct job employment during the fiscal year 1938 on the several classes of Federal and Federal-aid road construction administered by the Bureau of Public Roads and State road construction and maintenance

| Month                   | Men employed on road construction      |                        |                       |  |                       |                        |   |                                      |                               |  | Men employed on road maintenance by State highway departments | Total men employed |
|-------------------------|--|------------------------|-----------------------|--|-----------------------|------------------------|---|--------------------------------------|-------------------------------|--|---|--------------------|
|                         | In whole or in part with Federal funds |                        |                       |  |                       |                        |   |                                      |                               |  |   |                    |
|                         | National-forest highways               | National-park highways | Public-lands highways | Federal-aid highways and grade-crossing eliminations | Public Works highways | Works Program highways | Works Program grade-crossing eliminations | Loan-and-grant highways <sup>1</sup> | National work-relief highways | With State funds only, on State highways |   |                    |
| July.....               | 2,055                                  | 4,674                  | 180                   | 84,604   | 3,761                 | 23,215                 | 21,456                                    | 14,861                               | 4,683                         | 25,140                                   | 149,907   | 334,536            |
| August.....             | 2,949                                  | 4,987                  | 299                   | 90,905   | 3,974                 | 20,222                 | 19,268                                    | 16,612                               | 4,115                         | 28,379                                   | 180,143   | 351,853            |
| September.....          | 3,574                                  | 4,403                  | 348                   | 88,792   | 3,068                 | 17,712                 | 17,112                                    | 14,058                               | 3,717                         | 26,632                                   | 167,028   | 346,444            |
| October.....            | 3,715                                  | 3,680                  | 354                   | 86,058   | 2,466                 | 15,625                 | 15,491                                    | 13,032                               | 3,198                         | 27,286                                   | 160,045   | 330,942            |
| November.....           | 3,161                                  | 2,344                  | 310                   | 74,522   | 2,019                 | 12,333                 | 12,810                                    | 10,761                               | 3,134                         | 20,491                                   | 163,182   | 314,067            |
| December.....           | 1,477                                  | 1,552                  | 334                   | 50,622   | 1,489                 | 8,112                  | 9,175                                     | 9,034                                | 3,233                         | 23,825                                   | 146,340   | 255,530            |
| January.....            | 1,695                                  | 1,824                  | 251                   | 32,074   | 1,141                 | 4,497                  | 6,175                                     | 6,314                                | 2,998                         | 15,364                                   | 126,565   | 190,858            |
| February.....           | 340                                    | 826                    | 225                   | 30,806   | 1,083                 | 3,265                  | 4,812                                     | 5,117                                | 3,290                         | 12,252                                   | 115,710   | 177,675            |
| March.....              | 258                                    | 983                    | 206                   | 33,295   | 1,053                 | 3,045                  | 4,104                                     | 4,673                                | 3,549                         | 11,379                                   | 116,812   | 179,490            |
| April.....              | 516                                    | 1,351                  | 297                   | 47,225   | 1,242                 | 3,917                  | 4,628                                     | 5,308                                | 3,405                         | 14,075                                   | 131,803   | 213,802            |
| May.....                | 937                                    | 2,315                  | 300                   | 72,378   | 2,351                 | 4,793                  | 3,353                                     | 6,433                                | 3,229                         | 17,074                                   | 196,463   | 272,316            |
| June.....               | 1,598                                  | 2,782                  | 280                   | 87,207   | 2,105                 | 4,653                  | 5,801                                     | 6,769                                | 3,136                         | 19,875                                   | 139,992   | 294,240            |
| Total (man-months)..... | 21,275                                 | 30,721                 | 3,414                 | 778,488  | 25,732                | 121,302                | 126,642                                   | 112,972                              | 41,636                        | 251,394                                  | 1,754,087   | 3,267,683          |

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



As the Federal highway program passed out of the emergency employment stage and restrictions on contractors regarding employment of labor were no longer applied the employment of individual workers became more continuous and the weekly wage increased.

The total employment for the year on work supervised by the Bureau—1,262,202 man-months—is the equivalent of an average full-time employment each month of 105,180 men. The number of individuals actually employed, some of them on a part-time basis, averaged approximately 145,000 persons per month. Indirect employment in the production and transportation of equipment and materials is estimated at 1.7 times the direct employment for work of the character done during the year, indicating an indirect employment of 2,146,000 man-months, and this, added to the direct employment, gives a full-time employment of 3,408,000 man-months, the equivalent of the full-time continuous employment of 284,000 men.

Employment on State construction financed entirely with State funds and on State maintenance work increased slightly over the employment in the preceding year. Such work is financed almost entirely with State motor-vehicle revenues which furnish an income not subject to marked fluctuations from year to year and the resulting employment is correspondingly uniform.

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

The Hayden-Cartwright Act of 1934 requires that any State that applies to highway purposes a lesser amount of motor-vehicle fees and gasoline taxes than was provided by law on June 18, 1934, shall be penalized not more than one-third of the Federal-aid apportionments to which it would otherwise be entitled.

Administration of this requirement is placed under the Secretary of Agriculture and has necessitated a continuous study of State laws pertaining to disposition of motor-user revenue.

During the past year a careful review of official reports showed that motor-vehicle revenues had been diverted from highway purposes by legislative acts in New Jersey and Massachusetts. A reduction of \$250,000 in the Federal-aid funds apportioned to New Jersey for the fiscal year 1937 was made on August 7, 1937. On June 2, 1938, there was withheld from Massachusetts \$472,862 of the apportionment to that State for the fiscal year 1938.

In the preceding fiscal year State officials of Georgia were notified that the State had used motor-vehicle revenues for nonhighway purposes to such an extent as to require Federal action. Georgia officials gave assurance that required amounts would be restored to highway funds but satisfactory action has not yet been taken by the State.

### FEDERAL-AID LEGISLATION AMENDED AND FUNDS AUTHORIZED FOR 1940 AND 1941

Authorization of Federal-aid funds for the fiscal years 1940 and 1941 and for other road building administered by the Bureau was made by the act of June 8, 1938. The authorizations are as follows:

| Item   | 1940          | 1941          |
|--|---------------|---------------|
| Federal-aid system.....                        | \$100,000,000 | \$115,000,000 |
| Secondary or farm-to-market roads.....         | 15,000,000    | 15,000,000    |
| Elimination of hazards at grade crossings..... | 20,000,000    | 30,000,000    |
| National-forest roads.....                     | 10,000,000    | 13,000,000    |
| National-park roads.....                       | 4,000,000     | 5,000,000     |
| Parkways.....                                  | 6,000,000     | 8,000,000     |
| Public-land roads.....                         | 1,000,000     | 2,000,000     |
| Indian roads.....                              | 2,500,000     | 3,000,000     |

The new legislation made the District of Columbia eligible for participation in all regular Federal-aid funds beginning with the fiscal year 1940. Heretofore the District has participated in emergency highway funds and in grade-crossing funds for 1938 and 1939 but not in regular Federal-aid for highways.

Roadside and landscape development, including such sanitary and other facilities as may be deemed reasonably necessary to provide for the suitable accommodation of the public, are now specifically authorized as a part of Federal-

aid work. The purpose of this legislation is to remove any doubt as to the authority for these classes of improvements.

States devoting all motor-vehicle revenues to certain highway purposes and still unable to match Federal-aid funds for 1938 and 1939 may be relieved of matching under a provision of the new act. A State that applies all proceeds of special taxes on motor-vehicle transportation to highway purposes and expends 90 percent of them for administrative and operating expenses of the State highway department, maintenance of Federal-aid and State highways, and payment of interest and principal on highway debts for which such revenues have been pledged, may be relieved of matching Federal-aid funds to the extent that it lacks funds for this purpose.

Near the close of the fiscal year a study was made of the use of motor-vehicle revenue in Arkansas which showed that they were being used in accordance with the above provisions. Shortly after the close of the year the Secretary of Agriculture announced that the State would be relieved of the necessity of matching 1938 and 1939 funds to the extent that State funds were lacking.

MILEAGE OF FEDERAL-AID SYSTEM

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

The original system was limited to 7 percent of the rural road mileage within each State. When provision has been made for improvement of 90 percent of the designated system an additional 1 percent is permitted and further additions are permitted on the same basis. This provision is becoming of increasing importance and has been taken advantage of by 24 States. During the past year the mileage of the system outside of Federal reservations increased by 2,165 miles due almost entirely to extensions beyond the original 7 percent.

The system in any State may exceed what would otherwise be the limiting mileage by an amount equal to the mileage of the system within Federal reservations. Additions to the system in reservations amounted to 1,320 miles bringing the total additions for the year to 3,485. System mileages by States are shown in table 4.

TABLE 4.—Designated Federal-aid highway system mileage as of June 30, 1938

| State                            | Mileage of approved routes outside Federal reservations | Mileage of approved routes within Federal reservations | Total mileage of system | State                             | Mileage of approved routes outside Federal reservations | Mileage of approved routes within Federal reservations | Total mileage of system |
|----------------------------------|---|--|-------------------------|-----------------------------------|---|--|-------------------------|
| Alabama.....                     | 3,933   |  | 3,933                   | New Hampshire.....                | 968   | 33   | 1,001                   |
| Arizona <sup>1</sup> .....       | 1,617   | 597  | 2,214                   | New Jersey <sup>1</sup> .....     | 1,567   |  | 1,567                   |
| Arkansas.....                    | 5,029   | 175  | 5,204                   | New Mexico.....                   | 3,275   | 377  | 3,652                   |
| California <sup>1</sup> .....    | 5,581   | 555  | 6,136                   | New York <sup>1</sup> .....       | 9,078   | 16   | 9,094                   |
| Colorado.....                    | 3,211   | 514  | 3,725                   | North Carolina <sup>1</sup> ..... | 7,080   | 507  | 7,587                   |
| Connecticut <sup>1</sup> .....   | 1,046   |  | 1,046                   | North Dakota.....                 | 7,139   | 85   | 7,224                   |
| Delaware <sup>1</sup> .....      | 824   |  | 824                     | Ohio <sup>1</sup> .....           | 7,109   |  | 7,109                   |
| Florida <sup>1</sup> .....       | 2,479   |  | 2,479                   | Oklahoma.....                     | 6,474   | 48   | 6,522                   |
| Georgia.....                     | 5,654   | 73   | 5,727                   | Oregon <sup>1</sup> .....         | 3,272   | 482  | 3,754                   |
| Idaho.....                       | 2,549   | 772  | 3,321                   | Pennsylvania <sup>1</sup> .....   | 7,656   | 108  | 7,764                   |
| Illinois <sup>1</sup> .....      | 9,004   | 8  | 9,012                   | Rhode Island <sup>1</sup> .....   |   | 518  | 518                     |
| Indiana <sup>1</sup> .....       | 5,340   |  | 5,340                   | South Carolina <sup>1</sup> ..... | 4,020   | 196  | 4,216                   |
| Iowa <sup>1</sup> .....          | 7,703   | 2  | 7,705                   | South Dakota.....                 | 5,803   | 477  | 6,280                   |
| Kansas.....                      | 8,670   | 15   | 8,685                   | Tennessee.....                    | 4,566   | 66   | 4,632                   |
| Kentucky.....                    | 3,700   | 6  | 3,706                   | Texas <sup>1</sup> .....          | 14,174  | 127  | 14,301                  |
| Louisiana.....                   | 2,756   |  | 2,756                   | Utah <sup>1</sup> .....           | 2,085   | 146  | 2,231                   |
| Maine.....                       | 1,617   | 4  | 1,621                   | Vermont.....                      | 1,036   |  | 1,036                   |
| Maryland <sup>1</sup> .....      | 2,195   |  | 2,195                   | Virginia <sup>1</sup> .....       | 4,568   | 82   | 4,650                   |
| Massachusetts <sup>1</sup> ..... | 1,674   |  | 1,674                   | Washington.....                   | 2,938   | 404  | 3,342                   |
| Michigan <sup>1</sup> .....      | 5,729   | 233  | 5,962                   | West Virginia.....                | 2,214   | 29   | 2,243                   |
| Minnesota.....                   | 7,174   | 291  | 7,465                   | Wisconsin.....                    | 5,508   | 133  | 5,641                   |
| Mississippi.....                 | 3,699   | 10   | 3,709                   | Wyoming.....                      | 3,222   | 337  | 3,559                   |
| Missouri <sup>1</sup> .....      | 7,975   |  | 7,975                   | Hawaii.....                       | 539   |  | 539                     |
| Montana.....                     | 4,390   | 1,058  | 5,448                   | Puerto Rico.....                  | 858   |  | 858                     |
| Nebraska.....                    | 5,598   | 21   | 5,619                   |                                   |   |  |                         |
| Nevada <sup>1</sup> .....        | 1,760   | 54   | 1,814                   | Total.....                        | 216,574   | 8,041  | 224,615                 |

<sup>1</sup> Increased beyond 7 percent.

## STATUS OF MAJOR FUNDS AND PROGRESS IN CONSTRUCTION

During the year 12,129 miles of highway were brought to completion, exclusive of work done in Federal areas and with special funds. The completed work included 9,333 miles on the Federal-aid system outside of municipalities, 559 miles on extensions of the system into and through municipalities, 201 miles of secondary or feeder roads in municipalities, and 2,036 miles of secondary or feeder roads outside of municipalities. Payments to the States for construction completed amounted to \$218,637,062, as shown in table 5.

TABLE 5.—Funds paid to the States during the fiscal year 1938

| State                     | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal-aid system, 1936-39 | Federal aid, secondary or feeder | Federal aid, grade crossings | Total         |
|---------------------------|----------------------|-----------------------|---------------|-----------------|-----------------------------|----------------------------------|------------------------------|---------------|
|                           |                      |                       | Highways      | Grade-crossings |                             |                                  |                              |               |
| Alabama.....              | \$20, 545            | \$132, 833            | \$338, 184    | \$444, 580      | \$2, 492, 584               | \$40, 365                        | \$108, 680                   | \$3, 577, 771 |
| Arizona.....              |                      | 23, 427               | 208, 265      | 201, 391        | 2, 045, 124                 | 67, 854                          | 4, 718                       | 2, 550, 779   |
| Arkansas.....             |                      | 120, 402              | 263, 840      | 499, 473        | 2, 817, 299                 | 2, 757                           | 56, 681                      | 3, 760, 452   |
| California.....           |                      | 439, 792              | 844, 199      | 1, 026, 711     | 4, 812, 670                 | 78, 564                          | 310, 743                     | 7, 512, 679   |
| Colorado.....             |                      | 22, 933               | 193, 478      | 761, 122        | 1, 943, 618                 | 66, 404                          | 4, 000                       | 2, 991, 555   |
| Connecticut.....          |                      | 265, 702              | 693, 773      | 902, 485        | 234, 332                    |                                  |                              | 2, 096, 292   |
| Delaware.....             |                      | 4, 460                | 140, 439      |                 | 96, 548                     |                                  |                              | 241, 447      |
| Florida.....              |                      | 87, 623               | 296, 711      | 421, 548        | 1, 305, 059                 | 118                              |                              | 2, 111, 059   |
| Georgia.....              |                      | 910, 653              | 2, 493, 801   | 1, 485, 334     | 2, 711, 419                 | 21, 832                          |                              | 7, 623, 039   |
| Idaho.....                |                      | 20, 737               | 62, 011       | 452, 148        | 1, 647, 706                 | 147, 486                         | 66, 501                      | 2, 396, 589   |
| Illinois.....             |                      | 599, 152              | 891, 053      | 3, 360, 116     | 6, 057, 598                 | 127, 280                         | 163, 800                     | 11, 198, 999  |
| Indiana.....              |                      | 121, 449              | 564, 724      | 756, 083        | 3, 054, 514                 |                                  |                              | 247, 503      |
| Iowa.....                 |                      | 26, 910               | 749, 176      | 1, 449, 680     | 3, 910, 950                 |                                  |                              | 472, 245      |
| Kansas.....               |                      | 48, 641               | 420, 035      | 613, 929        | 2, 115, 945                 | 7, 735                           | 340, 425                     | 3, 846, 710   |
| Kentucky.....             |                      | 60, 003               | 653, 145      | 1, 348, 186     | 2, 245, 000                 | 200, 471                         | 73, 950                      | 4, 580, 755   |
| Louisiana.....            |                      | 143, 795              | 534, 562      | 905, 759        | 610, 852                    |                                  |                              | 2, 194, 968   |
| Maine.....                |                      | 45, 443               | 192, 318      | 374, 695        | 1, 441, 875                 | 130, 055                         |                              | 2, 184, 386   |
| Maryland.....             |                      | 406, 700              | 550, 685      | 381, 090        | 843, 789                    |                                  |                              | 2, 182, 264   |
| Massachusetts.....        | 1, 000               | 188, 708              | 1, 594, 780   | 1, 147, 328     | 1, 374, 624                 |                                  | 6, 565                       | 4, 313, 005   |
| Michigan.....             |                      | 103, 047              | 315, 332      | 550, 161        | 3, 605, 177                 |                                  | 518, 162                     | 5, 091, 879   |
| Minnesota.....            |                      | 422, 254              | 637, 761      | 1, 002, 483     | 3, 540, 148                 | 50, 635                          | 369, 268                     | 6, 022, 519   |
| Mississippi.....          | 6, 109               | 226, 251              | 522, 771      | 596, 299        | 2, 703, 982                 |                                  | 64, 587                      | 4, 119, 999   |
| Missouri.....             |                      | 196, 203              | 479, 641      | 1, 332, 948     | 3, 341, 211                 | 480, 173                         | 74, 470                      | 5, 904, 646   |
| Montana.....              |                      | 118, 851              | 448, 287      | 315, 070        | 2, 093, 763                 |                                  | 174, 773                     | 3, 150, 744   |
| Nebraska.....             |                      | 136, 655              | 577, 107      | 921, 894        | 2, 293, 479                 | 78, 625                          | 65, 568                      | 4, 073, 328   |
| Nevada.....               |                      | 56, 964               | 188, 316      | 78, 809         | 1, 877, 456                 | 239, 895                         | 83, 205                      | 2, 524, 645   |
| New Hampshire.....        |                      | 28, 482               | 187, 760      | 211, 219        | 364, 406                    | 27, 205                          | 3, 750                       | 822, 822      |
| New Jersey.....           |                      | 595, 321              | 512, 002      | 1, 505, 971     | 1, 908, 823                 |                                  | 44, 996                      | 3, 567, 113   |
| New Mexico.....           |                      | 96, 069               | 298, 711      | 297, 518        | 2, 528, 690                 | 27, 582                          | 6, 484                       | 3, 255, 054   |
| New York.....             |                      | 470, 793              | 1, 368, 216   | 3, 350, 463     | 7, 349, 032                 | 439, 390                         | 198, 811                     | 13, 176, 705  |
| North Carolina.....       |                      | 375, 718              | 844, 042      | 1, 073, 692     | 3, 326, 302                 | 147, 736                         | 61, 677                      | 5, 829, 167   |
| North Dakota.....         | 8, 230               | 543, 115              | 463, 928      | 981, 803        | 1, 597, 896                 |                                  | 47, 222                      | 3, 642, 194   |
| Ohio.....                 | 4, 480               | 354, 762              | 1, 656, 778   | 3, 097, 331     | 3, 402, 148                 | 15, 656                          |                              | 8, 531, 155   |
| Oklahoma.....             | 4, 542               | 270, 028              | 639, 448      | 1, 415, 769     | 3, 039, 910                 | 8, 986                           | 16, 343                      | 5, 395, 026   |
| Oregon.....               |                      | 164, 835              | 524, 207      | 282, 636        | 2, 023, 294                 | 54, 757                          | 358, 831                     | 3, 408, 560   |
| Pennsylvania.....         |                      | 1, 613, 596           | 5, 102, 692   | 4, 221, 926     | 5, 381, 736                 | 44, 127                          | 18, 425                      | 16, 382, 502  |
| Rhode Island.....         |                      |                       | 19, 460       | 142, 021        | 689, 151                    | 62, 008                          |                              | 912, 640      |
| South Carolina.....       | 7, 500               | 237, 583              | 485, 003      | 788, 986        | 2, 178, 118                 | 41, 049                          | 13, 716                      | 3, 751, 955   |
| South Dakota.....         |                      | 267, 176              | 520, 159      | 1, 124, 436     | 1, 623, 124                 | 6, 021                           | 63, 711                      | 3, 604, 627   |
| Tennessee.....            |                      | 170, 166              | 1, 193, 831   | 1, 899, 771     | 1, 523, 227                 | 12, 529                          |                              | 4, 799, 524   |
| Texas.....                | 5, 501               | 415, 240              | 715, 205      | 1, 137, 672     | 8, 058, 319                 | 56, 500                          | 72, 354                      | 10, 460, 791  |
| Utah.....                 |                      | 49, 074               | 348, 857      | 265, 019        | 1, 205, 765                 | 70, 407                          | 92, 817                      | 2, 031, 939   |
| Vermont.....              |                      | 56, 767               | 143, 782      | 199, 622        | 770, 162                    | 69, 657                          | 121, 001                     | 1, 360, 991   |
| Virginia.....             | 3, 078               | 444, 324              | 406, 933      | 1, 196, 245     | 2, 413, 030                 | 23, 749                          | 82, 419                      | 4, 569, 778   |
| Washington.....           |                      | 69, 657               | 228, 445      | 577, 496        | 1, 953, 086                 | 108, 418                         | 149, 754                     | 3, 086, 856   |
| West Virginia.....        |                      | 254, 541              | 301, 248      | 999, 377        | 867, 314                    | 12, 971                          | 58, 159                      | 2, 493, 640   |
| Wisconsin.....            |                      | 117, 245              | 296, 922      | 939, 290        | 4, 535, 504                 | 8, 246                           | 84, 797                      | 5, 982, 004   |
| Wyoming.....              |                      | 83, 815               | 181, 759      | 384, 977        | 1, 850, 287                 | 142, 536                         | 45, 693                      | 2, 689, 067   |
| District of Columbia..... |                      |                       |               | 32, 054         |                             |                                  | 95, 905                      | 127, 959      |
| Hawaii.....               |                      | 93, 575               | 224, 813      | 91, 099         | 367, 755                    |                                  |                              | 777, 242      |
| Puerto Rico.....          |                      |                       |               |                 | 242, 730                    | 79, 202                          | 22, 046                      | 343, 978      |
| Total.....                | 60, 985              | 11, 701, 470          | 31, 518, 595  | 47, 545, 715    | 119, 746, 531               | 3, 198, 981                      | 4, 864, 785                  | 218, 637, 062 |

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

**PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION**

This program was financed with \$400,000,000 provided by the National Recovery Act and the supplementary \$200,000,000 provided by the Hayden-Cartwright Act of June 1934. At the beginning of the year only a small amount of these funds remained available for construction and they did not play an important part in the year's work.

There have been completed since the beginning of the program 35,515 miles of highway, 698 railroad-highway grade separations, 86 separations of grade between highways, and 5,897 bridges, at a cost of \$585,368,902 from Public Works funds. Of the roads completed, 18,339 miles, involving \$274,337,625 of the Public Works funds, are on the Federal-aid system outside of municipalities; 2,670 miles, built at a cost of \$160,656,990 in Public Works funds, are on extensions of the Federal-aid system into and through municipalities; and 14,506 miles, costing \$150,374,287 in Public Works funds, are secondary roads. These cost figures include the cost of grade separations and bridges.

Of this mileage, 248 was completed during the year, including 116 miles on the Federal-aid system outside of municipalities, 24 miles on extensions of the system into and through municipalities, and 108 miles of secondary roads. The work completed during the year involved \$8,185,691 of Public Works funds. Payments to the States for construction work in progress amounted to \$11,701,470.

At the close of the year 119 miles of Public Works highways, to which \$6,558,836 had been allotted, were under contract and largely under construction, and 9 miles had been approved for construction at an estimated cost to the Federal Government of \$480,403 but were not yet under contract. Details concerning the funds and mileage completed, under contract, and approved for construction, but not under contract, classified according to the four classes of improvement and by States appear in tables 6, 7, 8, 10, 11, and 12.

**WORKS PROGRAM HIGHWAY CONSTRUCTION**

Active construction of Works Program projects under an authorization of \$200,000,000 began in October 1935 and the peak activity with these funds came in 1936 and 1937. The year began with 1,765 miles under contract and largely under construction but with only a small amount available for additional work.

The year's work resulted in the completion of 1,615 miles, bringing the total mileage completed in the program to 12,904 miles. The Works Program funds involved in the completed work amounted to \$177,829,247. State and other Federal funds were involved to the extent of \$11,519,637.

The classes of roads completed to date and the Works Program funds used to pay the cost were as follows: On the Federal-aid highway system outside of municipalities 2,696 miles costing \$44,322,677 in Works Program funds; on extensions of the Federal-aid system within municipalities, 1,033 miles costing \$35,738,262 in Works Program funds; on secondary roads within municipalities, 767 miles costing \$20,656,120 in Works Program funds; and secondary roads outside of municipalities, 8,408 miles costing \$77,112,188 in Works Program funds.

The 372 miles under contract and largely under construction were divided as follows: 32 miles on the Federal-aid system outside of municipalities, 67 miles on extensions of the Federal-aid system through municipalities, 46 miles of secondary road within municipalities, and 227 miles of secondary road outside of municipalities. Works Program funds involved were respectively \$4,512,141, \$3,697,875, \$1,250,709, and \$3,875,798.

Similar information for projects approved for construction but not yet under contract appears in tables 8 and 12. Details for work in all stages by States is presented in tables 6 to 12.

Funds available for new work and work approved but not yet under construction totaled \$3,834,231. Very little additional highway construction can be begun with Works Program funds as this program is now all but completed.

**PROGRESS IN FEDERAL-AID ROAD CONSTRUCTION ON FEDERAL-AID SYSTEM**

Improvement of the Federal-aid system was carried on with funds remaining from the previous fiscal year and under an authorization of \$125,000,000 for 1938 provided by the act of June 16, 1936. The apportionment of this fund was shown in the last annual report.

During the year 9,101 miles of highway financed with \$112,889,045 of Federal-aid funds were brought to completion. These projects involved \$106,310,057 of State and emergency funds. Payments to the States for completed work, including work done on projects still under construction, amounted to \$119,807,516.

At the close of the year projects under contract and in large part under construction included 9,142 miles of highway at an estimated cost of \$252,161,691 to be provided as follows: \$125,592,883 Federal aid, and \$126,568,808 from State funds. At the same time projects had been approved, but not yet contracted for, covering 1,805 miles, and involving \$25,782,883 of Federal-aid funds and \$28,150,839 of State funds.

On June 30, 1938, there remained available for new projects \$139,986,573 of Federal-aid funds. In greater part they were funds provided for 1939. Tables 6 to 12 show the status of the work by States.

#### PROGRESS IN CONSTRUCTION OF SECONDARY ROADS WITH FEDERAL AID

Improvement of secondary roads with Federal funds was first undertaken in the emergency program of road construction as a measure to relieve unemployment. Beginning with the fiscal year 1938 such work was made a part of the regular Federal-aid program and \$25,000,000 was authorized for each of the fiscal years 1938 and 1939.

In the emergency program Federal funds were available to pay the full cost of construction and, since employment was the primary objective, projects for improvement were selected without delay. The new program differs in that the States are required to match the Federal funds and they must also select a system of secondary roads for improvement, not exceeding 10 percent of the highway mileage, and carefully designed to connect agricultural districts with the main highway system. Pending the selection of such a system only those secondary roads that may reasonably be expected to form part of the system are to be approved for construction. These requirements occasioned some delay in getting the program under way in a number of States.

Where State funds were insufficient to permit expenditures on secondary roads or where authority for such expenditure was lacking, arrangements had to be made with local authorities to raise required amounts and place them under State control. Now that methods of financing the States' share of the cost of secondary roads are being established and highway-planning surveys are supplying information to guide the selection of projects for improvement, it is expected that the program will go forward with a considerable gain in impetus.

In spite of these delays 713 miles were completed, 1,616 miles were under contract at the end of the year, and 905 miles were approved but not under contract, making a total of 3,234 miles. The mileage completed cost \$3,581,853, the Federal Government contributing \$1,880,320 of this amount. The mileage under contract was to cost \$19,076,924 of which \$9,616,485 is to be Federal aid. The projects approved but not under contract are estimated to cost \$10,288,648 and \$4,613,801 has been assigned as Federal aid. Tables 6 to 12 show the status of the work.

The cost of secondary roads in this program has varied greatly, being particularly influenced by local conditions and by availability of suitable materials. The average cost of all projects approved for construction has been \$10,000 per mile.

#### GRADE-CROSSING ELIMINATION AND PROTECTION PROGRAM

Grade-crossing elimination work in 1938 did not equal the all-time peak established in the preceding year when 1,149 crossings were eliminated, but the record of 711 railroad-highway crossings eliminated, 144 separation structures reconstructed, and 744 crossings protected by signals or other safety devices is an important contribution to highway safety and will save much delay and inconvenience to public travel. By far the greater portion of the work done was in the emergency program of grade-crossing elimination financed by \$200,000,000 authorized by the Emergency Relief Appropriation Act of 1935. In this program 663 crossings were eliminated, 133 elimination structures were reconstructed, and 603 crossings were protected. Costs were met almost entirely with Federal funds which amounted to \$76,575,748. More than half of the expenditure was in municipalities, reflecting the relatively greater dangers and delays at city and suburban crossings.

In the new program of grade-crossing elimination for which \$50,000,000 was authorized, 20 crossings were eliminated, 11 existing structures were reconstructed, and 43 crossings were protected. Federal funds involved in this work amounted to \$1,495,583.

Since the Public Works program started in 1933, 2,556 crossings have been eliminated and 352 obsolete elimination structures have been reconstructed. The most dangerous and therefore the most important grade crossings are rapidly

being done away with in every State. The substantial program of railroad-highway grade-crossing elimination is considered one of the most advanced and productive undertakings of the present period of highway development.

At the end of the year work under contract consisted of 422 crossing eliminations, 84 elimination structures being reconstructed, and 626 crossings being protected. Table 13 shows details of the above work by States and also the number of projects approved but not under contract at the end of the year.

SUMMARY

The year's work with the funds apportioned to all States resulted in the completion of 12,129 miles of highway and the elimination of 711 railroad-highway grade crossings, the reconstruction of 144 grade separation structures and the protection of 744 crossings at a cost of \$239,555,509 in Federal funds and \$114,313,028 in State funds. The types of highway completed are shown in table 14.

The completed work was divided as follows: 9,333 miles on the Federal-aid system outside of municipalities, 559 miles of extensions of the system into and through municipalities, 201 miles of secondary roads in municipalities, and 2,036 miles of secondary roads outside of municipalities. Federal funds involved in the respective classes of work were \$138,853,674, \$40,949,891, \$28,262,849, and \$31,489,095.

The roads under contract at the end of the year totaled 11,486 miles and involved \$203,433,345 of Federal funds, and there were 2,800 miles approved but not yet contracted for, involving \$37,571,525 of Federal funds. Unobligated balances available for new work totaled \$257,405,917, in large part newly apportioned funds for the fiscal year 1939. Tables 15 and 16, respectively, show the types of road under contract and the types approved but not yet under contract.

TABLE 6.—Funds allotted to projects completed during the fiscal year 1938  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State          | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total Federal funds | Estimated total cost |
|----------------|----------------------|-----------------------|---------------|-----------------|-------------------|-----------------|---------------------|----------------------|
|                |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |                     |                      |
| Alabama        |                      | \$27,244              | \$42,570      |                 | \$1,646,913       |                 | \$1,716,727         | \$3,709,289          |
| Arizona        |                      |                       | 7,867         | \$40,226        | 1,670,771         |                 | 1,718,864           | 2,490,537            |
| Arkansas       |                      | 2,708                 | 32,149        | 190,367         | 2,998,127         |                 | 3,223,351           | 3,252,570            |
| California     |                      |                       | 377,011       | 576,707         | 3,762,771         |                 | 4,716,489           | 7,925,716            |
| Colorado       |                      | 11,000                |               | 259,453         | 1,967,430         |                 | 2,237,883           | 3,912,437            |
| Connecticut    |                      | 108,613               | 35,944        | 384,850         | 461,219           |                 | 990,659             | 1,484,020            |
| Delaware       |                      |                       | 21,120        |                 | 255,680           |                 | 276,800             | 539,741              |
| Florida        |                      | 108,370               | 256,690       | 181,000         | 493,993           |                 | 1,040,053           | 1,546,093            |
| Georgia        |                      | 420,369               | 104,684       | 533,892         | 1,402,781         |                 | 2,461,726           | 3,954,644            |
| Idaho          |                      | 10,820                | 13,500        | 226,122         | 1,560,179         |                 | 1,810,621           | 2,961,911            |
| Illinois       |                      |                       | 17,264        | 1,111,343       | 4,799,136         |                 | 5,927,743           | 10,929,284           |
| Indiana        |                      | 3,000                 | 153,394       | 412,564         | 2,837,986         | \$48,000        | 3,454,944           | 6,432,733            |
| Iowa           |                      |                       | 43,373        | 387,234         | 3,281,580         | 137,429         | 3,849,616           | 7,511,627            |
| Kansas         |                      |                       | 109,676       | 625,238         | 2,253,378         | 6,290           | 2,994,582           | 5,326,301            |
| Kentucky       |                      | 6,574                 | 127,112       | 343,520         | 1,211,252         |                 | 1,688,458           | 2,926,257            |
| Louisiana      |                      |                       | 207,500       | 1,119,068       | 286,501           |                 | 1,613,069           | 1,948,508            |
| Maine          |                      | 800                   | 43,249        | 338,480         | 1,009,510         |                 | 1,392,039           | 2,435,190            |
| Maryland       |                      | 19,000                | 131,718       | 9,673           | 524,145           |                 | 684,536             | 1,208,721            |
| Massachusetts  |                      |                       | 431,983       | 428,351         | 2,206,628         |                 | 3,066,962           | 5,274,002            |
| Michigan       |                      |                       |               | 462,100         | 2,844,502         |                 | 3,306,602           | 6,536,160            |
| Minnesota      |                      | 81,163                | 6,909         | 132,637         | 2,942,308         | 18,111          | 3,181,128           | 6,200,301            |
| Mississippi    |                      | 210,286               | 225,702       | 926,037         | 1,498,758         |                 | 2,860,783           | 4,391,468            |
| Missouri       |                      |                       |               | 1,386,671       | 4,205,783         |                 | 5,592,454           | 10,107,276           |
| Montana        |                      |                       | 13,720        | 72,191          | 2,426,674         |                 | 2,512,585           | 4,426,814            |
| Nebraska       |                      |                       | 74,081        | 103,005         | 1,624,560         |                 | 1,801,646           | 3,489,386            |
| Nevada         |                      |                       |               |                 | 1,927,619         |                 | 1,927,619           | 2,310,398            |
| New Hampshire  |                      |                       | 28,110        | 86,283          | 209,326           |                 | 323,719             | 540,355              |
| New Jersey     |                      | 132,557               |               | 46,192          | 942,731           |                 | 1,121,480           | 2,340,533            |
| New Mexico     |                      | 56,663                |               | 56,505          | 3,284,997         |                 | 3,398,165           | 5,473,761            |
| New York       |                      | 97,315                | 55,155        | 2,700,669       | 6,695,271         |                 | 9,548,410           | 17,853,474           |
| North Carolina |                      | 371,841               | 498,445       | 533,643         | 2,697,218         | 43,180          | 4,144,327           | 6,844,929            |
| North Dakota   |                      | 233,667               | 159,107       | 710,379         | 999,312           |                 | 2,102,465           | 2,191,489            |
| Ohio           |                      | 90,500                | 790,342       | 924,037         | 2,625,613         |                 | 4,430,492           | 7,243,866            |
| Oklahoma       | \$215,209            | 4,709                 | 44,873        | 535,228         | 2,159,803         |                 | 2,959,822           | 5,373,454            |
| Oregon         |                      |                       | 380,303       | 250,992         | 2,429,590         | 83,178          | 3,143,763           | 4,869,519            |
| Pennsylvania   |                      | 262,779               | 941,662       | 2,689,699       | 6,887,610         |                 | 10,781,750          | 18,234,628           |
| Rhode Island   |                      | 2,478                 | 3,837         | 8,074           | 539,214           |                 | 553,603             | 1,187,685            |
| South Carolina |                      | 86,493                |               | 652,696         | 1,617,096         |                 | 2,356,285           | 4,680,905            |

TABLE 6.—Funds allotted to projects completed during the fiscal year 1938—Contd.  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

| State         | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total Federal funds | Estimated total cost |
|---------------|----------------------|-----------------------|---------------|-----------------|-------------------|-----------------|---------------------|----------------------|
|               |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |                     |                      |
| South Dakota  |                      |                       | \$242,282     | \$886,911       | \$1,412,569       | \$17,500        | \$2,559,262         | \$3,651,781          |
| Tennessee     |                      |                       | 420,381       | 360,553         | 1,063,749         |                 | 1,844,683           | 2,941,809            |
| Texas         | \$52,968             |                       | 167,558       | 277,614         | 7,775,423         | 19,700          | 8,293,263           | 16,643,120           |
| Utah          |                      |                       | 42,927        | 212,531         | 987,457           |                 | 1,242,915           | 1,686,658            |
| Vermont       |                      |                       | 7,770         | 135,094         | 673,752           | 7,933           | 824,549             | 1,562,647            |
| Virginia      |                      | \$184,866             |               | 400,894         | 2,235,148         |                 | 2,820,908           | 5,175,906            |
| Washington    |                      |                       |               | 2,214           | 1,353,633         | 68,181          | 1,424,028           | 2,675,213            |
| West Virginia |                      | 188,854               | 297,370       | 740,868         | 744,270           |                 | 1,971,362           | 2,750,688            |
| Wisconsin     |                      |                       | 186,988       | 467,845         | 3,669,315         |                 | 4,324,148           | 8,217,489            |
| Wyoming       |                      |                       | 57,294        | 183,613         | 1,804,304         |                 | 2,045,211           | 3,133,420            |
| Hawaii        |                      | 169,565               | 8,907         |                 | 412,656           |                 | 591,128             | 1,026,795            |
| Total         | 268,177              | 2,892,234             | 6,810,527     | 23,112,993      | 105,320,241       | 449,502         | 138,853,674         | 239,461,538          |

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

|                      |  |           |           |            |           |          |            |            |
|----------------------|--|-----------|-----------|------------|-----------|----------|------------|------------|
| Alabama              |  | \$54,028  |           | \$567,449  | \$53,225  |          | \$674,702  | \$768,325  |
| Arizona              |  |           |           | 7,768      | 59,752    |          | 67,520     | 94,287     |
| Arkansas             |  | 25,977    | \$269,125 | 529,907    | 99,910    |          | 924,919    | 928,338    |
| California           |  |           | 216,200   | 256,175    | 148,621   |          | 620,996    | 792,495    |
| Colorado             |  |           |           |            | 36,043    |          | 36,043     | 67,524     |
| Connecticut          |  | 34,360    | 197,790   |            | 36,100    |          | 268,250    | 328,460    |
| Delaware             |  | 3,069     | 195,870   |            | 7,895     |          | 206,834    | 215,817    |
| Florida              |  | 134,300   | 69,309    | 258,279    | 246,771   |          | 708,659    | 963,883    |
| Georgia              |  | 208,831   | 70,221    | 308,451    | 66,914    |          | 654,417    | 731,729    |
| Idaho                |  | 42,124    | 6,218     | 229,642    | 45,491    |          | 323,475    | 369,347    |
| Illinois             |  | 322,649   | 170       | 1,493,565  | 853,758   | \$17,000 | 2,687,142  | 3,746,238  |
| Indiana              |  |           | 347,406   | 1,376,248  | 273,658   |          | 1,997,312  | 2,297,949  |
| Iowa                 |  |           | 375,188   | 796,275    | 301,140   | 19,500   | 1,492,103  | 1,922,710  |
| Kansas               |  |           | 7,556     | 673,654    | 60,278    |          | 741,488    | 1,226,946  |
| Kentucky             |  |           | 53,617    | 401,737    | 296,013   |          | 751,367    | 1,115,512  |
| Louisiana            |  |           | 203,270   | 168,364    |           |          | 371,634    | 371,654    |
| Maine                |  |           | 9,000     | 2,210      | 111,440   |          | 122,650    | 234,273    |
| Maryland             |  | 216,800   |           |            |           |          | 216,800    | 220,454    |
| Massachusetts        |  | 514,240   | 914,575   | 440,820    | 5,040     |          | 1,874,675  | 1,879,756  |
| Michigan             |  |           |           | 764,500    | 533,781   |          | 1,298,281  | 1,898,906  |
| Minnesota            |  | 160,120   | 64,987    | 154,988    | 382,487   | 191,194  | 953,776    | 1,481,860  |
| Mississippi          |  | 9,533     | 326,960   | 362,000    | 177,455   |          | 875,948    | 1,056,051  |
| Missouri             |  | 700,723   | 312,205   | 1,285,061  | 308,428   |          | 2,606,417  | 2,987,955  |
| Montana              |  |           |           |            | 39,494    |          | 39,494     | 70,430     |
| Nebraska             |  | 39,755    | 71,392    | 886,446    | 32,478    |          | 1,030,071  | 1,062,931  |
| Nevada               |  |           |           |            | 124,003   | 35,109   | 159,112    | 180,361    |
| New Hampshire        |  |           |           | 103,581    | 12,161    |          | 115,742    | 129,133    |
| New Jersey           |  |           | 1,595,224 | 272,256    | 10,440    |          | 1,877,920  | 1,894,270  |
| New Mexico           |  |           | 10,685    | 530,119    | 1,154     |          | 541,958    | 547,671    |
| New York             |  | 491,136   | 675,846   | 1,945,246  | 441,068   |          | 3,553,296  | 4,398,912  |
| North Carolina       |  |           | 291,631   | 306,592    | 126,769   |          | 724,992    | 865,170    |
| North Dakota         |  | 1,490     | 128,789   | 259,357    | 13,413    |          | 403,049    | 409,722    |
| Ohio                 |  | 12,118    | 147,263   | 184,009    | 155,852   |          | 499,242    | 671,571    |
| Oklahoma             |  |           | 153,046   | 747,872    | 40,783    |          | 941,701    | 1,004,809  |
| Oregon               |  | 65,000    | 522,122   | 739,834    | 97,459    | 33,719   | 1,458,134  | 1,733,583  |
| Pennsylvania         |  | 305,891   | 248,508   | 1,746,072  | 431,612   |          | 2,732,083  | 3,386,600  |
| Rhode Island         |  |           |           |            | 31,260    |          | 31,260     | 77,528     |
| South Carolina       |  | 167,812   | 242,874   | 289,670    | 133,257   |          | 833,613    | 1,041,885  |
| South Dakota         |  | 6,280     | 76,833    | 322,453    | 21,264    | 19,770   | 446,650    | 464,572    |
| Tennessee            |  |           | 223,723   | 307,640    | 107,954   |          | 639,317    | 752,150    |
| Texas                |  | 49,645    | 8,041     | 794,510    | 207,665   |          | 1,059,861  | 1,375,829  |
| Utah                 |  |           | 56,518    | 128,441    | 223,049   |          | 408,008    | 501,053    |
| Vermont              |  |           | 15,110    | 39,150     | 119,098   | 2,820    | 176,178    | 326,757    |
| Virginia             |  | 30,814    | 150,311   | 381,678    | 107,751   | 50,600   | 721,154    | 838,456    |
| Washington           |  |           |           | 273,682    | 85,972    |          | 359,654    | 441,997    |
| West Virginia        |  | 17,240    | 151,868   | 481,546    | 93,539    |          | 744,193    | 837,851    |
| Wisconsin            |  |           | 13,300    |            | 475,104   |          | 488,404    | 994,115    |
| Wyoming              |  | 2,784     | 18,609    | 235,856    | 63,828    |          | 321,077    | 361,770    |
| District of Columbia |  |           |           |            |           |          | 168,320    | 168,320    |
| Total                |  | 3,616,719 | 8,441,410 | 21,053,103 | 7,300,627 | 538,032  | 40,949,891 | 50,237,915 |

TABLE 6.—Funds allotted to projects completed during the fiscal year 1938—Contd.

ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| Alabama.....        |                       | \$37,300      | \$282,564       |                     |                 | \$319,864           | \$319,864            |
| Arizona.....        |                       | 6,095         | 6,095           |                     |                 | 6,095               | 6,095                |
| Arkansas.....       |                       | 24,781        | 664,085         |                     |                 | 688,866             | 694,880              |
| California.....     |                       | 316,000       | 1,063,353       | \$680               |                 | 1,380,033           | 1,615,820            |
| Colorado.....       |                       |               | 665,124         |                     |                 | 665,124             | 665,124              |
| Connecticut.....    |                       | 44,550        | 350,000         |                     |                 | 394,550             | 415,911              |
| Florida.....        |                       | 28,890        | 110,300         |                     |                 | 139,190             | 139,837              |
| Georgia.....        |                       | 321,354       | 278,608         |                     |                 | 599,962             | 616,026              |
| Idaho.....          |                       |               | 204,352         | 22,010              |                 | 226,362             | 248,819              |
| Illinois.....       |                       | 407,954       | 300,830         |                     | \$2,500         | 711,284             | 713,031              |
| Indiana.....        |                       | 242,214       | 972,814         |                     | 117,790         | 1,332,818           | 1,341,998            |
| Iowa.....           |                       | 1,981         | 69,861          |                     |                 | 71,842              | 74,377               |
| Kansas.....         |                       | 21,151        |                 |                     |                 | 21,151              | 21,318               |
| Kentucky.....       |                       | 152,203       | 947,119         | 1,047               |                 | 1,100,369           | 1,343,671            |
| Louisiana.....      |                       | 323,483       | 141,537         |                     |                 | 465,020             | 499,971              |
| Maine.....          |                       | 55,000        |                 | 46,900              |                 | 101,900             | 150,716              |
| Maryland.....       |                       | 85,000        | 10,360          |                     |                 | 95,360              | 95,415               |
| Michigan.....       |                       |               | 586,600         |                     |                 | 586,600             | 686,600              |
| Minnesota.....      |                       | 251,020       | 640,304         |                     | 25,913          | 917,237             | 1,094,344            |
| Mississippi.....    |                       |               | 35,400          |                     |                 | 35,400              | 35,400               |
| Missouri.....       |                       | 165,624       | 1,771,128       | 10,212              |                 | 1,946,964           | 1,967,586            |
| Montana.....        |                       | 185,240       |                 |                     |                 | 185,240             | 185,267              |
| Nebraska.....       |                       | 244,873       | 131,822         | 4,987               |                 | 381,682             | 386,700              |
| Nevada.....         |                       | 41,350        | 198,694         |                     |                 | 240,044             | 260,450              |
| New Hampshire.....  |                       | 65,870        | 168,326         |                     |                 | 234,196             | 234,876              |
| New Jersey.....     |                       | 303,530       | 1,562,329       |                     |                 | 1,865,859           | 1,865,859            |
| New Mexico.....     |                       |               | 108,236         |                     |                 | 108,236             | 109,216              |
| New York.....       |                       | 160,400       | 1,305,730       | 34,220              |                 | 1,700,350           | 1,734,570            |
| North Carolina..... |                       | 190,597       | 601,741         | 10,394              |                 | 802,732             | 828,656              |
| North Dakota.....   |                       |               | 471,271         |                     |                 | 471,271             | 471,383              |
| Ohio.....           |                       | 826,758       | 305,001         |                     |                 | 1,131,759           | 1,182,055            |
| Oklahoma.....       |                       | 235,534       | 235,376         |                     |                 | 470,910             | 472,972              |
| Oregon.....         |                       |               |                 | 552                 |                 | 552                 | 904                  |
| Pennsylvania.....   |                       | 2,220,419     | 770,572         |                     |                 | 2,990,991           | 3,435,285            |
| Rhode Island.....   |                       |               | 36,240          |                     |                 | 36,240              | 36,240               |
| South Carolina..... |                       |               | 114,599         |                     |                 | 114,599             | 114,599              |
| South Dakota.....   |                       | 14,977        | 263,009         |                     | 7,520           | 285,506             | 285,552              |
| Tennessee.....      |                       | 15,765        | 1,185,142       |                     |                 | 1,200,907           | 1,211,804            |
| Texas.....          |                       |               | 1,520,269       |                     |                 | 1,520,269           | 1,520,272            |
| Utah.....           |                       | 32,745        | 383,451         |                     | 14,000          | 430,196             | 471,187              |
| Virginia.....       |                       | 26,909        | 74,544          |                     |                 | 101,453             | 102,444              |
| Washington.....     |                       | 146,371       | 397,851         |                     | 66,593          | 610,815             | 673,016              |
| West Virginia.....  |                       |               | 298,065         |                     |                 | 298,065             | 298,565              |
| Wisconsin.....      |                       | 7,234         | 1,002,352       |                     |                 | 1,009,586           | 1,014,226            |
| Wyoming.....        |                       |               | 265,400         |                     |                 | 265,400             | 265,400              |
| Total.....          |                       | 7,197,077     | 20,700,454      | 131,002             | 234,316         | 28,262,849          | 29,808,301           |

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

|                    |          |           |           |          |          |           |           |
|--------------------|----------|-----------|-----------|----------|----------|-----------|-----------|
| Alabama.....       |          | \$512,367 | \$233,498 |          | \$16,100 | \$761,965 | \$791,218 |
| Arizona.....       |          | 80,743    | 96,532    | \$60,705 |          | 243,980   | 286,196   |
| Arkansas.....      | \$32,129 | 100,804   | 140,694   |          |          | 273,627   | 276,459   |
| California.....    |          | 405,197   | 179,396   | 73,086   |          | 657,679   | 768,338   |
| Colorado.....      |          |           | 71,670    |          | 1,880    | 73,550    | 73,550    |
| Connecticut.....   |          | 504,719   | 156,370   |          |          | 661,119   | 734,431   |
| Delaware.....      |          | 44,195    |           |          |          | 44,195    | 46,948    |
| Florida.....       |          | 61,200    | 223,125   |          |          | 284,325   | 284,675   |
| Georgia.....       |          | 794,471   | 214,442   | 19,060   |          | 1,091,394 | 1,123,447 |
| Idaho.....         | 63,421   |           | 59,395    | 128,264  |          | 189,545   | 321,838   |
| Illinois.....      | 1,886    |           | 187,861   | 39,900   |          | 651,910   | 698,246   |
| Indiana.....       | 32,800   | 391,349   | 179,041   |          |          | 1,090,472 | 1,145,804 |
| Iowa.....          |          | 719,431   | 338,937   |          |          | 1,066,777 | 1,145,022 |
| Kansas.....        |          | 668,940   |           | 12,458   | 58,900   | 371,905   | 384,396   |
| Kentucky.....      |          | 359,447   |           |          |          | 399,451   | 535,286   |
| Louisiana.....     | 14,079   | 160,050   | 103,796   | 121,526  |          | 692,025   | 714,478   |
| Maine.....         | 319,506  | 176,836   | 195,683   |          |          | 493,177   | 578,757   |
| Maryland.....      | 12,062   | 241,850   | 172,332   | 66,933   |          | 634,876   | 636,969   |
| Massachusetts..... |          | 85,317    | 549,559   |          |          | 1,827,538 | 1,827,546 |
| Michigan.....      |          | 666,750   | 1,160,788 |          |          | 188,150   | 220,573   |
| Minnesota.....     |          | 17,000    | 171,150   |          |          | 495,852   | 533,020   |
| Mississippi.....   | 136,419  | 150,841   | 208,592   |          |          | 509,711   | 521,531   |
| Missouri.....      | 26,380   | 304,052   | 179,279   |          |          | 1,094,578 | 1,608,407 |
| Missouri.....      | 229,564  | 244,248   | 162,932   | 457,834  |          |           |           |



TABLE 6.—Funds allotted to projects completed during the fiscal year 1938—Contd.

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| Montana.....        | \$34,791              | \$141,198     | -----           | -----               | -----           | \$175,989           | \$176,578            |
| Nebraska.....       | 31,054                | 157,596       | \$99,291        | \$41,669            | -----           | 329,610             | 388,615              |
| Nevada.....         | -----                 | 3,561         | -----           | 153,067             | -----           | 156,628             | 217,563              |
| New Hampshire.....  | -----                 | 162,250       | 108,103         | -----               | -----           | 270,393             | 300,464              |
| New Jersey.....     | 303,483               | 272,496       | 592,496         | -----               | -----           | 1,168,475           | 1,191,390            |
| New Mexico.....     | 1,770                 | 493,344       | -----           | -----               | -----           | 495,114             | 495,704              |
| New York.....       | -----                 | 587,275       | 576,670         | 80,092              | -----           | 1,244,037           | 1,327,587            |
| North Carolina..... | -----                 | 534,202       | 219,384         | 91,078              | -----           | 844,664             | 973,767              |
| North Dakota.....   | -----                 | 75,939        | 77,821          | -----               | -----           | 153,760             | 154,274              |
| Ohio.....           | -----                 | 1,423,036     | 609,446         | -----               | -----           | 2,032,482           | 2,068,885            |
| Oklahoma.....       | -----                 | 113,513       | 423,907         | -----               | -----           | 537,420             | 655,789              |
| Oregon.....         | 17,100                | 89,274        | 126,924         | 74,483              | \$61,993        | 369,774             | 430,622              |
| Pennsylvania.....   | 129,261               | 2,508,980     | 1,358,675       | 29,330              | -----           | 4,026,246           | 4,112,833            |
| Rhode Island.....   | -----                 | 2,312         | -----           | 58,984              | -----           | 61,296              | 125,518              |
| South Carolina..... | 87,800                | 242,667       | 139,716         | -----               | -----           | 470,183             | 490,573              |
| South Dakota.....   | 9,600                 | 209,709       | 174,030         | -----               | 6,170           | 399,509             | 399,509              |
| Tennessee.....      | -----                 | 632,904       | 392,419         | -----               | -----           | 1,025,323           | 1,053,526            |
| Texas.....          | -----                 | 243,161       | 498,703         | 24,545              | 38,100          | 804,509             | 829,604              |
| Utah.....           | -----                 | 317,452       | 87,220          | 21,346              | 57,000          | 483,018             | 525,642              |
| Vermont.....        | -----                 | 24,858        | 56,375          | 37,335              | 3,480           | 122,048             | 191,014              |
| Virginia.....       | 106,258               | 120,812       | 341,496         | 27,650              | 30,110          | 626,326             | 673,430              |
| Washington.....     | 5,844                 | 34,959        | 99,845          | 61,874              | -----           | 202,522             | 298,344              |
| West Virginia.....  | 81,531                | 719,230       | 98,320          | -----               | -----           | 899,081             | 1,018,106            |
| Wisconsin.....      | -----                 | 35,000        | 451,285         | 15,250              | -----           | 501,535             | 558,271              |
| Wyoming.....        | -----                 | 37,721        | -----           | 46,849              | -----           | 84,570              | 113,530              |
| Hawaii.....         | -----                 | 206,782       | -----           | -----               | -----           | 206,782             | 267,760              |
| Total.....          | 1,676,738             | 16,080,108    | 11,709,198      | 1,749,318           | 273,733         | 31,489,035          | 34,360,783           |

TOTAL

| State               | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|---------------------|----------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|                     |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
| Alabama.....        | -----                | \$81,272              | \$592,237     | \$1,083,511     | \$1,700,138       | -----               | \$16,100        | \$3,473,258         | \$5,588,696          |
| Arizona.....        | -----                | -----                 | 88,610        | 150,621         | 1,730,523         | \$66,705            | -----           | 2,036,459           | 2,877,115            |
| Arkansas.....       | 60,814               | 426,858               | 1,525,054     | 3,098,036       | -----             | -----               | -----           | 5,110,762           | 5,152,247            |
| California.....     | -----                | 1,314,408             | 2,075,631     | 3,911,392       | 73,766            | -----               | -----           | 7,375,197           | 11,102,370           |
| Colorado.....       | 11,000               | -----                 | 996,247       | 2,003,473       | -----             | -----               | 1,880           | 3,012,600           | 4,718,635            |
| Connecticut.....    | 142,973              | 783,033               | 891,250       | 497,319         | -----             | -----               | -----           | 2,314,575           | 2,962,822            |
| Delaware.....       | 3,069                | 261,185               | -----         | 263,575         | -----             | -----               | -----           | 527,829             | 802,505              |
| Florida.....        | 242,670              | 416,089               | 772,704       | 740,764         | -----             | -----               | -----           | 2,172,227           | 2,934,488            |
| Georgia.....        | 692,621              | 1,290,730             | 1,335,393     | 1,469,695       | 19,060            | -----               | -----           | 4,807,499           | 6,425,846            |
| Idaho.....          | 54,831               | 19,718                | 719,511       | 1,605,670       | 150,274           | -----               | -----           | 2,550,004           | 3,901,915            |
| Illinois.....       | 355,449              | 816,737               | 3,093,599     | 5,652,894       | 39,900            | 19,500              | -----           | 9,978,079           | 16,086,800           |
| Indiana.....        | 3,000                | 1,462,445             | 3,132,666     | 3,111,645       | -----             | 165,790             | -----           | 7,875,546           | 11,283,484           |
| Iowa.....           | -----                | 1,089,482             | 1,592,307     | 3,582,720       | -----             | 215,829             | -----           | 6,480,338           | 10,653,735           |
| Kansas.....         | -----                | 497,830               | 1,298,892     | 2,313,656       | 12,458            | 6,290               | -----           | 4,129,126           | 6,958,961            |
| Kentucky.....       | 20,653               | 492,982               | 1,796,172     | 1,507,265       | 122,573           | -----               | -----           | 3,939,645           | 5,920,726            |
| Louisiana.....      | 319,506              | 911,089               | 1,624,652     | 286,501         | -----             | -----               | -----           | 3,141,748           | 3,531,640            |
| Maine.....          | 12,862               | 349,099               | 513,022       | 1,120,950       | -----             | 113,833             | -----           | 2,109,766           | 3,398,937            |
| Maryland.....       | 235,800              | 302,035               | 569,592       | 524,145         | -----             | -----               | -----           | 1,631,572           | 2,161,559            |
| Massachusetts.....  | 514,240              | 2,013,308             | 2,029,959     | 2,211,667       | -----             | -----               | -----           | 6,769,174           | 8,981,304            |
| Michigan.....       | -----                | 17,000                | 1,984,350     | 3,378,283       | -----             | -----               | -----           | 5,379,633           | 9,242,329            |
| Minnesota.....      | 377,702              | 473,757               | 1,136,521     | 3,324,796       | -----             | 235,218             | -----           | 5,547,994           | 9,309,524            |
| Mississippi.....    | 246,198              | 856,714               | 1,502,717     | 1,676,213       | -----             | -----               | -----           | 4,281,842           | 6,004,540            |
| Missouri.....       | 930,287              | 722,077               | 4,605,792     | 4,514,211       | 468,046           | -----               | -----           | 11,240,413          | 16,671,224           |
| Montana.....        | 34,791               | 340,158               | 72,191        | 2,466,168       | -----             | -----               | -----           | 2,913,308           | 4,859,090            |
| Nebraska.....       | 70,809               | 547,942               | 1,220,563     | 1,657,038       | 46,656            | -----               | -----           | 3,543,008           | 5,327,632            |
| Nevada.....         | -----                | 44,911                | 198,694       | 2,051,622       | 153,067           | 35,109              | -----           | 2,483,403           | 2,968,772            |
| New Hampshire.....  | -----                | 256,271               | 466,292       | 221,487         | -----             | -----               | -----           | 944,050             | 1,204,828            |
| New Jersey.....     | 436,039              | 2,171,251             | 2,473,273     | 953,171         | -----             | -----               | -----           | 6,033,734           | 7,292,051            |
| New Mexico.....     | 58,433               | 504,029               | 694,860       | 3,286,151       | -----             | -----               | -----           | 4,543,473           | 6,626,352            |
| New York.....       | 588,451              | 1,478,676             | 6,728,311     | 7,136,340       | 114,312           | -----               | -----           | 16,046,093          | 25,314,543           |
| North Carolina..... | 371,841              | 1,514,876             | 1,661,360     | 2,823,987       | 101,472           | 43,180              | -----           | 6,516,716           | 9,512,523            |
| North Dakota.....   | 235,157              | 363,835               | 1,518,828     | 1,012,725       | -----             | -----               | -----           | 3,130,545           | 3,226,868            |

TABLE 6.—Funds allotted to projects completed during the fiscal year 1938—Contd.

| State                     | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|---------------------------|----------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|                           |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
|                           |                      |                       |               |                 |                   |                     |                 |                     |                      |
| Ohio.....                 |                      | \$102,618             | \$3,187,398   | \$2,022,494     | \$2,781,461       |                     |                 | \$8,093,974         | \$11,166,378         |
| Oklahoma.....             | \$215,209            | 4,709                 | 349,966       | 1,942,385       | 2,200,586         |                     |                 | 4,909,853           | 7,507,024            |
| Oregon.....               |                      | 82,100                | 991,699       | 1,117,450       | 2,527,049         | \$75,035            | \$178,890       | 4,972,223           | 7,034,627            |
| Pennsylvania.....         |                      | 697,951               | 5,919,569     | 6,565,018       | 7,319,221         | 29,330              |                 | 20,531,059          | 29,169,404           |
| Rhode Island.....         |                      | 2,478                 | 6,150         | 14,313          | 570,474           |                     |                 | 682,400             | 1,376,571            |
| South Carolina.....       |                      | 342,106               | 485,540       | 1,196,681       | 1,750,353         |                     |                 | 3,774,680           | 6,307,963            |
| South Dakota.....         |                      | 15,880                | 543,851       | 1,646,409       | 1,433,533         |                     | 50,960          | 3,690,927           | 4,801,415            |
| Tennessee.....            |                      |                       | 1,292,773     | 2,245,754       | 1,171,705         |                     |                 | 4,710,230           | 5,959,289            |
| Texas.....                | 52,968               | 49,645                | 418,759       | 3,091,045       | 7,983,089         | 24,545              | 57,800          | 11,677,901          | 20,368,824           |
| Utah.....                 |                      |                       | 449,641       | 811,644         | 1,210,506         | 21,349              | 71,000          | 2,564,157           | 3,184,541            |
| Vermont.....              |                      |                       | 47,738        | 230,619         | 792,549           | 37,355              | 14,233          | 1,122,774           | 2,080,417            |
| Virginia.....             |                      | 321,938               | 298,032       | 1,198,612       | 2,312,899         | 27,650              | 80,710          | 4,269,841           | 6,790,237            |
| Washington.....           |                      | 5,844                 | 181,330       | 773,533         | 1,493,605         |                     | 134,774         | 2,597,020           | 4,088,600            |
| West Virginia.....        |                      | 287,625               | 1,168,468     | 1,618,799       | 837,810           |                     |                 | 3,912,702           | 4,905,210            |
| Wisconsin.....            |                      |                       | 242,522       | 1,921,482       | 4,144,419         | 15,290              |                 | 6,323,673           | 10,874,101           |
| Wyoming.....              |                      | 2,784                 | 113,621       | 684,869         | 1,968,432         | 46,849              |                 | 2,716,258           | 3,874,120            |
| Hawaii.....               |                      | 169,565               | 215,690       |                 | 412,635           |                     |                 | 797,911             | 1,294,555            |
| District of Columbia..... |                      |                       |               |                 |                   |                     | 168,320         | 168,320             | 168,320              |
| Total.....                | 268,177              | 8,185,691             | 38,529,122    | 76,575,748      | 112,620,868       | 1,880,320           | 1,495,583       | 239,555,509         | 353,868,537          |

TABLE 7.—Funds allotted to projects under contract on June 30, 1938

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |                     |                      |
| Alabama.....        | \$17,000              | \$104,100     | \$60,519        | \$3,302,346       | \$32,024        | \$3,515,989         | \$6,820,773          |
| Arizona.....        |                       | 38,548        | 18,841          | 1,363,703         | 4,718           | 1,425,810           | 1,883,750            |
| Arkansas.....       |                       | 100,026       | 172,109         | 1,083,504         | 265,112         | 1,635,315           | 1,647,228            |
| California.....     | 14,764                | 116,218       | 112,295         | 6,330,549         | 783,652         | 7,342,714           | 13,028,538           |
| Colorado.....       |                       | 554,697       | 39,474          | 1,383,120         | 37,744          | 2,015,035           | 3,159,079            |
| Connecticut.....    | 1,970                 |               | 127,600         | 478,086           |                 | 607,656             | 1,101,349            |
| Delaware.....       |                       | 10,234        | 279,052         | 336,176           | 5,060           | 630,462             | 907,660              |
| Florida.....        | 39,920                | 38,957        | 49,918          | 1,442,681         | 10,616          | 1,582,092           | 3,024,773            |
| Georgia.....        | 259,564               | 319,104       | 872,919         | 3,542,571         | 18,346          | 5,012,504           | 8,555,076            |
| Idaho.....          | 34,162                | 52,439        | 25,117          | 1,204,630         | 99,994          | 1,416,342           | 2,245,896            |
| Illinois.....       |                       | 140,310       | 414,858         | 4,751,691         | 478,675         | 5,785,534           | 10,499,486           |
| Indiana.....        | 31,500                | 49,000        | 122,950         | 3,216,617         | 947,660         | 4,367,667           | 7,600,236            |
| Iowa.....           |                       | 74,865        | 84,060          | 3,030,138         | 364,000         | 3,553,003           | 7,302,122            |
| Kansas.....         |                       | 74,925        | 78,694          | 2,371,814         | 491,604         | 3,017,067           | 5,476,434            |
| Kentucky.....       | 13,376                | 55,894        | 159,026         | 2,992,278         | 13,609          | 3,231,183           | 6,251,945            |
| Louisiana.....      | 44,459                | 121,673       | 220,222         | 2,709,725         | 146,478         | 3,245,457           | 13,304,704           |
| Maine.....          |                       | 25,152        | 69,281          | 1,158,655         | 49,687          | 1,302,775           | 2,485,549            |
| Maryland.....       | 131,500               | 291,343       | 343,899         | 1,096,021         | 64,586          | 1,927,349           | 3,027,509            |
| Massachusetts.....  |                       | 436,840       | 70,410          | 857,864           | 15,710          | 1,380,824           | 2,676,535            |
| Michigan.....       | 96,788                | 94,521        | 169,432         | 2,474,244         | 479,602         | 3,314,587           | 5,807,126            |
| Minnesota.....      | 13,041                | 79,060        | 176,500         | 2,327,036         | 73,868          | 2,669,445           | 5,029,615            |
| Mississippi.....    | 80,143                | 24,239        | 345,433         | 2,926,521         | 107,400         | 3,483,836           | 7,591,455            |
| Missouri.....       | 30,000                | 122,484       | 92,132          | 2,686,299         | 229,970         | 3,160,885           | 5,945,524            |
| Montana.....        | 7,599                 | 34,485        | 105,187         | 974,303           | 253,298         | 1,374,872           | 2,138,205            |
| Nebraska.....       |                       | 58,061        | 86,603          | 3,655,931         | 188,967         | 3,989,562           | 7,669,540            |
| Nevada.....         | 6,682                 | 33,646        | 13,308          | 1,222,535         | 146,452         | 1,422,623           | 1,611,210            |
| New Hampshire.....  |                       | 14,178        | 14,443          | 580,440           | 65,175          | 674,236             | 1,261,376            |
| New Jersey.....     | 30,305                | 46,947        | 188,700         | 1,003,533         | 104,554         | 1,374,039           | 2,415,065            |
| New Mexico.....     |                       | 43,071        | 25,879          | 1,505,836         | 122,441         | 1,697,227           | 2,496,191            |
| New York.....       | 222,900               | 144,795       | 22,000          | 7,625,282         | 1,012,700       | 9,027,677           | 16,895,064           |
| North Carolina..... | 8,895                 | 50,733        | 192,799         | 3,232,277         | 272,900         | 3,757,604           | 7,224,521            |
| North Dakota.....   | 216,988               | 43,009        | 48,112          | 2,828,611         | 12,046          | 3,148,769           | 3,273,874            |
| Ohio.....           | 117,975               | 115,062       | 1,722,688       | 3,911,813         | 32,120          | 5,899,658           | 9,877,362            |
| Oklahoma.....       | 11,446                | 87,560        | 172,271         | 2,741,767         | 17,343          | 3,030,387           | 5,563,700            |
| Oregon.....         | 15,000                | 45,500        | 35,013          | 1,480,590         | 48,685          | 1,624,868           | 2,652,409            |
| Pennsylvania.....   | 44,426                | 203,842       | 1,103,947       | 3,584,384         | 208,824         | 5,145,423           | 8,800,293            |
| Rhode Island.....   |                       |               |                 | 382,966           | 223,897         | 606,863             | 989,829              |

TABLE 7.—Funds allotted to projects under contract on June 30, 1938—Continued

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

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |                     |                      |
| South Carolina..... | \$99,580              | \$40,530      | \$214,539       | \$2,378,282       | \$22,137        | \$2,755,068         | \$5,745,158          |
| South Dakota.....   | 90,681                | 50,997        | 106,996         | 2,293,020         | 96,548          | 2,638,242           | 4,475,720            |
| Tennessee.....      |                       | 41,923        | 58,560          | 2,497,746         | 14,381          | 2,612,610           | 5,110,356            |
| Texas.....          | 174,061               | 179,840       | 162,840         | 6,398,356         |                 | 6,915,097           | 13,521,758           |
| Utah.....           |                       | 31,007        | 18,461          | 725,404           | 108,143         | 883,015             | 1,171,326            |
| Vermont.....        |                       | 13,865        | 10,900          | 692,676           | 158,996         | 876,347             | 1,809,732            |
| Virginia.....       | 2,150                 | 90,859        | 55,358          | 2,679,032         | 132,725         | 2,960,124           | 5,641,708            |
| Washington.....     | 25,090                | 65,824        | 46,426          | 2,471,774         | 124,799         | 2,733,823           | 5,001,177            |
| West Virginia.....  | 23,168                | 33,471        | 277,876         | 1,085,323         | 214,004         | 1,633,842           | 2,205,637            |
| Wisconsin.....      | 56,700                | 72,000        | 89,783          | 2,329,267         | 572,947         | 3,120,697           | 5,753,907            |
| Wyoming.....        |                       | 33,287        | 20,412          | 1,399,661         | 144,884         | 1,598,234           | 2,477,665            |
| Hawaii.....         |                       | 10,000        | 169,698         | 475,695           |                 | 655,393             | 1,146,760            |
| Puerto Rico.....    |                       |               |                 | 562,390           | 61,550          | 623,940             | 1,190,759            |
| Total.....          | 1,961,743             | 4,512,141     | 9,067,480       | 113,784,986       | 9,080,511       | 138,406,861         | 253,582,751          |

ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

|                     |           |           |           |            |           |            |             |
|---------------------|-----------|-----------|-----------|------------|-----------|------------|-------------|
| Alabama.....        | \$273,322 |           | \$131,700 | \$287,265  | \$81,800  | \$774,087  | \$1,069,243 |
| Arizona.....        |           |           |           | 6,108      |           | 6,108      | 8,483       |
| Arkansas.....       | 800       |           | 14,460    | 16,865     | 13,370    | 45,495     | 46,520      |
| California.....     | 20,460    |           |           | 572,275    | 203,970   | 796,705    | 1,298,605   |
| Colorado.....       |           | \$8,200   |           | 18,260     | 2,450     | 28,910     | 47,278      |
| Connecticut.....    |           |           | 295,180   | 101,905    |           | 397,085    | 512,440     |
| Delaware.....       |           |           |           | 12,109     |           | 12,109     | 24,834      |
| Florida.....        |           |           | 19,820    | 91,850     |           | 111,670    | 203,520     |
| Georgia.....        | 344,120   | 506,240   | 93,090    | 420,100    |           | 1,363,550  | 2,001,350   |
| Idaho.....          |           |           | 1,244     | 18,032     |           | 19,276     | 31,515      |
| Illinois.....       | 423,083   |           | 1,045,550 | 1,149,160  | 530,000   | 3,147,793  | 4,354,732   |
| Indiana.....        | 16,400    |           |           | 344,013    | 10,400    | 370,813    | 728,306     |
| Iowa.....           |           | 30,000    | 1,005,000 | 211,435    | 619,800   | 1,866,235  | 2,179,962   |
| Kansas.....         | 20,885    | 143,071   | 1,110,603 | 576,783    | 203,862   | 2,055,204  | 2,746,553   |
| Kentucky.....       | 35,261    | 174,680   | 417,814   | 118,950    | 154,478   | 901,183    | 1,020,133   |
| Louisiana.....      |           | 76,360    | 345,820   | 14,460     |           | 436,640    | 504,639     |
| Maine.....          | 8,645     |           |           | 243,889    | 134,770   | 387,304    | 630,183     |
| Maryland.....       | 115,570   | 154,193   | 10,000    |            |           | 279,763    | 279,763     |
| Massachusetts.....  |           |           |           | 521,581    |           | 521,581    | 1,043,165   |
| Michigan.....       |           | 43,400    | 35,000    | 798,350    | 192,150   | 1,068,900  | 2,022,500   |
| Minnesota.....      | 178,568   |           | 407,520   | 543,681    | 80,155    | 1,209,924  | 1,783,537   |
| Mississippi.....    | 5,300     | 62,100    | 105,100   | 387,960    | 75,300    | 635,760    | 1,087,880   |
| Missouri.....       |           | 640,518   | 12,675    | 208,462    | 155,240   | 1,016,895  | 1,281,679   |
| Montana.....        | 40,949    | 60,900    |           | 8,303      | 107,474   | 217,626    | 224,088     |
| Nebraska.....       |           | 146,793   | 80,551    | 88,181     | 12,108    | 327,633    | 416,441     |
| Nevada.....         |           |           | 4,257     | 16,363     |           | 20,620     | 23,128      |
| New Hampshire.....  |           |           |           | 24,960     |           | 24,960     | 50,011      |
| New Jersey.....     | 76,178    |           |           | 421,385    |           | 497,563    | 938,640     |
| New Mexico.....     |           |           | 3,129     |            |           | 3,129      | 3,129       |
| New York.....       | 90,000    | 23,700    | 263,750   | 758,345    |           | 1,135,795  | 1,985,186   |
| North Carolina..... | 40,085    | 16,641    | 77,330    | 220,865    |           | 354,921    | 593,906     |
| North Dakota.....   | 237,831   | 269,211   |           | 67,075     | 337,300   | 911,417    | 912,734     |
| Ohio.....           |           | 395,780   | 1,609,452 | 509,647    |           | 2,514,879  | 3,069,394   |
| Oklahoma.....       | 22,482    |           | 7,800     | 125,330    |           | 155,612    | 263,897     |
| Oregon.....         |           |           |           | 160,741    | 276,370   | 437,111    | 540,862     |
| Pennsylvania.....   | 102,707   | 586,310   | 1,076,115 | 334,043    |           | 2,099,175  | 2,540,093   |
| Rhode Island.....   |           |           |           | 101,400    |           | 101,400    | 202,800     |
| South Carolina..... | 24,471    | 141,878   | 74,092    | 217,343    | 9,000     | 466,784    | 783,219     |
| South Dakota.....   | 8,723     | 167,900   | 56,370    | 32,010     | 18,835    | 283,838    | 319,285     |
| Tennessee.....      |           |           |           | 221,611    |           | 221,611    | 443,222     |
| Texas.....          |           | 46,000    | 283,130   | 200,132    |           | 529,262    | 1,074,817   |
| Utah.....           |           |           |           | 161,930    | 2,030     | 163,960    | 227,745     |
| Vermont.....        |           |           |           | 30,925     | 2,400     | 33,325     | 64,250      |
| Virginia.....       |           |           | 568,954   | 66,860     | 147,790   | 783,604    | 850,464     |
| Washington.....     | 11,596    |           |           | 156,350    |           | 167,946    | 309,586     |
| West Virginia.....  | 160,821   |           | 212,500   | 191,550    | 62,000    | 626,871    | 670,063     |
| Wisconsin.....      |           | 4,000     |           | 1,026,190  | 463,840   | 1,536,449  | 2,114,009   |
| Wyoming.....        | 17,900    |           | 90,800    | 2,865      |           | 111,565    | 113,350     |
| Total.....          | 2,276,157 | 3,697,875 | 9,501,325 | 11,807,897 | 3,896,892 | 31,180,146 | 44,441,139  |

TABLE 7.—Funds allotted to projects under contract on June 30, 1938—Continued

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|----------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| Alabama        |                       |               |                 | \$3,550             | \$315,850       | \$319,400           | \$322,950            |
| Arkansas       |                       |               | \$6,475         |                     |                 | 6,475               | 6,475                |
| California     |                       | \$21,938      |                 |                     | 212,760         | 234,698             | 234,698              |
| Colorado       |                       |               | 316,470         | 5,630               | 3,550           | 325,650             | 330,150              |
| Delaware       |                       |               |                 |                     | 2,000           | 2,000               | 2,000                |
| Florida        |                       |               | 43,290          |                     |                 | 43,290              | 43,290               |
| Georgia        |                       | 363,810       | 517,950         | 12,350              |                 | 894,110             | 906,460              |
| Idaho          |                       |               |                 | 2,901               |                 | 2,901               | 7,570                |
| Illinois       |                       | 5,600         | 48,922          | 45,100              | 4,500           | 104,122             | 155,626              |
| Indiana        |                       |               |                 | 2,492               | 95,000          | 97,492              | 100,500              |
| Iowa           |                       |               |                 |                     | 3,000           | 3,000               | 3,252                |
| Kansas         |                       |               |                 | 21,835              | 3,950           | 25,785              | 47,620               |
| Kentucky       |                       |               | 157,000         | 413                 | 62,380          | 219,793             | 220,456              |
| Louisiana      |                       |               | 367,720         |                     |                 | 367,720             | 367,736              |
| Maine          |                       |               |                 | 22,200              |                 | 22,200              | 44,400               |
| Maryland       |                       |               | 72,500          |                     |                 | 72,500              | 72,500               |
| Massachusetts  |                       |               |                 |                     | 54,710          | 54,710              | 54,710               |
| Michigan       |                       |               |                 |                     | 247,775         | 247,775             | 247,775              |
| Minnesota      |                       |               |                 | 24,898              | 425,833         | 450,731             | 479,443              |
| Mississippi    |                       | 34,100        | 21,600          |                     | 70,000          | 125,700             | 125,700              |
| Missouri       |                       |               | 590,923         | 1,070               |                 | 591,993             | 593,063              |
| Montana        |                       |               | 80,744          |                     | 276,614         | 357,358             | 417,003              |
| Nebraska       |                       | 7,378         | 94,818          | 20,733              | 110,708         | 233,637             | 254,370              |
| Nevada         |                       |               |                 | 166                 | 3,309           | 3,475               | 3,501                |
| New Jersey     |                       |               | 161,724         |                     | 100,225         | 261,949             | 261,949              |
| New York       |                       | 40,070        | 1,085,900       | 8,980               |                 | 1,145,950           | 1,153,930            |
| North Carolina |                       | 37,900        | 634,730         | 20,520              |                 | 693,150             | 713,670              |
| North Dakota   |                       | 13,500        | 364,000         |                     | 184,700         | 562,200             | 562,200              |
| Ohio           |                       | 136,809       | 2,038,739       |                     |                 | 2,175,548           | 2,578,890            |
| Oklahoma       |                       | 56,010        | 144,700         | 6,725               |                 | 207,435             | 213,350              |
| Oregon         |                       |               |                 | 678                 |                 | 678                 | 1,216                |
| Pennsylvania   |                       | 208,174       | 285,377         | 8,271               |                 | 501,822             | 557,232              |
| South Carolina |                       | 89,055        | 145,857         | 3,100               | 38,500          | 276,512             | 286,209              |
| South Dakota   |                       |               | 9,260           |                     | 45,370          | 54,630              | 54,630               |
| Tennessee      |                       | 175,890       | 519,850         |                     |                 | 695,740             | 695,740              |
| Texas          |                       | 60,475        | 2,920           | 19,255              | 9,250           | 91,900              | 130,543              |
| Utah           |                       |               |                 | 16,580              |                 | 16,580              | 30,520               |
| Vermont        |                       |               |                 | 14,650              |                 | 14,650              | 33,180               |
| Virginia       |                       |               | 3,892           | 1,050               |                 | 4,942               | 5,992                |
| Washington     |                       |               |                 | 40,300              | 250,690         | 290,990             | 327,326              |
| West Virginia  |                       |               | 406,400         |                     | 58,900          | 465,300             | 465,300              |
| Wisconsin      |                       |               | 347,148         | 55,640              |                 | 402,788             | 473,493              |
| Wyoming        |                       |               |                 | 58,010              | 5,030           | 63,040              | 98,910               |
| Total          |                       | 1,250,709     | 8,478,909       | 417,095             | 2,584,604       | 12,731,317          | 13,685,528           |

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

|               |          |           |           |           |           |           |           |
|---------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Alabama       |          | \$156,200 | \$106,600 | \$204,250 | \$154,460 | \$621,510 | \$826,034 |
| Arizona       | \$19,573 |           |           | 192,948   |           | 212,521   | 308,558   |
| Arkansas      |          |           |           | 6,563     |           | 6,563     | 13,126    |
| California    | 71,027   |           |           | 474,070   |           | 545,097   | 901,681   |
| Colorado      |          | 36,285    |           | 329,293   | 2,475     | 368,053   | 636,179   |
| Connecticut   |          |           | 254,140   |           |           | 254,140   | 254,140   |
| Delaware      |          |           |           |           | 70,270    | 70,270    | 70,270    |
| Florida       |          |           | 59,610    | 10,061    |           | 69,671    | 79,732    |
| Georgia       | 628,230  | 983,740   | 246,490   | 159,649   |           | 2,018,109 | 2,325,499 |
| Idaho         |          |           | 52,614    | 128,808   |           | 181,422   | 342,741   |
| Illinois      | 16,098   | 117,331   | 135,900   | 710,666   |           | 979,995   | 1,763,632 |
| Indiana       |          |           | 28,293    | 210,308   | 317,913   | 556,514   | 1,000,640 |
| Kansas        |          | 16,102    |           | 23,650    |           | 39,752    | 63,402    |
| Kentucky      |          | 44,323    | 17,858    | 211,697   | 28,855    | 302,733   | 764,604   |
| Louisiana     | 7,420    | 97,070    |           | 35,961    |           | 140,451   | 176,621   |
| Maine         |          | 13,000    |           | 122,518   | 51,200    | 186,718   | 309,236   |
| Maryland      | 295,516  | 223,048   | 432,075   | 3,132     |           | 953,771   | 1,047,990 |
| Massachusetts |          | 521,293   | 521,380   | 2,650     |           | 1,045,323 | 1,569,267 |
| Michigan      |          | 185,000   |           | 11,681    | 25,625    | 222,306   | 233,987   |
| Minnesota     | 206,861  |           |           | 156,529   | 27,020    | 390,410   | 587,149   |
| Mississippi   | 120,000  |           |           |           |           | 120,000   | 120,000   |
| Missouri      |          |           |           | 192,625   |           | 192,625   | 388,410   |
| Montana       | 66,036   | 23,054    |           | 7,865     |           | 96,955    | 135,377   |
| Nebraska      |          | 40,869    |           | 223,699   |           | 264,568   | 488,267   |
| Nevada        | 15,297   |           |           | 303,739   |           | 319,036   | 365,877   |

TABLE 7.—Funds allotted to projects under contract on June 30, 1938—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|----------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| New Hampshire  |                       | \$87,794      |                 | \$50,152            |                 | \$137,946           | \$202,427            |
| New Jersey     |                       |               | \$246,680       |                     |                 | 246,680             | 246,680              |
| New Mexico     |                       |               |                 | 330,193             |                 | 330,193             | 541,394              |
| New York       | \$16,000              | 79,630        | 52,700          | 1,172,150           | \$832,400       | 2,152,880           | 3,329,580            |
| North Carolina | 30,383                | 75,600        | 241,230         | 333,550             | 235,600         | 916,363             | 1,249,913            |
| North Dakota   | 24,610                | 72,680        |                 |                     | 16,490          | 113,780             | 113,780              |
| Ohio           |                       | 49,680        | 383,812         | 92,200              |                 | 525,692             | 648,830              |
| Oklahoma       | 195,373               | 16,500        |                 | 55,764              |                 | 267,637             | 345,334              |
| Oregon         | 66,468                |               | 10,000          | 282,524             |                 | 358,992             | 609,566              |
| Pennsylvania   | 32,701                | 292,870       | 218,128         | 665,390             | 75,086          | 1,284,175           | 2,129,051            |
| Rhode Island   |                       |               |                 | 42,535              |                 | 42,535              | 85,070               |
| South Carolina | 44,000                | 281,959       |                 | 240,362             | 15,000          | 581,321             | 921,879              |
| South Dakota   | 5,130                 | 11,370        | 201,132         | 6,250               | 53,990          | 277,872             | 341,880              |
| Tennessee      |                       | 165,205       | 93,710          | 123,803             |                 | 382,713             | 566,521              |
| Texas          | 184,531               | 39,116        | 7,790           | 739,901             | 28,850          | 1,000,188           | 1,926,920            |
| Utah           |                       |               |                 | 199,660             | 1,760           | 201,420             | 363,035              |
| Vermont        |                       |               |                 | 73,203              | 46,292          | 119,495             | 218,168              |
| Virginia       | 43,900                | 180,679       |                 | 225,993             | 56,600          | 507,172             | 763,093              |
| Washington     | 10,000                |               | 43,356          | 186,678             | 83,036          | 323,070             | 493,020              |
| West Virginia  | 193,582               | 65,400        | 76,490          | 104,000             | 61,950          | 501,422             | 607,360              |
| Wisconsin      | 14,200                |               | 19,537          | 226,835             | 75,000          | 335,572             | 605,325              |
| Wyoming        |                       |               |                 | 175,810             | 9,500           | 185,310             | 294,040              |
| Hawaii         | 14,000                |               |                 | 28,125              |                 | 42,125              | 70,250               |
| Puerto Rico    |                       |               |                 | 121,950             |                 | 121,950             | 244,000              |
| Total          | 2,320,936             | 3,875,798     | 3,449,525       | 9,199,390           | 2,269,372       | 21,115,021          | 31,629,565           |

TOTAL

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|----------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|                |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
| Alabama        | \$290,323             | \$260,300     | \$298,819       | \$3,589,610       | \$207,800           | \$584,134       | \$5,230,986         | \$9,039,001          |
| Arizona        | 19,573                | 38,548        | 18,841          | 1,369,811         | 192,948             | 4,718           | 1,644,439           | 2,200,791            |
| Arkansas       | 15,564                | 100,626       | 193,044         | 1,100,169         | 6,563               | 278,482         | 1,693,848           | 1,713,349            |
| California     | 91,487                | 138,156       | 112,295         | 6,902,824         | 474,070             | 1,200,383       | 8,919,215           | 15,463,522           |
| Colorado       |                       | 599,182       | 355,944         | 1,401,380         | 334,923             | 46,219          | 2,737,648           | 4,172,687            |
| Connecticut    | 1,970                 |               | 676,920         | 579,991           |                     |                 | 1,258,881           | 1,867,929            |
| Delaware       |                       | 10,234        | 279,052         | 348,285           |                     | 77,270          | 714,841             | 1,064,860            |
| Florida        | 39,920                | 38,957        | 172,638         | 1,534,531         | 10,061              | 10,616          | 1,806,723           | 3,351,315            |
| Georgia        | 1,231,914             | 2,172,894     | 1,730,449       | 3,962,671         | 171,999             | 18,346          | 9,288,273           | 13,788,384           |
| Idaho          | 34,162                | 52,439        | 79,075          | 1,222,662         | 131,709             | 99,994          | 1,620,041           | 2,627,722            |
| Illinois       | 439,181               | 263,241       | 1,645,230       | 5,900,852         | 755,766             | 1,013,174       | 10,017,444          | 16,773,475           |
| Indiana        | 47,900                | 49,000        | 151,243         | 3,560,630         | 212,800             | 1,370,913       | 5,392,486           | 9,429,682            |
| Iowa           |                       | 104,865       | 1,089,000       | 3,241,573         |                     | 986,800         | 5,422,238           | 9,485,336            |
| Kansas         | 20,885                | 234,098       | 1,189,297       | 2,948,628         | 45,485              | 699,416         | 5,137,809           | 8,334,010            |
| Kentucky       | 48,637                | 274,897       | 751,698         | 3,111,228         | 212,110             | 259,322         | 4,657,892           | 8,257,138            |
| Louisiana      | 51,879                | 298,003       | 933,762         | 2,724,185         | 35,961              | 146,478         | 4,190,268           | 14,383,700           |
| Maine          | 8,645                 | 38,152        | 69,281          | 1,402,543         | 144,718             | 235,657         | 1,898,996           | 3,469,368            |
| Maryland       | 542,585               | 668,584       | 858,474         | 1,096,021         | 3,132               | 64,556          | 3,233,382           | 4,427,761            |
| Massachusetts  |                       | 958,133       | 591,790         | 1,379,445         | 2,650               | 70,420          | 3,002,438           | 5,343,676            |
| Michigan       | 96,788                | 322,921       | 204,432         | 3,272,594         | 11,681              | 945,152         | 4,853,568           | 8,311,388            |
| Minnesota      | 398,470               | 79,000        | 584,020         | 2,870,717         | 181,427             | 606,876         | 4,720,510           | 7,879,745            |
| Mississippi    | 205,413               | 120,539       | 472,133         | 3,314,481         |                     | 252,700         | 4,365,296           | 8,825,035            |
| Missouri       | 30,000                | 763,002       | 695,730         | 2,894,762         | 193,695             | 385,210         | 4,962,399           | 8,208,677            |
| Montana        | 114,555               | 118,438       | 185,931         | 982,606           | 7,865               | 637,386         | 2,046,811           | 2,914,673            |
| Nebraska       |                       | 253,101       | 261,972         | 3,744,112         | 244,431             | 311,783         | 4,815,399           | 8,828,618            |
| Nevada         | 21,979                | 33,646        | 17,565          | 1,238,898         | 303,905             | 149,761         | 1,765,574           | 2,003,716            |
| New Hampshire  |                       | 101,972       | 14,443          | 605,400           | 50,152              | 65,175          | 837,142             | 1,513,814            |
| New Jersey     | 106,483               | 46,947        | 597,104         | 1,424,918         |                     | 204,779         | 2,380,231           | 3,682,334            |
| New Mexico     |                       | 43,071        | 29,008          | 1,505,836         | 330,193             | 122,441         | 2,030,549           | 3,040,714            |
| New York       | 328,900               | 288,195       | 1,434,350       | 8,383,628         | 1,181,130           | 1,845,100       | 13,461,303          | 23,363,760           |
| North Carolina | 79,364                | 180,874       | 1,146,089       | 3,453,142         | 354,070             | 508,500         | 5,722,039           | 9,782,010            |
| North Dakota   | 479,429               | 398,400       | 412,112         | 2,895,689         |                     | 550,536         | 4,736,166           | 4,862,588            |
| Ohio           | 117,975               | 697,332       | 5,754,691       | 4,421,461         | 92,200              | 32,120          | 11,115,779          | 16,174,476           |
| Oklahoma       | 229,300               | 160,070       | 324,771         | 2,867,098         | 62,487              | 17,343          | 3,661,069           | 6,386,281            |
| Oregon         | 81,467                | 45,580        | 45,013          | 1,641,331         | 283,202             | 325,055         | 2,421,648           | 3,804,053            |
| Pennsylvania   | 179,834               | 1,291,196     | 2,683,567       | 3,918,426         | 673,661             | 283,910         | 9,030,594           | 14,026,689           |
| Rhode Island   |                       |               |                 | 484,366           | 42,535              | 223,897         | 750,798             | 1,277,699            |
| South Carolina | 168,051               | 553,422       | 434,488         | 2,595,624         | 243,462             | 84,637          | 4,079,684           | 7,736,466            |

TABLE 7.—Funds allotted to projects under contract on June 30, 1938—Continued

| State              | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|--------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|                    |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
| South Dakota.....  | \$104,534             | \$230,267     | \$373,758       | \$2,325,030       | \$6,250             | \$214,743       | \$3,254,582         | \$5,191,515          |
| Tennessee.....     | 383,018               | 672,129       | 2,719,357       | 123,803           | 14,381              | 3,912,679       | 6,755,839           | 16,654,038           |
| Texas.....         | 358,592               | 325,431       | 456,680         | 6,598,486         | 759,157             | 38,100          | 8,536,446           | 17,924,626           |
| Utah.....          | 31,907                | 31,907        | 18,461          | 887,334           | 216,240             | 111,933         | 1,264,975           | 1,792,626            |
| Vermont.....       | 13,865                | 10,900        | 723,601         | 87,853            | 207,688             | 1,043,907       | 2,125,330           | 7,261,257            |
| Virginia.....      | 46,050                | 271,538       | 628,204         | 2,745,892         | 227,043             | 337,115         | 4,255,812           | 6,131,109            |
| Washington.....    | 46,596                | 65,824        | 89,782          | 2,628,124         | 226,978             | 458,525         | 3,515,829           | 3,948,359            |
| West Virginia..... | 377,571               | 98,871        | 973,266         | 1,276,873         | 101,000             | 396,854         | 3,227,435           | 9,746,734            |
| Wisconsin.....     | 70,900                | 76,000        | 498,857         | 3,355,457         | 282,475             | 1,111,787       | 5,935,506           | 2,983,965            |
| Wyoming.....       | 17,900                | 33,287        | 111,212         | 1,402,516         | 233,820             | 159,414         | 1,998,149           | 1,217,010            |
| Hawaii.....        | 14,000                | 10,000        | 169,698         | 475,695           | 28,125              | 61,550          | 745,580             | 1,434,759            |
| Puerto Rico.....   |                       |               |                 | 562,390           | 121,950             |                 |                     |                      |
| Total.....         | 6,558,836             | 13,336,523    | 30,497,239      | 125,592,883       | 9,616,485           | 17,831,379      | 203,433,345         | 343,338,983          |

TABLE 8.—Funds allotted to projects approved but not under contract on June 30, 1938 ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid      |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Highways 1936-39 | Grade crossings |                     |                      |
| Alabama.....        |                       |               |                 | \$1,207,559      | \$83,400        | \$1,290,959         | \$2,501,301          |
| Arizona.....        |                       |               |                 | 6,073            |                 | 6,073               | 7,592                |
| Arkansas.....       |                       |               |                 | 11,882           | 110,000         | 121,882             | 122,720              |
| California.....     |                       |               |                 | 471,900          | 144,157         | 616,057             | 1,034,011            |
| Colorado.....       |                       |               |                 | 207,350          |                 | 207,350             | 372,930              |
| Connecticut.....    |                       |               |                 | 241,510          |                 | 241,510             | 405,970              |
| Delaware.....       |                       |               |                 | 275,399          |                 | 275,399             | 557,100              |
| Florida.....        |                       |               |                 | 441,423          |                 | 441,423             | 882,846              |
| Georgia.....        |                       |               |                 | 794,850          |                 | 794,850             | 1,589,700            |
| Idaho.....          |                       |               |                 | 149,288          |                 | 149,288             | 249,305              |
| Illinois.....       |                       |               |                 | 1,227,000        | 226,000         | 1,453,000           | 2,680,000            |
| Indiana.....        | \$20,686              |               |                 | 472,319          |                 | 592,005             | 976,900              |
| Iowa.....           |                       |               |                 | 794,300          |                 | 794,300             | 1,682,784            |
| Kansas.....         |                       |               |                 | 1,757,860        | 246,393         | 2,004,253           | 3,782,085            |
| Kentucky.....       |                       |               |                 | 919,396          | 160,432         | 1,118,788           | 2,068,134            |
| Louisiana.....      |                       |               |                 | 227,491          | 134,100         | 361,591             | 637,353              |
| Maine.....          | 6,559                 |               |                 | 175,217          | 201,130         | 382,927             | 558,175              |
| Maryland.....       |                       |               | \$130,627       | 287,175          |                 | 417,802             | 720,350              |
| Massachusetts.....  |                       |               |                 |                  | 162,480         | 162,480             | 162,480              |
| Michigan.....       |                       | \$25,746      |                 | 186,240          | 359,900         | 571,846             | 918,238              |
| Minnesota.....      |                       |               |                 | 380,570          |                 | 380,570             | 770,436              |
| Mississippi.....    | 1,650                 |               |                 | 390,650          | 103,300         | 495,600             | 1,654,990            |
| Missouri.....       |                       |               |                 | 1,229,376        |                 | 1,229,376           | 3,071,600            |
| Montana.....        |                       |               | 9,240           | 142,262          |                 | 151,502             | 262,596              |
| Nebraska.....       |                       |               |                 | 375,303          | 13,880          | 389,183             | 766,716              |
| Nevada.....         |                       |               |                 | 334,345          |                 | 334,345             | 385,484              |
| New Hampshire.....  |                       |               |                 | 47,327           |                 | 47,327              | 94,656               |
| New Mexico.....     |                       |               |                 | 242,840          |                 | 242,840             | 398,170              |
| New York.....       |                       |               | 72,000          | 559,045          | 211,800         | 833,845             | 1,384,400            |
| North Carolina..... |                       |               |                 | 371,060          |                 | 371,060             | 858,401              |
| North Dakota.....   |                       |               |                 | 21,300           |                 | 21,300              | 39,770               |
| Ohio.....           |                       |               |                 | 1,535,997        | 71,710          | 1,607,707           | 3,114,125            |
| Oklahoma.....       |                       |               |                 | 1,129,064        |                 | 1,129,064           | 2,159,721            |
| Oregon.....         |                       |               |                 | 1,160            |                 | 1,160               | 1,897                |
| Pennsylvania.....   |                       |               |                 | 766,419          |                 | 766,419             | 1,560,338            |
| Rhode Island.....   |                       |               | 6,781           | 49,525           |                 | 47,306              | 87,831               |
| South Carolina..... |                       |               | 126,000         | 307,900          | 14,820          | 448,720             | 873,040              |
| South Dakota.....   |                       |               |                 | 375,870          | 4,670           | 380,540             | 684,814              |
| Tennessee.....      |                       |               |                 | 307,230          |                 | 307,230             | 614,460              |
| Texas.....          |                       |               |                 | 962,358          | 535,345         | 1,437,703           | 2,451,498            |
| Utah.....           |                       |               |                 | 150,624          | 16,100          | 166,724             | 231,340              |
| Vermont.....        |                       |               |                 | 107,699          |                 | 107,699             | 216,698              |
| Virginia.....       |                       |               |                 | 1,150,293        | 248,443         | 1,398,736           | 2,550,729            |
| Washington.....     |                       | 4,746         | 70,000          | 32,400           | 12,902          | 120,018             | 166,735              |
| West Virginia.....  |                       |               |                 | 352,932          | 7,200           | 360,132             | 583,860              |
| Wisconsin.....      |                       |               |                 | 708,000          |                 | 708,000             | 1,605,672            |
| Wyoming.....        | 26,356                | 20,859        |                 | 38,427           |                 | 85,642              | 109,416              |
| Hawaii.....         |                       | 44,644        |                 | 350,440          |                 | 592,624             | 968,150              |
| Puerto Rico.....    |                       |               |                 |                  | 157,920         | 157,920             | 159,001              |
| Total.....          | 64,242                | 95,995        | 414,648         | 22,186,519       | 3,452,562       | 26,213,966          | 49,796,642           |

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

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid      |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Highways 1936-39 | Grade crossings |                     |                      |
| Alabama.....        |                       |               |                 | \$79,555         |                 | \$79,555            | \$165,480            |
| Arkansas.....       |                       |               |                 | 1,080            |                 | 1,080               | 1,320                |
| California.....     |                       |               | \$10,000        | 246,556          |                 | 256,556             | 474,622              |
| Colorado.....       |                       |               |                 | 65,390           |                 | 65,390              | 117,630              |
| Delaware.....       |                       |               |                 | 30,851           |                 | 30,851              | 62,077               |
| Florida.....        |                       |               |                 | 645,800          | \$178,800       | \$24,600            | 1,470,400            |
| Georgia.....        |                       |               | 2,710           | 60,590           |                 | 63,300              | 123,890              |
| Idaho.....          |                       |               |                 | 228,900          |                 | 228,900             | 382,517              |
| Illinois.....       | \$86,286              |               |                 | 95,351           |                 | 181,637             | 276,987              |
| Indiana.....        | 39,200                |               |                 | 9,850            |                 | 49,080              | 58,960               |
| Iowa.....           |                       |               |                 | 78,100           |                 | 78,100              | 164,885              |
| Kansas.....         |                       | \$35,200      |                 | 13,426           | 6,600           | 55,226              | 68,652               |
| Kentucky.....       |                       |               |                 | 160,579          |                 | 160,579             | 321,158              |
| Louisiana.....      |                       |               |                 | 252,661          | 16,750          | 269,411             | 545,926              |
| Maryland.....       |                       |               |                 | 213,655          |                 | 213,655             | 446,061              |
| Massachusetts.....  |                       |               | 249,991         | 117,225          |                 | 367,216             | 484,441              |
| Michigan.....       |                       |               |                 | 231,600          | 132,300         | 363,900             | 595,500              |
| Minnesota.....      |                       |               |                 | 64,389           | 39,540          | 103,929             | 169,504              |
| Mississippi.....    | 44,550                | 10,450        |                 | 4,900            |                 | 59,900              | 74,800               |
| Missouri.....       |                       |               |                 | 21,930           |                 | 21,930              | 48,350               |
| Nebraska.....       |                       | 69,610        |                 | 170,740          |                 | 240,350             | 1,671,089            |
| Nevada.....         |                       |               |                 | 8,763            |                 | 8,763               | 10,106               |
| New Mexico.....     |                       | 12,196        |                 | 1,080            |                 | 13,276              | 16,452               |
| New York.....       | 6,000                 |               |                 | 21,550           |                 | 27,550              | 49,100               |
| North Carolina..... |                       |               |                 | 22,350           | 17,420          | 39,770              | 62,186               |
| North Dakota.....   |                       |               |                 | 2,318            | 46,140          | 48,458              | 50,470               |
| Ohio.....           |                       |               |                 | 129,678          | 195,400         | 325,078             | 454,755              |
| Oklahoma.....       |                       |               |                 | 1,489            |                 | 1,489               | 2,800                |
| Oregon.....         | 21,300                |               |                 |                  |                 | 21,300              | 24,211               |
| Pennsylvania.....   |                       |               |                 | 54,500           |                 | 54,500              | 108,800              |
| Rhode Island.....   |                       |               |                 | 60,410           |                 | 60,410              | 120,820              |
| South Carolina..... |                       |               |                 | 7,700            | 291,210         | 298,910             | 309,160              |
| South Dakota.....   |                       |               |                 | 330              |                 | 330                 | 610                  |
| Tennessee.....      |                       |               |                 | 24,500           |                 | 24,500              | 49,000               |
| Texas.....          | 1,952                 |               |                 | 252,029          | 458             | 254,439             | 521,590              |
| Utah.....           |                       |               |                 | 45,685           |                 | 45,685              | 64,080               |
| Virginia.....       | 10,503                | 11,740        | 1,256           | 39,735           |                 | 63,234              | 104,796              |
| West Virginia.....  |                       |               |                 | 65,156           | 43,200          | 108,356             | 174,806              |
| Wisconsin.....      |                       |               |                 | 63,700           |                 | 63,700              | 139,068              |
| Wyoming.....        | 570                   |               |                 | 2,203            |                 | 2,773               | 4,139                |
| Total.....          | 210,361               | 139,196       | 263,957         | 3,596,364        | 967,818         | 5,177,696           | 9,991,198            |

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| Alabama.....        |                       |               |                 | \$15,600            |                 | \$15,600            | \$34,300             |
| Colorado.....       |                       |               |                 | 19,800              |                 | 19,800              | 35,630               |
| Connecticut.....    |                       |               |                 | 7,190               |                 | 7,190               | 14,380               |
| Georgia.....        |                       | \$6,910       | \$60,200        | 16,600              |                 | 83,710              | 100,310              |
| Idaho.....          |                       |               |                 | 1,181               |                 | 1,181               | 3,702                |
| Illinois.....       |                       |               |                 | 21,250              |                 | 21,250              | 42,500               |
| Indiana.....        |                       |               |                 | 150                 |                 | 150                 | 300                  |
| Kentucky.....       |                       |               |                 | 557                 |                 | 557                 | 1,306                |
| Nebraska.....       |                       |               | 140,000         |                     |                 | 140,000             | 140,000              |
| New Jersey.....     |                       |               | 44,730          |                     |                 | 44,730              | 44,730               |
| New York.....       |                       |               |                 |                     | \$227,718       | 227,718             | 228,468              |
| North Carolina..... |                       |               |                 | 34,400              |                 | 34,400              | 89,900               |
| North Dakota.....   |                       |               |                 | 1,713               |                 | 1,713               | 3,200                |
| Pennsylvania.....   |                       | 4,700         |                 | 1,600               |                 | 6,300               | 7,900                |
| South Carolina..... |                       |               |                 | 8,100               | 12,814          | 20,914              | 33,934               |
| Texas.....          |                       |               |                 | 27,307              | 105,000         | 132,307             | 162,129              |
| Virginia.....       |                       |               |                 | 9,423               |                 | 9,423               | 65,800               |
| Washington.....     |                       |               |                 | 8,600               |                 | 8,600               | 16,371               |
| Wisconsin.....      |                       |               |                 | 500                 |                 | 500                 | 1,353                |
| Total.....          |                       | 11,610        | 244,930         | 173,971             | 345,532         | 776,043             | 1,026,213            |

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

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total Federal funds | Estimated total cost |
|----------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------------------|----------------------|
|                |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |                     |                      |
| Alabama        |                       |               |                 | \$108,050           |                 | \$108,050           | \$216,100            |
| California     |                       |               |                 | 347,128             |                 | 347,128             | 651,558              |
| Colorado       |                       |               |                 | 47,570              |                 | 47,570              | 85,560               |
| Connecticut    |                       |               |                 | 16,560              |                 | 16,560              | 33,150               |
| Delaware       |                       | \$17,000      |                 |                     |                 | 17,000              | 26,712               |
| Georgia        | \$73,318              | 69,030        | \$5,400         | 126,850             |                 | 274,598             | 404,620              |
| Idaho          |                       |               |                 | 52,309              |                 | 52,309              | 135,681              |
| Illinois       |                       | 36,000        |                 | 413,050             |                 | 449,050             | 862,100              |
| Indiana        |                       |               |                 | 338,050             |                 | 338,050             | 741,953              |
| Kansas         |                       |               |                 | 64,900              |                 | 64,900              | 129,800              |
| Kentucky       |                       |               |                 | 326,745             |                 | 326,745             | 1,115,721            |
| Louisiana      |                       |               |                 | 147,820             |                 | 147,820             | 408,602              |
| Maine          |                       |               |                 | 62,400              |                 | 62,400              | 124,800              |
| Maryland       |                       | 69,764        |                 |                     |                 | 69,764              | 70,959               |
| Michigan       |                       |               |                 | 158,000             |                 | 158,000             | 316,000              |
| Missouri       |                       |               |                 | 93,420              |                 | 93,420              | 278,080              |
| Nebraska       |                       |               |                 | 90,594              |                 | 90,594              | 191,536              |
| Nevada         | 13,501                |               |                 | 53,422              |                 | 66,923              | 76,335               |
| New Hampshire  | 20,236                |               |                 | 74,848              |                 | 95,084              | 226,601              |
| New Jersey     | 51,847                |               |                 | 55,855              |                 | 107,702             | 200,390              |
| New York       |                       |               |                 | 6,250               |                 | 6,250               | 12,500               |
| North Carolina |                       |               |                 | 74,500              |                 | 74,500              | 188,773              |
| North Dakota   |                       |               |                 | 29,157              |                 | 29,157              | 54,440               |
| Ohio           |                       |               |                 | 5,000               |                 | 5,000               | 11,100               |
| Oklahoma       |                       |               |                 | 225,521             |                 | 225,521             | 442,700              |
| Oregon         |                       | 11,846        |                 | 11,850              |                 | 23,696              | 31,270               |
| Pennsylvania   |                       |               |                 | 313,876             |                 | 313,876             | 638,552              |
| Rhode Island   |                       |               |                 | 23,481              |                 | 23,481              | 48,090               |
| South Carolina | 35,500                |               |                 | 166,054             |                 | 201,554             | 423,485              |
| Tennessee      | 5,295                 |               |                 | 59,230              |                 | 61,525              | 123,755              |
| Texas          |                       | 30,809        |                 | 399,293             | \$802,100       | 732,202             | 1,313,425            |
| Utah           |                       |               |                 | 17,000              |                 | 17,000              | 32,635               |
| Vermont        |                       |               |                 |                     | 22,170          | 22,170              | 26,450               |
| Virginia       | 6,103                 |               |                 | 181,547             |                 | 187,650             | 416,623              |
| Washington     |                       |               |                 | 182,600             | 194,071         | 376,671             | 540,803              |
| West Virginia  |                       |               |                 | 59,100              |                 | 59,100              | 118,200              |
| Wisconsin      |                       |               |                 | 69,800              |                 | 69,800              | 160,387              |
| Wyoming        |                       |               |                 | 38,000              |                 | 38,000              | 61,500               |
| Total          | 205,800               | 234,449       | 5,400           | 4,439,830           | 518,341         | 5,403,820           | 10,955,946           |

TOTAL

| State         | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|---------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|               |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
| Alabama       |                       |               |                 | \$1,287,135       | \$123,650           | \$83,400        | \$1,494,185         | \$2,917,181          |
| Arizona       |                       |               |                 | 6,073             |                     |                 | 6,073               | 7,592                |
| Arkansas      |                       |               |                 | 12,962            |                     | 110,000         | 122,962             | 124,040              |
| California    |                       |               | \$10,000        | 718,456           | 347,128             | 144,157         | 1,210,741           | 2,160,191            |
| Colorado      |                       |               |                 | 272,740           | 67,370              |                 | 340,110             | 611,750              |
| Connecticut   |                       |               |                 | 201,510           | 23,750              |                 | 225,260             | 453,500              |
| Delaware      |                       | \$17,000      |                 | 306,250           |                     |                 | 323,250             | 645,889              |
| Florida       |                       |               |                 | 1,087,223         |                     | 178,800         | 1,266,023           | 2,353,246            |
| Georgia       | \$73,318              | 75,940        | 68,310          | 855,440           | 143,450             |                 | 1,216,455           | 2,218,520            |
| Idaho         |                       |               |                 | 378,108           | 53,490              |                 | 431,598             | 771,205              |
| Illinois      | 86,287                | 36,000        |                 | 1,322,350         | 434,309             | 226,000         | 2,104,937           | 3,861,587            |
| Indiana       | 68,885                |               |                 | 482,200           | 338,200             |                 | 889,285             | 1,778,113            |
| Iowa          |                       |               |                 | 872,400           |                     |                 | 872,400             | 1,847,669            |
| Kansas        |                       | 35,200        |                 | 1,771,287         | 64,900              | 272,963         | 2,144,350           | 3,480,537            |
| Kentucky      |                       |               |                 | 1,109,945         | 327,302             | 169,402         | 1,606,649           | 3,506,319            |
| Louisiana     |                       |               |                 | 480,152           | 147,820             | 150,850         | 778,822             | 1,591,880            |
| Maine         | 6,550                 |               |                 | 175,247           | 62,400              | 201,130         | 445,327             | 682,875              |
| Maryland      |                       | 69,764        | 130,627         | 500,830           |                     |                 | 701,221             | 1,237,370            |
| Massachusetts |                       |               | 249,991         | 117,225           |                     | 162,480         | 529,696             | 646,921              |
| Michigan      |                       | 25,746        |                 | 417,800           |                     | 158,300         | 1,093,746           | 1,829,738            |
| Minnesota     |                       |               |                 | 444,939           |                     | 39,540          | 484,499             | 939,940              |



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

TOTAL—Continued

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total Federal funds | Estimated total cost |
|----------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------------------|----------------------|
|                |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |                     |                      |
| Mississippi    | \$46,200              | \$10,450      |                 | \$395,550         |                     | \$103,300       | \$555,500           | \$1,729,790          |
| Missouri       |                       |               |                 | 1,251,306         | \$93,420            |                 | 1,344,726           | 3,398,030            |
| Montana        |                       |               | \$9,240         | 142,262           |                     |                 | 151,502             | 262,596              |
| Nebraska       |                       | 69,610        | 140,000         | 546,043           | 90,594              | 13,880          | 800,127             | 2,769,372            |
| Nevada         | 13,501                |               |                 | 343,108           | 53,422              |                 | 410,031             | 471,925              |
| New Hampshire  | 20,236                |               |                 | 47,327            | 74,848              |                 | 142,411             | 321,257              |
| New Jersey     | 51,847                |               | 44,730          |                   | 55,856              |                 | 152,432             | 245,120              |
| New Mexico     |                       | 12,196        |                 | 243,920           |                     |                 | 256,116             | 414,622              |
| New York       | 6,000                 |               | 72,000          | 571,595           | 6,250               | 439,518         | 1,095,363           | 1,674,558            |
| North Carolina |                       |               |                 | 393,410           | 108,900             | 17,420          | 519,730             | 1,199,263            |
| North Dakota   |                       |               |                 | 23,618            | 30,870              | 46,140          | 100,628             | 147,880              |
| Ohio           |                       |               |                 | 1,665,674         | 5,000               | 267,110         | 1,937,784           | 3,609,980            |
| Oklahoma       |                       |               |                 | 1,130,553         | 225,521             |                 | 1,356,074           | 2,605,221            |
| Oregon         | 21,300                | 11,846        |                 | 1,160             | 11,850              |                 | 46,156              | 57,378               |
| Pennsylvania   |                       | 4,700         |                 | 820,919           | 315,476             |                 | 1,141,095           | 2,330,590            |
| Rhode Island   |                       |               | 6,781           | 100,935           | 23,481              |                 | 131,197             | 256,741              |
| South Carolina | 35,500                |               | 126,000         | 315,600           | 174,154             | 318,844         | 970,098             | 1,639,619            |
| South Dakota   |                       |               |                 | 376,200           |                     | 4,670           | 380,870             | 685,424              |
| Tennessee      | 5,295                 |               |                 | 331,730           | 59,230              |                 | 399,255             | 787,215              |
| Texas          | 1,952                 | 30,809        |                 | 1,154,387         | 426,600             | 942,903         | 2,556,651           | 4,448,643            |
| Utah           |                       |               |                 | 196,309           | 17,000              | 16,100          | 229,409             | 328,055              |
| Vermont        |                       |               |                 | 107,699           |                     | 22,170          | 129,869             | 273,148              |
| Virginia       | 16,606                | 11,740        | 1,256           | 1,190,028         | 190,970             | 248,443         | 1,659,043           | 3,137,948            |
| Washington     |                       | 4,746         | 70,000          | 32,400            | 191,200             | 206,973         | 505,319             | 723,909              |
| West Virginia  |                       |               |                 | 418,088           | 59,100              | 50,400          | 527,588             | 786,866              |
| Wisconsin      |                       |               |                 | 771,700           | 70,300              |                 | 842,000             | 1,906,480            |
| Wyoming        | 26,926                | 20,859        |                 | 40,630            | 38,000              |                 | 126,415             | 175,055              |
| Hawaii         |                       | 44,644        |                 | 350,440           |                     |                 | 197,540             | 592,624              |
| Puerto Rico    |                       |               |                 |                   |                     | 157,920         | 157,920             | 159,001              |
| Total          | 480,403               | 451,250       | 928,935         | 25,782,883        | 4,613,801           | 5,284,253       | 37,571,525          | 71,769,999           |

TABLE 9.—Balances of funds available for programmed projects on June 30, 1938

| State         | Public Works, 1934-35 | Works Program |                 | Federal aid system 1936-39 | Federal aid, secondary or feeder | Federal aid, grade crossings | Total       |
|---------------|-----------------------|---------------|-----------------|----------------------------|----------------------------------|------------------------------|-------------|
|               |                       | Highways      | Grade crossings |                            |                                  |                              |             |
| Alabama       | \$83,316              | \$2,860       | \$9,575         | \$3,873,445                | \$721,522                        | \$1,317,985                  | \$6,008,703 |
| Arizona       | 6,071                 | 88            | 21,114          | 1,799,834                  | 463,534                          | 625,495                      | 2,916,136   |
| Arkansas      | 9,945                 | 7,791         | 31,283          | 4,320,542                  | 857,545                          | 1,370,287                    | 6,597,393   |
| California    | 1,831                 | 36,593        | 178,412         | 2,209,182                  | 1,023,734                        | 2,355,669                    | 5,805,421   |
| Colorado      | 11,371                | 999,932       | 32,161          | 3,038,935                  | 519,275                          | 1,241,823                    | 5,843,497   |
| Connecticut   | 12,988                | 39,576        | 73,681          | 1,522,970                  | 294,528                          | 844,490                      | 2,788,233   |
| Delaware      |                       | 31,706        | 11,043          | 1,184,277                  | 246,875                          | 416,480                      | 1,890,381   |
| Florida       |                       | 27,893        | 162,738         | 2,724,162                  | 664,791                          | 1,216,381                    | 4,795,965   |
| Georgia       | 272,391               | 390,655       | 1,677,060       | 5,515,965                  | 943,117                          | 2,399,041                    | 11,198,229  |
| Idaho         |                       | 3,250         | 570             | 1,305,659                  | 286,300                          | 722,876                      | 2,318,655   |
| Illinois      | 90,488                | 11,990        | 45,644          | 3,272,279                  | 836,849                          | 3,965,468                    | 8,222,718   |
| Indiana       | 44,396                | 81,491        | 10,639          | 2,596,312                  | 691,438                          | 1,041,793                    | 4,466,069   |
| Iowa          |                       | 6,468         | 85,175          | 1,998,050                  | 1,298,449                        | 1,571,017                    | 4,559,159   |
| Kansas        |                       | 52,257        | 73,876          | 3,576,379                  | 1,208,618                        | 1,600,424                    | 6,511,554   |
| Kentucky      | 32,990                | 37,839        | 44,873          | 2,255,884                  | 267,092                          | 1,353,321                    | 4,024,591   |
| Louisiana     | 940                   | 10,723        | 111,820         | 2,516,382                  | 540,355                          | 1,279,743                    | 4,459,963   |
| Maine         |                       | 13,793        | 23,176          | 672,327                    | 121,455                          | 254,416                      | 1,085,107   |
| Maryland      | 13,801                | 245,743       | 134,200         | 1,992,259                  | 409,344                          | 962,247                      | 3,757,594   |
| Massachusetts | 195,840               | 61,291        | 99,288          | 2,847,916                  | 643,750                          | 1,680,388                    | 5,528,473   |
| Michigan      |                       | 6,903         |                 | 3,450,087                  | 1,365,858                        | 1,847,833                    | 6,670,631   |
| Minnesota     | 10,245                | 30,072        | 65,536          | 3,528,637                  | 1,198,153                        | 1,775,066                    | 6,607,709   |
| Mississippi   | 4,847                 | 20,665        | 98,085          | 3,443,558                  | 888,927                          | 1,228,151                    | 5,684,533   |
| Missouri      | 141,913               | 41,253        | 35,693          | 3,963,961                  | 775,403                          | 2,640,043                    | 7,598,266   |
| Montana       | 3,875                 |               | 48,184          | 4,462,564                  | 1,027,170                        | 687,085                      | 6,228,878   |
| Nebraska      | 15,990                | 40,577        | 69,143          | 2,785,460                  | 662,426                          | 1,438,747                    | 5,012,343   |
| Nevada        | 1,804                 |               | 6,789           | 1,490,200                  | 134,117                          | 308,880                      | 1,941,790   |
| New Hampshire | 8                     | 7,905         | 5,510           | 1,172,082                  | 121,875                          | 428,575                      | 1,735,955   |
| New Jersey    | 77,304                | 29,916        | 41,538          | 2,776,553                  | 616,918                          | 1,765,478                    | 5,307,707   |

TABLE 9.—Balances of funds available for programmed projects on June 30, 1938—Continued

| State                     | Public Works, 1934-35 | Works Program |                 | Federal-aid system 1936-39 | Federal aid, secondary or feeder | Federal aid, grade crossings | Total       |
|---------------------------|-----------------------|---------------|-----------------|----------------------------|----------------------------------|------------------------------|-------------|
|                           |                       | Highways      | Grade crossings |                            |                                  |                              |             |
| New Mexico.....           | \$13,239              | \$496         | \$10,632        | \$1,134,063                | \$476,579                        | \$729,050                    | \$2,364,059 |
| New York.....             | 113,241               | 524,519       | 269,313         | 4,248,388                  | 1,171,081                        | 4,485,311                    | 10,811,853  |
| North Carolina.....       | 278                   | 1,764         | 178,986         | 3,388,863                  | 619,115                          | 1,918,474                    | 6,107,480   |
| North Dakota.....         | 13,541                | 34,878        | 59,186          | 3,813,287                  | 756,382                          | 982,545                      | 5,659,819   |
| Ohio.....                 | 55,747                | 127,214       | 261,553         | 7,760,747                  | 1,734,441                        | 3,929,938                    | 13,869,640  |
| Oklahoma.....             | 4,719                 | 17,199        | 108,713         | 3,387,789                  | 896,907                          | 2,264,166                    | 6,679,493   |
| Oregon.....               | 9,104                 | 28,945        | 24,943          | 2,326,410                  | 458,070                          | 650,276                      | 3,497,748   |
| Pennsylvania.....         | 254,651               | 125,229       | 287,202         | 6,063,066                  | 1,126,751                        | 5,448,625                    | 13,335,554  |
| Rhode Island.....         | .....                 | .....         | .....           | 1,158,499                  | 121,875                          | 269,853                      | 1,550,227   |
| South Carolina.....       | 3,498                 | 1             | 208,529         | 1,866,336                  | 261,064                          | 1,085,621                    | 3,425,049   |
| South Dakota.....         | 3,277                 | 13,983        | 62,527          | 3,442,676                  | 816,436                          | 1,098,084                    | 5,436,983   |
| Tennessee.....            | .....                 | 10,076        | 292,383         | 4,938,008                  | 876,457                          | 1,877,652                    | 7,924,576   |
| Texas.....                | 37,387                | 49,092        | 129,422         | 8,602,515                  | 1,938,768                        | 4,360,065                    | 15,117,249  |
| Utah.....                 | .....                 | 34,704        | 25,903          | 1,721,289                  | 317,130                          | 444,955                      | 2,543,981   |
| Vermont.....              | .....                 | 10,820        | 15,254          | 294,747                    | 121,687                          | 249,659                      | 692,167     |
| Virginia.....             | 19,321                | 90,884        | 57,121          | 1,119,840                  | 473,986                          | 1,210,472                    | 2,971,624   |
| Washington.....           | 714                   | 15,216        | 805             | 1,350,405                  | 311,791                          | 718,301                      | 2,397,232   |
| West Virginia.....        | .....                 | 28,417        | 6,418           | 2,518,310                  | 386,574                          | 876,844                      | 3,816,563   |
| Wisconsin.....            | .....                 | .....         | 116,227         | 2,161,311                  | 859,453                          | 1,361,722                    | 4,498,713   |
| Wyoming.....              | .....                 | .....         | 314             | 893,056                    | 313,373                          | 517,316                      | 1,762,425   |
| District of Columbia..... | .....                 | .....         | .....           | .....                      | .....                            | 325,431                      | 325,431     |
| Hawaii.....               | 30,788                | .....         | .....           | 1,198,792                  | 218,750                          | 296,210                      | 1,744,540   |
| Puerto Rico.....          | .....                 | .....         | .....           | 671,985                    | 124,925                          | 510,830                      | 1,307,740   |
| Total.....                | 1,591,859             | 3,352,981     | 5,280,289       | 139,986,573                | 33,211,613                       | 73,982,602                   | 257,405,917 |

TABLE 10.—Mileage of projects completed during the fiscal year 1938 ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State               | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total |
|---------------------|----------------------|-----------------------|---------------|-----------------|-------------------|-----------------|-------|
|                     |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |       |
|                     | Miles                | Miles                 | Miles         | Miles           | Miles             | Miles           | Miles |
| Alabama.....        | .....                | 1.0                   | .....         | 0.7             | 67.9              | .....           | 68.9  |
| Arizona.....        | .....                | .....                 | .....         | 2.8             | 114.7             | .....           | 115.4 |
| Arkansas.....       | .....                | .....                 | 1.2           | 2.8             | 182.2             | .....           | 186.2 |
| California.....     | .....                | .....                 | 5.9           | 3.0             | 154.2             | .....           | 163.1 |
| Colorado.....       | .....                | .....                 | .....         | 1.6             | 133.8             | .....           | 135.4 |
| Connecticut.....    | .....                | 1.1                   | .....         | 2.0             | 9.4               | .....           | 12.5  |
| Delaware.....       | .....                | .....                 | .....         | .....           | 21.0              | .....           | 21.0  |
| Florida.....        | .....                | 2.3                   | 4.0           | 1.3             | 32.4              | .....           | 40.0  |
| Georgia.....        | .....                | 21.3                  | 7.0           | 5.5             | 154.6             | .....           | 188.4 |
| Idaho.....          | .....                | .....                 | .5            | 1.2             | 206.0             | .....           | 207.7 |
| Illinois.....       | .....                | .....                 | .....         | 2.0             | 305.7             | .....           | 307.7 |
| Indiana.....        | .....                | .....                 | 8.6           | 1.7             | 146.0             | 0.1             | 156.4 |
| Iowa.....           | .....                | .....                 | .....         | 2.8             | 233.1             | .9              | 236.8 |
| Kansas.....         | .....                | .....                 | 14.5          | 8.0             | 255.1             | .....           | 277.6 |
| Kentucky.....       | .....                | .....                 | 3.6           | 1.7             | 91.4              | .....           | 96.7  |
| Louisiana.....      | .....                | .....                 | 13.4          | 6.5             | 15.0              | .....           | 34.9  |
| Maine.....          | .....                | .....                 | 1.4           | 1.0             | 57.9              | .....           | 60.3  |
| Maryland.....       | .....                | .....                 | 3.0           | .....           | 14.9              | .....           | 17.9  |
| Massachusetts.....  | .....                | .....                 | .8            | .9              | 20.3              | .....           | 22.0  |
| Michigan.....       | .....                | .....                 | .....         | .9              | 160.8             | .....           | 161.7 |
| Minnesota.....      | .....                | 1.1                   | .....         | 1.1             | 326.4             | .....           | 328.6 |
| Mississippi.....    | .....                | 12.5                  | 10.4          | 33.2            | 155.5             | .....           | 211.6 |
| Missouri.....       | .....                | .....                 | .....         | 8.5             | 462.6             | .....           | 471.1 |
| Montana.....        | .....                | .....                 | .....         | .5              | 319.5             | .....           | 320.0 |
| Nebraska.....       | .....                | .....                 | 3.2           | 4.4             | 351.7             | .....           | 359.3 |
| Nevada.....         | .....                | .....                 | .....         | .....           | 128.8             | .....           | 128.8 |
| New Hampshire.....  | .....                | .....                 | .5            | .2              | 6.9               | .....           | 7.6   |
| New Jersey.....     | .....                | 3.9                   | .....         | .....           | 19.0              | .....           | 22.9  |
| New Mexico.....     | .....                | 1.2                   | .....         | .4              | 365.5             | .....           | 367.1 |
| New York.....       | .....                | .5                    | .6            | 7.0             | 268.4             | .....           | 276.5 |
| North Carolina..... | .....                | 11.8                  | 18.0          | 10.3            | 391.1             | .4              | 431.6 |
| North Dakota.....   | .....                | 36.2                  | 12.7          | 33.3            | 184.2             | .....           | 266.4 |
| Ohio.....           | .....                | 1.4                   | 13.3          | 3.3             | 70.9              | .....           | 88.9  |
| Oklahoma.....       | 23.1                 | .....                 | 4.4           | 3.2             | 216.9             | .....           | 247.6 |

TABLE 10.—Mileage of projects completed during the fiscal year 1933—Continued  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Con.

| State               | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total        |
|---------------------|----------------------|-----------------------|---------------|-----------------|-------------------|-----------------|--------------|
|                     |                      |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |              |
|                     | <i>Miles</i>         | <i>Miles</i>          | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>      | <i>Miles</i>    | <i>Miles</i> |
| Oregon.....         |                      |                       | 2.6           | 1.0             | 166.2             | 1.8             | 171.6        |
| Pennsylvania.....   |                      | 6.5                   | 21.4          | 12.3            | 197.4             |                 | 237.6        |
| Rhode Island.....   |                      |                       |               |                 | 10.5              |                 | 10.5         |
| South Carolina..... |                      | 1.9                   |               | 17.2            | 277.4             |                 | 296.5        |
| South Dakota.....   |                      |                       | 26.2          | 51.7            | 231.4             |                 | 309.3        |
| Tennessee.....      |                      |                       | 13.8          | 1.8             | 87.8              |                 | 103.4        |
| Texas.....          | 8.1                  |                       | .3            | 1.1             | 1,054.5           |                 | 1,064.0      |
| Utah.....           |                      |                       |               | 1.3             | 138.3             |                 | 139.6        |
| Vermont.....        |                      |                       |               | 1.5             | 38.7              |                 | 40.2         |
| Virginia.....       |                      | 11.8                  |               | 1.7             | 175.3             |                 | 188.8        |
| Washington.....     |                      |                       |               |                 | 77.7              | .3              | 78.0         |
| West Virginia.....  |                      | .7                    | 6.3           | 3.3             | 41.8              |                 | 52.1         |
| Wisconsin.....      |                      |                       | 2.7           | 6.4             | 260.1             |                 | 269.2        |
| Wyoming.....        |                      |                       | .1            | 1.1             | 318.0             |                 | 319.2        |
| Hawaii.....         |                      | 1.1                   |               |                 | 13.3              |                 | 14.4         |
| Total.....          | 31.2                 | 116.3                 | 200.4         | 249.4           | 8,732.2           | 3.5             | 9,333.0      |

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

|                           | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> |
|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Alabama.....              | 0.9          |              | 1.2          | 2.8          |              | 4.9          |
| Arizona.....              |              |              |              | .9           |              | .9           |
| Arkansas.....             | .5           | 17.4         | 1.2          | 6.5          |              | 25.6         |
| California.....           |              | 3.0          | .3           | 4.2          |              | 7.5          |
| Colorado.....             |              |              |              | 1.4          |              | 1.4          |
| Connecticut.....          | .3           | 1.7          |              | .7           |              | 2.7          |
| Delaware.....             |              | 6.0          |              |              |              | 6.0          |
| Florida.....              | .5           | 2.0          | 1.1          | 5.6          |              | 9.2          |
| Georgia.....              | 4.7          | 2.3          | 1.1          | 6.7          |              | 14.8         |
| Idaho.....                | 1.9          |              | .7           | 5.8          |              | 8.4          |
| Illinois.....             | .2           |              | 2.1          | 31.2         |              | 33.5         |
| Indiana.....              |              | 2.0          | 2.7          | 7.0          |              | 11.7         |
| Iowa.....                 |              | .7           | 2.5          | 16.2         |              | 19.4         |
| Kansas.....               |              | .7           | 1.2          | 4.8          |              | 6.7          |
| Kentucky.....             |              | .8           | 2.4          | 3.7          |              | 6.9          |
| Louisiana.....            |              | 2.0          | .6           |              |              | 2.6          |
| Maine.....                |              | .1           |              | 4.5          |              | 4.6          |
| Maryland.....             | 2.0          |              |              |              |              | 2.0          |
| Massachusetts.....        | .1           | 5.0          | .7           |              |              | 5.8          |
| Michigan.....             |              |              | .5           | 13.1         |              | 13.6         |
| Minnesota.....            | 1.3          | 2.1          | 1.3          | 25.1         | 1.5          | 31.3         |
| Mississippi.....          | .3           | 19.0         | 2.0          | 12.8         |              | 34.1         |
| Missouri.....             | .9           | 4.1          | 2.0          | 28.3         |              | 35.3         |
| Montana.....              |              |              |              | 4.1          |              | 4.1          |
| Nebraska.....             | .4           | 1.0          | 1.7          | 4.9          |              | 8.0          |
| Nevada.....               |              |              |              | 3.7          | .2           | 3.9          |
| New Hampshire.....        |              |              | .1           | .3           |              | .4           |
| New Jersey.....           |              | 4.7          | .4           |              |              | 5.1          |
| New Mexico.....           |              |              | .3           | .2           |              | .5           |
| New York.....             | .8           | 5.8          | 1.0          | 13.7         |              | 21.3         |
| North Carolina.....       |              | 1.4          | 1.3          | 14.9         |              | 17.6         |
| North Dakota.....         | .3           | 17.4         | 2.2          | 2.3          |              | 22.2         |
| Ohio.....                 | .7           | 1.0          | .5           | 2.8          |              | 5.0          |
| Oklahoma.....             |              | 2.5          | 1.3          | 3.4          |              | 7.2          |
| Oregon.....               | .7           | 3.8          | 1.1          | 4.0          | .7           | 10.3         |
| Pennsylvania.....         | 3.0          | 2.6          | 4.1          | 8.8          |              | 18.5         |
| Rhode Island.....         |              |              |              | .8           |              | .8           |
| South Carolina.....       | 2.7          | .8           | 2.6          | 9.5          |              | 23.6         |
| South Dakota.....         |              | 11.6         | 4.2          | 3.8          |              | 19.6         |
| Tennessee.....            |              | 1.6          | .9           | 2.5          |              | 5.0          |
| Texas.....                | 1.0          | 1.1          | 1.7          | 22.2         |              | 26.0         |
| Utah.....                 |              | 2.5          | .4           | 12.1         |              | 15.0         |
| Vermont.....              |              | .4           | .1           | 5.8          |              | 6.3          |
| Virginia.....             | .4           | 2.6          | 5.2          | 5.7          | .2           | 14.1         |
| Washington.....           |              |              | .3           | 1.8          |              | 2.1          |
| West Virginia.....        | .1           | 2.9          | 1.2          | 3.6          |              | 7.8          |
| Wisconsin.....            |              | .3           |              | 21.3         |              | 21.6         |
| Wyoming.....              | .3           |              | .2           | 3.7          |              | 4.2          |
| District of Columbia..... |              |              |              |              | .2           | .2           |
| Total.....                | 24.0         | 140.9        | 54.4         | 337.2        | 2.8          | 559.3        |

TABLE 10.—*Mileage of projects completed during the fiscal year 1938—Continued*

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|-------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |       |
|                     |                       | Miles         | Miles           | Miles               | Miles           | Miles |
| Alabama.....        |                       | 1.3           | 0.7             |                     |                 | 2.0   |
| Arkansas.....       |                       | 1.2           | 1.2             |                     |                 | 2.4   |
| California.....     |                       | 5.8           | 1.2             | 1.0                 |                 | 8.0   |
| Colorado.....       |                       |               | .8              |                     |                 | .8    |
| Connecticut.....    |                       | 1.4           | .3              |                     |                 | 1.7   |
| Florida.....        |                       | 2.8           | .6              |                     |                 | 3.4   |
| Georgia.....        |                       | 7.7           | 1.9             |                     |                 | 9.6   |
| Idaho.....          |                       |               | .3              | 9.5                 |                 | 9.8   |
| Illinois.....       |                       | 3.9           | .5              |                     |                 | 4.4   |
| Indiana.....        |                       | 5.5           | 1.2             |                     | 0.5             | 7.2   |
| Iowa.....           |                       | .8            | .6              |                     |                 | 1.4   |
| Kansas.....         |                       | .7            |                 |                     |                 | .7    |
| Kentucky.....       |                       | 1.8           | .3              | .8                  |                 | 2.9   |
| Louisiana.....      |                       | 2.8           | .3              |                     |                 | 3.1   |
| Maine.....          |                       | 1.9           |                 | 6.0                 |                 | 7.9   |
| Michigan.....       |                       |               | .5              |                     |                 | .5    |
| Minnesota.....      |                       | 9.5           | 1.6             |                     |                 | 11.1  |
| Missouri.....       |                       | 1.7           | .8              | 8.9                 |                 | 11.4  |
| Montana.....        |                       | 1.1           |                 |                     |                 | 1.1   |
| Nebraska.....       |                       | 3.2           | 1.1             | .3                  |                 | 4.6   |
| Nevada.....         |                       | .3            | .2              |                     |                 | .5    |
| New Hampshire.....  |                       | 2.8           | .1              |                     |                 | 2.9   |
| New Jersey.....     |                       | 1.9           | 2.5             |                     |                 | 4.4   |
| New Mexico.....     |                       |               | .1              |                     |                 | .1    |
| New York.....       |                       | .5            | .8              | 7.2                 |                 | 8.5   |
| North Carolina..... |                       | 5.0           | 2.1             | 4.8                 |                 | 11.9  |
| North Dakota.....   |                       |               | 1.0             |                     |                 | 1.0   |
| Ohio.....           |                       | 6.2           | .4              |                     |                 | 6.6   |
| Oklahoma.....       |                       | 6.1           | .7              |                     |                 | 6.8   |
| Oregon.....         |                       |               |                 | .1                  |                 | .1    |
| Pennsylvania.....   |                       | 35.8          | 2.1             |                     |                 | 37.9  |
| Rhode Island.....   |                       |               | .2              |                     |                 | .2    |
| South Dakota.....   |                       | .9            | 1.0             |                     |                 | 1.9   |
| Tennessee.....      |                       | .5            | 2.2             |                     |                 | 2.7   |
| Texas.....          |                       |               | 2.8             |                     |                 | 2.8   |
| Utah.....           |                       | 10.3          | 1.0             |                     | .9              | 12.2  |
| Virginia.....       |                       | .4            | .1              |                     |                 | .5    |
| Washington.....     |                       | 1.2           | 1.2             |                     | .1              | 2.5   |
| West Virginia.....  |                       |               | .8              |                     |                 | .8    |
| Wisconsin.....      |                       | .6            | 1.2             |                     |                 | 1.8   |
| Wyoming.....        |                       |               | .4              |                     |                 | .4    |
| Total.....          |                       | 125.6         | 34.8            | 38.6                | 1.5             | 200.5 |

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

|                    | Miles | Miles | Miles | Miles | Miles | Miles |
|--------------------|-------|-------|-------|-------|-------|-------|
| Alabama.....       |       | 22.5  | 2.1   |       |       | 24.6  |
| Arizona.....       |       | 7.3   | .5    | 9.9   |       | 17.7  |
| Arkansas.....      | 11.1  | 23.7  | .4    |       |       | 35.2  |
| California.....    |       | 11.1  | .6    | 36.2  |       | 47.9  |
| Colorado.....      |       |       | .2    |       |       | .2    |
| Connecticut.....   |       | 14.9  | .4    |       |       | 15.3  |
| Delaware.....      |       | 10.3  |       |       |       | 10.3  |
| Florida.....       |       | 3.7   | 10.4  |       |       | 14.1  |
| Georgia.....       | 4.9   | 49.3  | 2.6   | 3.2   |       | 60.0  |
| Idaho.....         |       |       | .5    | 33.6  |       | 34.1  |
| Illinois.....      | 9.3   | 40.3  | .7    | 3.3   |       | 53.6  |
| Indiana.....       |       | 66.0  | 1.6   |       |       | 67.6  |
| Iowa.....          |       | 70.1  | 4.8   |       | 0.9   | 75.8  |
| Kansas.....        |       | 20.7  | .6    | 24.4  |       | 45.1  |
| Kentucky.....      |       | 12.5  | .6    | 104.3 |       | 117.4 |
| Louisiana.....     | 17.2  | 11.3  | .7    |       |       | 29.2  |
| Maine.....         | .9    | 11.4  | 1.6   | 9.4   |       | 23.3  |
| Maryland.....      |       | 6.4   | 2.9   |       |       | 9.5   |
| Massachusetts..... |       | 9.7   | 3.7   |       |       | 13.4  |
| Michigan.....      |       | 1.4   | .6    |       |       | 2.0   |
| Minnesota.....     | 10.5  | 45.9  | 4.8   |       |       | 61.2  |
| Mississippi.....   | 1.1   | 26.7  | 10.8  |       |       | 38.6  |
| Missouri.....      | .3    | 12.8  | .7    | 237.6 |       | 251.4 |
| Montana.....       | .1    | 8.9   |       |       |       | 9.0   |

TABLE 10.—*Mileage of projects completed during the fiscal year 1938*—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total   |
|----------------|-----------------------|---------------|-----------------|---------------------|-----------------|---------|
|                |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |         |
|                |                       | Miles         | Miles           | Miles               | Miles           |         |
| Nebraska       | 6.3                   | 31.0          | .5              | 8.6                 |                 | 46.4    |
| Nevada         |                       | 1.7           |                 | 26.5                |                 | 28.2    |
| New Hampshire  |                       | 7.7           | 1.3             |                     |                 | 9.0     |
| New Jersey     | 1.1                   | 12.6          | 1.0             |                     |                 | 14.7    |
| New Mexico     |                       | 33.8          |                 |                     |                 | 33.8    |
| New York       |                       | 17.6          | 2.1             | 11.8                |                 | 31.5    |
| North Carolina |                       | 43.2          | 1.8             | 41.5                |                 | 86.5    |
| North Dakota   |                       | 27.5          | .2              |                     |                 | 27.7    |
| Ohio           |                       | 104.0         | 6.0             |                     |                 | 110.0   |
| Oklahoma       |                       | 16.2          | 2.4             |                     |                 | 18.6    |
| Oregon         | .7                    | 3.6           | .8              | 36.4                | .2              | 41.7    |
| Pennsylvania   | 5.2                   | 105.3         | 3.8             | 5.9                 |                 | 120.2   |
| Rhode Island   |                       |               |                 | 3.3                 |                 | 3.3     |
| South Carolina | 8.1                   | 30.3          | 1.6             |                     |                 | 40.0    |
| South Dakota   | 6.9                   | 34.5          | 7.1             |                     |                 | 48.5    |
| Tennessee      |                       | 22.2          | 6.5             |                     |                 | 28.7    |
| Texas          |                       | 21.3          |                 |                     |                 | 53.0    |
| Utah           |                       | 21.1          | 1.8             | 25.6                | 4.6             | 53.1    |
| Vermont        |                       | 1.3           | .2              | 4.8                 | 6.4             | 33.1    |
| Virginia       | 21.0                  | 57.3          | 1.7             | 4.3                 |                 | 5.8     |
| Washington     | .2                    | .6            | .4              | 11.7                | .9              | 92.6    |
| West Virginia  | 3.3                   | 43.3          | .5              | 18.0                |                 | 19.2    |
| Wisconsin      |                       | 5.7           | 1.2             | 6.7                 |                 | 47.1    |
| Wyoming        |                       | 12.5          |                 | 7.2                 |                 | 13.6    |
| Hawaii         |                       | 7.0           |                 |                     |                 | 19.7    |
|                |                       |               |                 |                     |                 | 7.0     |
| Total          | 108.2                 | 1,148.4       | 92.6            | 674.2               | 13.0            | 2,036.4 |

TOTAL

| State          | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid      |                     |                 | Total |
|----------------|----------------------|-----------------------|---------------|-----------------|------------------|---------------------|-----------------|-------|
|                |                      |                       | Highways      | Grade crossings | Highways 1936-39 | Secondary or feeder | Grade crossings |       |
|                |                      |                       | Miles         | Miles           | Miles            | Miles               | Miles           |       |
| Alabama        |                      | 1.9                   | 23.7          | 4.0             | 70.7             |                     |                 | 100.3 |
| Arizona        |                      |                       | 7.3           | 1.2             | 115.6            | 9.9                 |                 | 134.0 |
| Arkansas       |                      | 11.7                  | 43.5          | 5.6             | 188.7            |                     |                 | 249.5 |
| California     |                      |                       | 25.8          | 5.1             | 158.4            | 37.2                |                 | 226.5 |
| Colorado       |                      |                       |               | 2.6             | 135.2            |                     |                 | 137.8 |
| Connecticut    |                      | 1.5                   | 18.0          | 2.6             | 10.1             |                     |                 | 32.2  |
| Delaware       |                      |                       | 16.3          |                 | 21.0             |                     |                 | 37.3  |
| Florida        |                      | 2.9                   | 12.4          | 13.4            | 38.0             |                     |                 | 66.7  |
| Georgia        |                      | 30.9                  | 66.2          | 11.1            | 161.4            | 3.2                 |                 | 272.8 |
| Idaho          |                      | 1.9                   | .5            | 2.8             | 211.8            | 43.1                |                 | 260.1 |
| Illinois       |                      | 9.5                   | 44.2          | 5.2             | 337.0            | 3.3                 |                 | 399.2 |
| Indiana        |                      |                       | 82.0          | 7.2             | 153.1            |                     | 0.6             | 242.9 |
| Iowa           |                      |                       | 71.6          | 10.8            | 249.2            |                     | 1.8             | 333.4 |
| Kansas         |                      |                       | 36.7          | 9.2             | 259.8            | 24.4                |                 | 330.1 |
| Kentucky       |                      |                       | 18.7          | 5.0             | 95.2             | 105.1               |                 | 224.0 |
| Louisiana      |                      | 17.2                  | 29.6          | 8.1             | 15.0             |                     |                 | 69.9  |
| Maine          |                      | .9                    | 14.8          | 2.6             | 62.4             | 15.4                |                 | 96.1  |
| Maryland       |                      | 2.0                   | 9.6           | 2.8             | 15.0             |                     |                 | 29.4  |
| Massachusetts  |                      | .1                    | 15.5          | 5.2             | 20.3             |                     |                 | 41.1  |
| Michigan       |                      |                       | 1.5           | 2.4             | 174.0            |                     |                 | 177.9 |
| Minnesota      |                      | 12.9                  | 57.4          | 9.0             | 351.3            |                     | 1.6             | 432.2 |
| Mississippi    |                      | 13.8                  | 56.1          | 46.0            | 168.4            |                     |                 | 284.3 |
| Missouri       |                      | 1.1                   | 18.6          | 12.0            | 490.9            | 246.5               |                 | 769.1 |
| Montana        |                      | .1                    | 10.1          | .5              | 323.5            |                     |                 | 334.2 |
| Nebraska       |                      | 6.7                   | 38.4          | 7.7             | 356.6            | 8.9                 |                 | 418.3 |
| Nevada         |                      |                       | 2.0           | .2              | 132.5            | 26.5                | .2              | 161.4 |
| New Hampshire  |                      |                       | 10.9          | 1.9             | 7.1              |                     |                 | 19.9  |
| New Jersey     |                      | 5.0                   | 19.3          | 3.9             | 19.0             |                     |                 | 47.2  |
| New Mexico     |                      | 1.2                   | 33.8          | .8              | 365.7            |                     |                 | 401.5 |
| New York       |                      | 1.4                   | 24.4          | 11.0            | 282.0            | 19.0                |                 | 337.8 |
| North Carolina |                      | 11.8                  | 67.6          | 15.4            | 406.0            | 46.4                | .4              | 547.6 |
| North Dakota   |                      | 36.5                  | 57.6          | 36.7            | 186.5            |                     |                 | 317.3 |

TABLE 10.—Mileage of projects completed during the fiscal year 1938—Contd.

TOTAL—Continued

| State                     | Federal aid, 1917-33 | Public Works, 1934-35 | Works Program |                 | Federal aid      |                     |                 | Total    |
|---------------------------|----------------------|-----------------------|---------------|-----------------|------------------|---------------------|-----------------|----------|
|                           |                      |                       | Highways      | Grade crossings | Highways 1936-39 | Secondary or feeder | Grade crossings |          |
|                           | Miles                | Miles                 | Miles         | Miles           | Miles            | Miles               | Miles           |          |
| Ohio.....                 |                      | 2.0                   | 124.5         | 10.2            | 73.7             |                     |                 | 210.4    |
| Oklahoma.....             | 23.1                 |                       | 29.2          | 7.7             | 220.2            |                     |                 | 280.2    |
| Oregon.....               |                      | 1.4                   | 10.0          | 3.0             | 170.2            |                     |                 | 223.7    |
| Pennsylvania.....         |                      | 14.7                  | 165.1         | 22.3            | 206.2            | 36.4                | 2.7             | 414.2    |
| Rhode Island.....         |                      |                       |               | 1               | 11.3             | 5.9                 |                 | 14.7     |
| South Carolina.....       |                      | 12.6                  | 39.1          | 21.4            | 287.0            |                     |                 | 360.1    |
| South Dakota.....         |                      | 6.9                   | 73.3          | 64.0            | 235.2            |                     |                 | 379.4    |
| Tennessee.....            |                      |                       | 38.1          | 11.3            | 90.3             |                     |                 | 139.7    |
| Texas.....                | 8.1                  | 1.0                   | 22.9          | 7.1             | 1,076.7          | 25.6                | 4.5             | 1,145.9  |
| Utah.....                 |                      |                       | 34.0          | 3.5             | 150.3            | 4.8                 | 7.3             | 199.9    |
| Vermont.....              |                      |                       | 1.7           | 1.7             | 44.5             | 4.3                 |                 | 52.2     |
| Virginia.....             |                      | 33.1                  | 60.3          | 8.8             | 181.0            | 11.7                | 1.1             | 296.0    |
| Washington.....           |                      | .2                    | 1.8           | 1.9             | 79.6             | 18.0                | .4              | 101.9    |
| West Virginia.....        |                      | 4.2                   | 52.5          | 5.7             | 45.4             |                     |                 | 107.8    |
| Wisconsin.....            |                      |                       | 9.3           | 8.8             | 281.4            | 6.7                 |                 | 306.2    |
| Wyoming.....              |                      | .3                    | 12.4          | 1.7             | 321.7            | 7.2                 |                 | 343.3    |
| Hawaii.....               |                      | 1.1                   | 7.0           |                 | 13.3             |                     |                 | 21.4     |
| District of Columbia..... |                      |                       |               |                 |                  |                     | .2              | .2       |
| Total.....                | 31.2                 | 248.5                 | 1,615.3       | 431.2           | 9,069.4          | 712.8               | 20.8            | 12,129.2 |

TABLE 11.—Mileage of projects under contract on June 30, 1938

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|-------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |       |
|                     | Miles                 | Miles         | Miles           | Miles             | Miles           | Miles |
| Alabama.....        |                       | 1.3           |                 | 274.2             |                 | 275.5 |
| Arizona.....        |                       |               |                 | 103.0             |                 | 103.0 |
| Arkansas.....       |                       | 4.0           | 8.0             | 74.5              | 17.4            | 103.9 |
| California.....     |                       |               |                 | 237.7             | 1.3             | 239.0 |
| Colorado.....       |                       | 2.8           |                 | 79.8              |                 | 82.6  |
| Connecticut.....    |                       |               | .4              | 11.5              |                 | 11.9  |
| Delaware.....       |                       | .2            | .3              | 18.0              |                 | 18.5  |
| Florida.....        |                       |               |                 | 68.2              |                 | 68.2  |
| Georgia.....        | 1.9                   | 15.1          | 7.9             | 351.1             |                 | 376.0 |
| Idaho.....          |                       |               |                 | 176.3             | .6              | 176.9 |
| Illinois.....       |                       |               | .7              | 241.5             | 1.2             | 243.4 |
| Indiana.....        | .9                    |               |                 | 163.0             | 3.1             | 167.0 |
| Iowa.....           |                       |               |                 | 217.0             | 2.5             | 219.5 |
| Kansas.....         |                       |               |                 | 674.0             | 5.7             | 679.7 |
| Kentucky.....       |                       |               | 1.0             | 215.2             |                 | 216.2 |
| Louisiana.....      |                       | .1            | 1.1             | 88.2              | 5.7             | 95.1  |
| Maine.....          |                       |               | .4              | 54.2              | .1              | 54.7  |
| Maryland.....       | 2.1                   | 6.2           | .1              | 37.5              |                 | 45.9  |
| Massachusetts.....  |                       | .5            | .1              | 7.6               |                 | 8.2   |
| Michigan.....       |                       |               | .3              | 128.4             | .1              | 128.8 |
| Minnesota.....      |                       |               | .4              | 232.0             | .1              | 232.5 |
| Mississippi.....    | 2.6                   |               | 1.0             | 300.2             | .1              | 303.9 |
| Missouri.....       |                       |               |                 | 154.6             | 1.7             | 156.3 |
| Montana.....        |                       |               | .4              | 70.3              | 10.2            | 80.9  |
| Nebraska.....       |                       |               | 1.6             | 625.8             | 7.0             | 634.4 |
| Nevada.....         |                       |               |                 | 93.3              | .6              | 93.9  |
| New Hampshire.....  |                       |               |                 | 23.1              | .6              | 23.7  |
| New Jersey.....     |                       |               | .3              | 15.2              |                 | 15.5  |
| New Mexico.....     |                       |               |                 | 201.1             | 14.9            | 216.0 |
| New York.....       |                       | .2            |                 | 272.2             | 5.9             | 278.3 |
| North Carolina..... |                       |               | .5              | 317.6             | 2.3             | 320.4 |
| North Dakota.....   | 15.5                  |               |                 | 208.1             |                 | 223.6 |
| Ohio.....           |                       |               | 2.2             | 85.5              |                 | 87.7  |
| Oklahoma.....       |                       | .4            | .3              | 204.1             |                 | 204.8 |
| Oregon.....         |                       |               |                 | 92.0              | .2              | 92.2  |
| Pennsylvania.....   |                       |               |                 | 113.1             | .7              | 119.2 |
| Rhode Island.....   |                       |               |                 | 13.0              | .3              | 13.3  |

TABLE 11.—*Mileage of projects under contract on June 30, 1933*—Continued  
ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total        |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|--------------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |              |
|                     | <i>Miles</i>          | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>      | <i>Miles</i>    | <i>Miles</i> |
| South Carolina..... | 1.0                   |               | 1.4             | 236.7             | .1              | 239.2        |
| South Dakota.....   | 13.1                  | .5            | .5              | 361.4             | .6              | 376.1        |
| Tennessee.....      |                       |               |                 | 161.4             |                 | 161.4        |
| Texas.....          |                       |               |                 | 776.8             |                 | 776.8        |
| Utah.....           |                       |               |                 | 100.8             | 1.1             | 101.9        |
| Vermont.....        |                       |               |                 | 42.4              | 2.1             | 44.5         |
| Virginia.....       |                       |               |                 | 183.1             | 1.0             | 184.1        |
| Washington.....     |                       | .7            |                 | 87.3              | .9              | 88.9         |
| West Virginia.....  | .1                    |               | 1.1             | 54.4              | .7              | 56.3         |
| Wisconsin.....      | .1                    |               |                 | 168.3             | 4.5             | 172.9        |
| Wyoming.....        |                       |               |                 | 250.6             | 1.1             | 251.7        |
| Hawaii.....         |                       |               | .5              | 18.6              |                 | 19.1         |
| Puerto Rico.....    |                       |               |                 | 20.5              | .4              | 20.9         |
| Total.....          | 37.3                  | 32.0          | 35.9            | 8,704.4           | 94.8            | 8,904.4      |

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

|                     | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> |
|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Alabama.....        | 1.5          |              | 1.0          | 15.4         | 0.6          | 18.5         |
| Arizona.....        |              |              |              | .3           |              | .3           |
| Arkansas.....       |              |              | .4           | 1.4          | 1.2          | 3.0          |
| California.....     |              |              |              | 22.8         | .6           | 23.4         |
| Colorado.....       |              |              |              | 1.4          |              | 1.4          |
| Connecticut.....    |              |              | .5           | 1.7          |              | 2.2          |
| Delaware.....       |              |              |              | .7           |              | .7           |
| Florida.....        |              |              |              | 2.0          |              | 2.0          |
| Georgia.....        | 5.8          | 12.8         | .4           | 35.3         |              | 54.3         |
| Idaho.....          |              |              |              | .9           |              | .9           |
| Illinois.....       | .1           |              | .8           | 18.1         | .7           | 19.7         |
| Indiana.....        | .2           |              |              | 19.3         |              | 19.5         |
| Iowa.....           |              | .3           | 1.5          | 11.0         | .7           | 13.5         |
| Kansas.....         | .2           | .7           | 1.3          | 14.3         | 1.1          | 17.6         |
| Kentucky.....       | .8           | 1.2          | .6           | 4.9          | .4           | 7.9          |
| Louisiana.....      |              | 1.3          | 6.0          | 1.2          |              | 8.5          |
| Maine.....          |              |              |              | 9.1          | .2           | 9.3          |
| Maryland.....       | .8           | 1.7          |              |              |              | 2.5          |
| Massachusetts.....  |              |              |              | 3.4          |              | 3.4          |
| Michigan.....       |              | .3           |              | 12.1         |              | 12.5         |
| Minnesota.....      | .2           |              | .3           | 30.6         | .5           | 31.6         |
| Mississippi.....    | .1           | 2.5          | .4           | 35.7         | 1.1          | 38.8         |
| Missouri.....       |              | .6           | .1           | 7.3          | .8           | 8.8          |
| Montana.....        |              | .1           |              | .4           | .5           | 1.0          |
| Nebraska.....       |              | 1.1          | .3           | 12.7         | .6           | 14.7         |
| Nevada.....         |              |              |              | .3           |              | .3           |
| New Hampshire.....  |              |              |              | 1.4          |              | 1.4          |
| New Jersey.....     |              |              |              | 6.1          |              | 6.1          |
| New York.....       | .4           | .2           | .2           | 20.1         |              | 20.9         |
| North Carolina..... |              | .2           |              | 17.0         |              | 17.2         |
| North Dakota.....   | .8           | 22.4         |              | 3.1          | .1           | 26.4         |
| Ohio.....           |              | .6           | 1.4          | 10.2         |              | 12.2         |
| Oklahoma.....       |              |              | .1           | 6.2          |              | 6.3          |
| Oregon.....         |              |              |              | 4.8          | .5           | 5.3          |
| Pennsylvania.....   | .1           | 3.3          | 2.0          | 10.8         |              | 16.2         |
| Rhode Island.....   |              |              |              | 1.7          |              | 1.7          |
| South Carolina..... | .4           | 2.2          | .7           | 21.5         |              | 24.8         |
| South Dakota.....   | .8           | 12.9         | 1.5          | 4.9          |              | 20.1         |
| Tennessee.....      |              |              |              | 6.2          |              | 6.2          |
| Texas.....          |              | 2.9          | .6           | 17.7         |              | 21.2         |
| Utah.....           |              |              |              | 6.2          |              | 6.2          |
| Vermont.....        |              |              |              | .5           |              | .5           |
| Virginia.....       |              |              | 1.3          | 4.3          | 1.0          | 6.6          |
| Washington.....     |              |              |              | 2.1          |              | 2.1          |
| West Virginia.....  | 2.3          |              | .2           | 5.2          | .5           | 8.2          |
| Wisconsin.....      |              |              |              | 24.0         |              | 24.0         |
| Wyoming.....        | .6           |              | .5           | .4           |              | 1.5          |
| Total.....          | 15.1         | 67.3         | 22.2         | 437.6        | 10.1         | 552.3        |

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued  
ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State          | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total |
|----------------|-----------------------|---------------|-----------------|---------------------|-----------------|-------|
|                |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |       |
|                |                       | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>        | <i>Miles</i>    |       |
| Alabama        |                       |               |                 | 0.7                 | 0.7             | 1.4   |
| California     |                       |               |                 |                     | .3              | .3    |
| Colorado       |                       |               | 0.3             | .4                  |                 | .7    |
| Georgia        |                       | 1.34          | 2.0             | 1.5                 |                 | 16.9  |
| Idaho          |                       |               |                 | .1                  |                 | .1    |
| Illinois       |                       | .8            | .3              | 4.5                 |                 | 5.6   |
| Indiana        |                       |               |                 | .3                  |                 | .3    |
| Kansas         |                       |               |                 | .5                  |                 | .5    |
| Kentucky       |                       |               | .1              | .4                  |                 | .5    |
| Louisiana      |                       |               | .7              |                     |                 | .7    |
| Maine          |                       |               |                 | 3.2                 |                 | 3.2   |
| Maryland       |                       |               | .4              |                     |                 | .4    |
| Massachusetts  |                       |               |                 |                     | .1              | .1    |
| Minnesota      |                       |               |                 | .8                  | 1.9             | 2.7   |
| Mississippi    |                       | 1.6           | .1              |                     | .1              | 1.8   |
| Missouri       |                       |               | .3              | .3                  |                 | .6    |
| Montana        |                       |               | .1              |                     | .2              | .3    |
| Nebraska       |                       | 1.3           | .6              | 2.0                 | .3              | 4.2   |
| New Jersey     |                       |               | .2              |                     | .2              | .4    |
| New York       |                       | .1            | .7              | 1.1                 |                 | 1.9   |
| North Carolina |                       | .5            | .5              | 4.3                 |                 | 5.3   |
| North Dakota   |                       |               | .1              |                     | .1              | .2    |
| Ohio           |                       | 1.0           | 1.1             |                     |                 | 2.1   |
| Oklahoma       |                       | 4.0           | .4              | 1.3                 |                 | 5.7   |
| Oregon         |                       |               |                 | .4                  |                 | .4    |
| Pennsylvania   |                       | 5.6           | .5              | 1.6                 |                 | 7.7   |
| South Carolina |                       | 9.6           | .9              | .6                  |                 | 11.1  |
| South Dakota   |                       |               | .4              |                     | .2              | .6    |
| Tennessee      |                       | 2.0           | .7              |                     |                 | 2.7   |
| Texas          |                       | 6.0           |                 | 4.4                 | .8              | 11.2  |
| Utah           |                       |               |                 | 1.4                 |                 | 1.4   |
| Vermont        |                       |               |                 | 1.4                 |                 | 1.4   |
| Washington     |                       |               |                 | 3.6                 | .6              | 4.2   |
| West Virginia  |                       |               | .6              |                     | .3              | .9    |
| Wisconsin      |                       |               | .4              | 1.4                 |                 | 1.8   |
| Wyoming        |                       |               |                 | 6.0                 |                 | 6.0   |
| Total          |                       | 45.9          | 11.4            | 42.2                | 5.8             | 105.3 |

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

|                | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Alabama        |              | 6.5          | 0.1          | 23.1         | 1.4          | 31.1         |
| Arizona        |              |              |              | 18.6         |              | 18.6         |
| California     |              |              |              | 52.7         |              | 52.7         |
| Colorado       |              | 6.0          |              | 29.1         |              | 35.1         |
| Connecticut    |              |              | .6           |              |              | .6           |
| Florida        |              |              | .5           |              |              | .5           |
| Georgia        |              |              |              | 42.7         |              | 137.2        |
| Idaho          | 6.4          | 80.6         | 7.5          | 12.3         |              | 12.8         |
| Illinois       | 6.1          | 10.8         | .2           | 113.7        |              | 130.8        |
| Indiana        |              |              | 1.1          | 61.7         | 4.5          | 67.3         |
| Kansas         |              | 10.2         |              | .6           |              | 10.8         |
| Kentucky       |              | 2.3          |              | 76.9         |              | 79.2         |
| Louisiana      |              | 10.4         |              | 5.0          |              | 16.6         |
| Maine          | 1.2          | .8           |              | 15.0         | 1.6          | 17.4         |
| Maryland       | 6.2          | 7.5          | 1.9          |              |              | 15.6         |
| Massachusetts  |              | .5           | .5           |              |              | 1.0          |
| Michigan       |              | 3.3          |              |              |              | 3.3          |
| Minnesota      | .2           |              |              | 44.7         |              | 44.9         |
| Mississippi    | 5.2          |              |              |              |              | 5.2          |
| Missouri       |              |              |              | 44.0         |              | 44.0         |
| Montana        |              | 4.4          |              |              |              | 7.9          |
| Nebraska       | 3.5          | 4.5          |              | 67.2         |              | 71.7         |
| Nevada         |              |              |              | 46.2         |              | 46.2         |
| New Hampshire  |              | 5.7          |              | 1.8          |              | 7.5          |
| New Jersey     |              |              | .9           |              |              | .9           |
| New Mexico     |              |              |              | 30.7         |              | 30.7         |
| New York       | .2           | 1.0          | .1           | 146.9        | 1.7          | 149.9        |
| North Carolina |              | 4.9          | .9           | 72.3         | .6           | 78.7         |
| North Dakota   | 4.0          | 16.2         |              |              | .3           | 20.5         |
| Ohio           |              | 2.2          | 1.5          | 3.7          |              | 7.4          |
| Oklahoma       | .4           | 1.6          |              | 8.8          |              | 10.8         |



TABLE 11.—Mileage of projects under contract on June 30, 1938—Continued

ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES—Continued

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total        |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|--------------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |              |
|                     | <i>Miles</i>          | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>        | <i>Miles</i>    | <i>Miles</i> |
| Oregon.....         | .2                    |               | .1              | 56.6                |                 | 56.9         |
| Pennsylvania.....   | 1.0                   | 5.6           | .3              | 91.1                | .4              | 98.4         |
| Rhode Island.....   |                       |               |                 | 3.2                 |                 | 3.2          |
| South Carolina..... | 7.7                   | 13.1          |                 | 62.5                |                 | 83.3         |
| South Dakota.....   | 6.2                   |               | 17.4            |                     | 1.0             | 25.0         |
| Tennessee.....      |                       | 9.5           | .3              | 12.6                |                 | 22.4         |
| Texas.....          | .4                    | .1            |                 | 223.9               | 2.2             | 226.6        |
| Utah.....           |                       |               |                 | 31.6                |                 | 31.6         |
| Vermont.....        |                       |               |                 | 10.1                |                 | 10.8         |
| Virginia.....       | 7.3                   | 14.5          |                 | 43.7                | 4.8             | 70.3         |
| Washington.....     |                       |               | .5              | 28.0                |                 | 29.1         |
| West Virginia.....  | 10.5                  | 4.3           | .5              | 16.5                | .6              | 32.4         |
| Wisconsin.....      |                       |               |                 | 22.8                | .4              | 23.2         |
| Wyoming.....        |                       |               |                 | 37.8                |                 | 37.8         |
| Hawaii.....         |                       |               |                 | 2.4                 |                 | 2.4          |
| Puerto Rico.....    |                       |               |                 | 13.7                |                 | 13.7         |
| Total.....          | 66.7                  | 226.9         | 35.4            | 1,574.2             | 20.8            | 1,924.0      |

## TOTAL

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total        |
|---------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|--------------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |              |
|                     | <i>Miles</i>          | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>      | <i>Miles</i>        | <i>Miles</i>    | <i>Miles</i> |
| Alabama.....        | 1.5                   | 7.8           | 1.1             | 289.6             | 23.8                | 2.8             | 326.6        |
| Arizona.....        |                       |               |                 | 103.3             | 18.6                |                 | 121.9        |
| Arkansas.....       |                       | 4.0           | 8.4             | 75.9              |                     | 18.6            | 106.9        |
| California.....     |                       |               |                 | 260.5             | 52.7                | 2.1             | 315.3        |
| Colorado.....       |                       | 8.8           | .4              | 81.1              | 29.5                |                 | 119.8        |
| Connecticut.....    |                       |               | 1.5             | 13.1              |                     |                 | 14.6         |
| Delaware.....       |                       | .2            | .3              | 18.6              |                     |                 | 19.1         |
| Florida.....        |                       |               | .5              | 70.2              |                     |                 | 70.7         |
| Georgia.....        | 14.1                  | 121.8         | 17.8            | 386.5             | 44.2                |                 | 584.4        |
| Idaho.....          |                       |               | .6              | 177.2             | 12.3                | .6              | 190.7        |
| Illinois.....       | 6.2                   | 11.6          | 2.0             | 259.6             | 118.1               | 2.0             | 399.5        |
| Indiana.....        | 1.2                   |               | 1.1             | 182.2             | 62.0                | 7.7             | 254.2        |
| Iowa.....           |                       | .3            | 1.5             | 228.1             |                     | 3.1             | 233.0        |
| Kansas.....         | .2                    | 11.0          | 1.2             | 688.2             | 1.1                 | 6.9             | 708.6        |
| Kentucky.....       | .7                    | 3.5           | 1.8             | 220.1             | 77.3                | .4              | 303.8        |
| Louisiana.....      | 1.2                   | 11.8          | 7.7             | 89.4              | 5.0                 | 5.7             | 120.8        |
| Maine.....          |                       | .8            | .4              | 63.3              | 18.2                | 1.9             | 84.6         |
| Maryland.....       | 9.1                   | 15.3          | 2.4             | 37.6              |                     |                 | 64.4         |
| Massachusetts.....  |                       | 1.0           | .6              | 11.0              |                     | .1              | 12.7         |
| Michigan.....       |                       | 3.6           | .4              | 140.5             |                     | .1              | 144.6        |
| Minnesota.....      | .4                    |               | .7              | 262.6             | 45.5                | 2.5             | 311.7        |
| Mississippi.....    | 7.9                   | 4.0           | 1.5             | 335.9             |                     | .3              | 349.6        |
| Missouri.....       |                       | .6            | .4              | 161.9             | 44.4                | 2.5             | 209.8        |
| Montana.....        | 3.5                   | 4.4           | .4              | 70.9              |                     | 10.8            | 90.0         |
| Nebraska.....       |                       | 7.0           | 2.5             | 638.5             | 69.2                | 7.8             | 725.0        |
| Nevada.....         |                       |               |                 | 93.7              | 46.1                | .6              | 140.4        |
| New Hampshire.....  |                       | 5.6           |                 | 24.6              | 1.8                 | .6              | 32.6         |
| New Jersey.....     |                       |               | 1.5             | 21.2              |                     | .2              | 22.9         |
| New Mexico.....     |                       |               |                 | 201.1             | 30.7                | 14.9            | 246.7        |
| New York.....       | .6                    | 1.5           | 1.0             | 292.3             | 148.0               | 7.6             | 451.0        |
| North Carolina..... |                       | 5.6           | 1.8             | 334.7             | 76.6                | 2.9             | 421.6        |
| North Dakota.....   | 20.3                  | 38.7          | .1              | 211.2             |                     | .5              | 270.8        |
| Ohio.....           |                       | 3.7           | 6.3             | 95.6              | 3.8                 |                 | 109.4        |
| Oklahoma.....       | .4                    | 6.0           | .9              | 210.2             | 10.1                |                 | 227.6        |
| Oregon.....         | .2                    |               | .1              | 96.7              | 57.0                | .7              | 154.7        |
| Pennsylvania.....   | 1.2                   | 14.4          | 8.1             | 123.8             | 92.8                | 1.2             | 241.5        |
| Rhode Island.....   |                       |               |                 | 14.7              | 3.2                 |                 | 18.2         |
| South Carolina..... | 9.1                   | 24.9          | 3.0             | 258.2             | 63.1                |                 | 358.4        |
| South Dakota.....   | 20.0                  | 13.8          | 19.7            | 366.5             |                     | 1.8             | 421.8        |
| Tennessee.....      |                       | 11.6          | 1.0             | 167.6             | 12.6                |                 | 192.8        |
| Texas.....          | .4                    | 9.2           | .6              | 794.4             | 228.2               | 3.0             | 1,035.8      |
| Utah.....           |                       |               |                 | 107.0             | 33.0                | 1.1             | 141.1        |

TABLE 11.—*Mileage of projects under contract on June 30, 1938*—Continued

TOTAL—Continued

| State              | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total    |
|--------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|----------|
|                    |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |          |
|                    | Miles                 | Miles         | Miles           | Miles             | Miles               | Miles           | Miles    |
| Vermont.....       |                       |               |                 | 42.9              | 11.6                | 2.8             | 57.3     |
| Virginia.....      | 7.3                   | 14.6          | 1.3             | 187.4             | 43.7                | 6.7             | 261.0    |
| Washington.....    |                       | .7            | .5              | 89.5              | 31.6                | 2.1             | 124.4    |
| West Virginia..... | 12.9                  | 4.3           | 2.5             | 59.5              | 16.5                | 2.1             | 97.8     |
| Wisconsin.....     | .1                    |               | .3              | 193.3             | 24.2                | 4.9             | 222.8    |
| Wyoming.....       | .6                    |               | .5              | 251.0             | 43.8                | 1.1             | 297.0    |
| Hawaii.....        |                       |               | .5              | 18.6              | 2.4                 |                 | 21.5     |
| Puerto Rico.....   |                       |               |                 | 20.5              | 13.7                | .4              | 34.6     |
| Total.....         | 119.1                 | 372.1         | 104.9           | 9,142.0           | 1,616.4             | 131.5           | 11,486.0 |

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938*

ON THE FEDERAL-AID HIGHWAY SYSTEM OUTSIDE OF MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total   |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|---------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |         |
|                     | Miles                 | Miles         | Miles           | Miles             | Miles           | Miles   |
| Alabama.....        |                       |               |                 | 111.8             | 0.2             | 112.0   |
| Arkansas.....       |                       |               |                 | 4.0               | .5              | 4.5     |
| California.....     |                       |               |                 | 20.7              | .4              | 21.1    |
| Colorado.....       |                       |               |                 | 9.5               |                 | 9.5     |
| Connecticut.....    |                       |               |                 | 3.6               |                 | 3.6     |
| Delaware.....       |                       |               |                 | 4.7               |                 | 4.7     |
| Florida.....        |                       |               |                 | 19.8              |                 | 19.8    |
| Georgia.....        |                       |               |                 | 76.9              |                 | 76.9    |
| Idaho.....          |                       |               |                 | 15.7              |                 | 15.7    |
| Illinois.....       |                       |               |                 | 76.9              | .7              | 77.6    |
| Indiana.....        | 0.3                   |               |                 | 10.4              |                 | 10.7    |
| Iowa.....           |                       |               |                 | 63.6              |                 | 63.6    |
| Kansas.....         |                       |               |                 | 215.2             | 8.6             | 223.8   |
| Kentucky.....       |                       |               |                 | 37.0              | 1.0             | 38.0    |
| Louisiana.....      |                       |               |                 | 1.8               | 7.4             | 9.2     |
| Maine.....          | .1                    |               |                 | 6.4               | 4.7             | 11.2    |
| Maryland.....       |                       |               | 0.4             | 11.1              |                 | 11.5    |
| Massachusetts.....  |                       |               |                 |                   | .6              | .6      |
| Michigan.....       |                       |               |                 | 7.1               | 4.2             | 11.3    |
| Minnesota.....      |                       |               |                 | 78.8              |                 | 78.8    |
| Mississippi.....    |                       |               |                 | 80.0              | .1              | 80.1    |
| Missouri.....       |                       |               |                 | 126.6             |                 | 126.6   |
| Montana.....        |                       |               | .1              | 8.3               |                 | 8.4     |
| Nebraska.....       |                       |               |                 | 64.7              | 2.5             | 67.2    |
| Nevada.....         |                       |               |                 | 64.1              |                 | 64.1    |
| New Hampshire.....  |                       |               |                 | 1.4               |                 | 1.4     |
| New Mexico.....     |                       |               |                 | 38.0              |                 | 38.0    |
| New York.....       |                       |               |                 | 12.7              | .4              | 13.1    |
| North Carolina..... |                       |               |                 | 54.6              |                 | 54.6    |
| North Dakota.....   |                       |               |                 | 8.0               |                 | 8.0     |
| Ohio.....           |                       |               |                 | 20.3              | 1.4             | 21.7    |
| Oklahoma.....       |                       |               |                 | 68.9              |                 | 68.9    |
| Pennsylvania.....   |                       |               |                 | 21.2              |                 | 21.2    |
| Rhode Island.....   |                       |               |                 | .3                |                 | .3      |
| South Carolina..... |                       |               | .5              | 35.7              |                 | 36.2    |
| South Dakota.....   |                       |               |                 | 66.1              | .5              | 66.6    |
| Tennessee.....      |                       |               |                 | 16.1              |                 | 16.1    |
| Texas.....          |                       |               |                 | 86.8              | 11.9            | 98.7    |
| Utah.....           |                       |               |                 | 21.5              |                 | 21.5    |
| Vermont.....        |                       |               |                 | 6.7               |                 | 6.7     |
| Virginia.....       |                       |               |                 | 63.1              | .5              | 63.6    |
| Washington.....     |                       |               | .6              | .3                |                 | .9      |
| West Virginia.....  |                       |               |                 | 11.4              | .1              | 11.5    |
| Wisconsin.....      |                       |               |                 | 51.1              |                 | 51.1    |
| Wyoming.....        |                       |               |                 | 7.6               |                 | 7.6     |
| Hawaii.....         |                       | 0.7           |                 | 8.7               | 1.6             | 11.0    |
| Puerto Rico.....    |                       |               |                 |                   | .6              | .6      |
| Total.....          | .4                    | .7            | 1.6             | 1,719.2           | 47.9            | 1,769.8 |

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938—*  
Continued

## ON THE FEDERAL-AID HIGHWAY SYSTEM IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                 | Total        |
|---------------------|-----------------------|---------------|-----------------|-------------------|-----------------|--------------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Grade crossings |              |
|                     | <i>Miles</i>          | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>      | <i>Miles</i>    | <i>Miles</i> |
| Alabama.....        |                       |               |                 | 7.2               |                 | 7.2          |
| California.....     |                       |               | 0.2             | 2.9               |                 | 3.1          |
| Colorado.....       |                       |               |                 | 1.3               |                 | 1.3          |
| Delaware.....       |                       |               |                 | .4                |                 | .4           |
| Florida.....        |                       |               |                 | .7                | 0.2             | .9           |
| Georgia.....        |                       |               |                 | 9.0               |                 | 9.0          |
| Idaho.....          |                       |               |                 | .3                |                 | .3           |
| Illinois.....       |                       |               |                 | 4.2               |                 | 4.2          |
| Indiana.....        | 0.4                   |               |                 | .3                |                 | .7           |
| Iowa.....           |                       |               |                 | 1.8               |                 | 1.8          |
| Kansas.....         |                       | 0.3           |                 | .7                | .2              | 1.2          |
| Kentucky.....       |                       |               |                 | 2.6               |                 | 2.6          |
| Louisiana.....      |                       |               |                 | .3                | 2.0             | 2.3          |
| Maryland.....       |                       |               |                 | .2                |                 | .2           |
| Massachusetts.....  |                       |               | .4              | 2.2               |                 | 2.6          |
| Michigan.....       |                       |               |                 | 3.2               | .8              | 4.0          |
| Minnesota.....      |                       |               |                 | 6.3               |                 | 6.3          |
| Mississippi.....    | .5                    | .1            |                 | 1.3               |                 | 1.9          |
| Missouri.....       |                       |               |                 | 1.8               |                 | 1.8          |
| Nebraska.....       |                       | 1.8           |                 | 4.8               |                 | 6.6          |
| New Mexico.....     |                       |               |                 | .2                |                 | .2           |
| New York.....       |                       |               |                 | .7                |                 | .7           |
| North Carolina..... |                       |               |                 | .9                | .1              | 1.0          |
| North Dakota.....   |                       |               |                 | .8                | .6              | 1.4          |
| Ohio.....           |                       |               |                 | 1.2               | .1              | 1.3          |
| Oklahoma.....       |                       |               |                 | .5                |                 | .5           |
| Oregon.....         | .2                    |               |                 |                   |                 | .2           |
| Pennsylvania.....   |                       |               |                 | 1.4               |                 | 1.4          |
| Rhode Island.....   |                       |               |                 | 1.0               |                 | 1.0          |
| South Carolina..... |                       |               |                 | 1.2               | .6              | 1.8          |
| South Dakota.....   |                       |               |                 | .1                |                 | .1           |
| Tennessee.....      |                       |               |                 | .5                |                 | .5           |
| Texas.....          |                       |               |                 | 7.8               |                 | 7.8          |
| Utah.....           |                       |               |                 | 8.0               |                 | 8.0          |
| Virginia.....       | .3                    | .2            |                 | 2.5               |                 | 3.0          |
| West Virginia.....  |                       |               |                 | 1.5               | .3              | 1.8          |
| Wisconsin.....      |                       |               |                 | 5.5               |                 | 5.5          |
| Wyoming.....        |                       |               |                 | .3                |                 | .3           |
| Total.....          | 1.4                   | 2.4           | .6              | 85.6              | 4.9             | 94.9         |

## ON SECONDARY OR FEEDER ROADS IN MUNICIPALITIES

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid         |                 | Total        |
|---------------------|-----------------------|---------------|-----------------|---------------------|-----------------|--------------|
|                     |                       | Highways      | Grade crossings | Secondary or feeder | Grade crossings |              |
|                     |                       | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>        | <i>Miles</i>    | <i>Miles</i> |
| Alabama.....        |                       |               |                 | 1.9                 |                 | 1.9          |
| Colorado.....       |                       |               |                 | .4                  |                 | .4           |
| Connecticut.....    |                       |               |                 | .3                  |                 | .3           |
| Georgia.....        |                       | 0.4           | 0.2             | 4.6                 |                 | 5.2          |
| Idaho.....          |                       |               |                 | .5                  |                 | .5           |
| Illinois.....       |                       |               |                 | 4.8                 |                 | 4.8          |
| Indiana.....        |                       |               |                 | .1                  |                 | .1           |
| Kentucky.....       |                       |               |                 | .3                  |                 | .3           |
| Nebraska.....       |                       |               | .6              |                     |                 | .6           |
| New Jersey.....     |                       |               | .1              |                     |                 | .1           |
| New York.....       |                       |               |                 |                     | 0.1             | .1           |
| North Carolina..... |                       |               |                 | 10.3                |                 | 10.3         |
| North Dakota.....   |                       |               |                 | .5                  |                 | .5           |
| Pennsylvania.....   |                       | .2            |                 |                     |                 | .2           |
| South Carolina..... |                       |               |                 | 1.9                 |                 | 1.9          |
| Texas.....          |                       |               |                 | 4.3                 | .3              | 4.6          |
| Virginia.....       |                       |               |                 | .3                  |                 | .3           |
| Washington.....     |                       |               |                 | 1.7                 |                 | 1.7          |
| Wisconsin.....      |                       |               |                 | .1                  |                 | .1           |
| Total.....          |                       | .6            | .9              | 32.0                | .4              | 33.9         |

TABLE 12.—*Mileage of projects approved but not under contract on June 30, 1938—*  
Continued

## ON SECONDARY OR FEEDER ROADS OUTSIDE OF MUNICIPALITIES

| State               | Public Works,<br>1934-35 | Works Program |                 | Federal aid         |                 | Total        |
|---------------------|--------------------------|---------------|-----------------|---------------------|-----------------|--------------|
|                     |                          | Highways      | Grade crossings | Secondary or feeder | Grade crossings |              |
|                     | <i>Miles</i>             | <i>Miles</i>  | <i>Miles</i>    | <i>Miles</i>        | <i>Miles</i>    | <i>Miles</i> |
| Alabama.....        |                          |               |                 | 18.2                |                 | 18.2         |
| California.....     |                          |               |                 | 28.2                |                 | 28.2         |
| Colorado.....       |                          |               |                 | 3.6                 |                 | 3.6          |
| Connecticut.....    |                          |               |                 | .6                  |                 | .6           |
| Delaware.....       |                          | 4.4           |                 |                     |                 | 4.4          |
| Georgia.....        | 0.5                      | 4.3           | 0.1             | 27.8                |                 | 32.7         |
| Idaho.....          |                          |               |                 | 32.2                |                 | 32.2         |
| Illinois.....       |                          |               |                 | 70.8                |                 | 70.8         |
| Indiana.....        |                          |               |                 | 65.8                |                 | 65.8         |
| Kansas.....         |                          |               |                 | 25.7                |                 | 25.7         |
| Kentucky.....       |                          |               |                 | 104.9               |                 | 104.9        |
| Louisiana.....      |                          |               |                 | 28.5                |                 | 28.5         |
| Maine.....          |                          |               |                 | 6.7                 |                 | 6.7          |
| Maryland.....       |                          | 1.6           |                 |                     |                 | 1.6          |
| Michigan.....       |                          |               |                 | 26.3                |                 | 26.3         |
| Missouri.....       |                          |               |                 | 31.1                |                 | 31.1         |
| Nebraska.....       |                          |               |                 | 38.7                |                 | 38.7         |
| Nevada.....         | 1.7                      |               |                 | 7.9                 |                 | 9.6          |
| New Hampshire.....  |                          |               |                 | 3.9                 |                 | 3.9          |
| New Jersey.....     | 1.1                      |               |                 | 1.9                 |                 | 3.0          |
| New York.....       |                          |               |                 | .1                  |                 | .1           |
| North Carolina..... |                          |               |                 | 10.9                |                 | 10.9         |
| North Dakota.....   |                          |               |                 | 8.5                 |                 | 8.5          |
| Ohio.....           |                          |               |                 | .9                  |                 | .9           |
| Oklahoma.....       |                          |               |                 | 39.7                |                 | 39.7         |
| Oregon.....         |                          | .9            |                 | 2.1                 |                 | 3.0          |
| Pennsylvania.....   |                          |               |                 | 36.9                |                 | 36.9         |
| Rhode Island.....   |                          |               |                 | 2.9                 |                 | 2.9          |
| South Carolina..... | 1.4                      |               |                 | 46.7                |                 | 48.1         |
| Tennessee.....      | 2.6                      |               |                 | 2.6                 |                 | 5.2          |
| Texas.....          |                          | 8.6           |                 | 124.1               | 0.6             | 133.3        |
| Utah.....           |                          |               |                 | 1.6                 |                 | 1.6          |
| Vermont.....        |                          |               |                 |                     | .2              | .2           |
| Virginia.....       |                          |               |                 | 21.8                |                 | 21.8         |
| Washington.....     |                          |               |                 | 30.9                | .4              | 31.3         |
| West Virginia.....  |                          |               |                 | 9.4                 |                 | 9.4          |
| Wisconsin.....      |                          |               |                 | 6.4                 |                 | 6.4          |
| Wyoming.....        |                          |               |                 | 5.1                 |                 | 5.1          |
| Total.....          | 7.3                      | 19.8          | .1              | 873.4               | 1.2             | 901.8        |

TABLE 12.—Mileage of projects approved but not under contract on June 30, 1938—  
Continued

## TOTAL

| State               | Public Works, 1934-35 | Works Program |                 | Federal aid       |                     |                 | Total   |
|---------------------|-----------------------|---------------|-----------------|-------------------|---------------------|-----------------|---------|
|                     |                       | Highways      | Grade crossings | Highways, 1936-39 | Secondary or feeder | Grade crossings |         |
|                     | Miles                 | Miles         | Miles           | Miles             | Miles               | Miles           | Miles   |
| Alabama.....        |                       |               |                 | 118.9             | 20.1                | 0.2             | 139.2   |
| Arkansas.....       |                       |               |                 | 4.0               |                     | .5              | 4.5     |
| California.....     |                       |               | 0.2             | 23.6              | 28.2                | .4              | 52.4    |
| Colorado.....       |                       |               |                 | 10.9              | 4.0                 |                 | 14.9    |
| Connecticut.....    |                       |               |                 | 3.6               | .9                  |                 | 4.5     |
| Delaware.....       |                       | 4.4           |                 | 5.1               |                     |                 | 9.5     |
| Florida.....        |                       |               |                 | 20.5              |                     | .2              | 20.7    |
| Georgia.....        | 0.5                   | 4.7           | .4              | 85.9              | 32.3                |                 | 123.8   |
| Idaho.....          |                       |               |                 | 16.0              | 32.7                |                 | 48.7    |
| Illinois.....       |                       |               |                 | 81.1              | 75.5                | .7              | 157.3   |
| Indiana.....        | .7                    |               |                 | 10.7              | 65.9                |                 | 77.3    |
| Iowa.....           |                       |               |                 | 65.4              |                     |                 | 65.4    |
| Kansas.....         |                       | .3            |                 | 216.0             | 25.7                | 8.8             | 250.8   |
| Kentucky.....       |                       |               |                 | 39.5              | 105.3               | 1.0             | 145.8   |
| Louisiana.....      |                       |               |                 | 2.1               | 28.4                | 9.4             | 39.9    |
| Maine.....          | .1                    |               |                 | 6.4               | 6.7                 | 4.7             | 17.9    |
| Maryland.....       |                       | 1.6           | .4              | 11.3              |                     |                 | 13.3    |
| Massachusetts.....  |                       |               | .4              | 2.2               |                     | .6              | 3.2     |
| Michigan.....       |                       |               |                 | 10.3              | 26.2                | 5.0             | 41.5    |
| Minnesota.....      |                       |               |                 | 85.1              |                     |                 | 85.1    |
| Mississippi.....    | .6                    | .1            |                 | 81.1              |                     | .1              | 81.9    |
| Missouri.....       |                       |               |                 | 128.4             | 31.1                |                 | 159.5   |
| Montana.....        |                       |               | .1              | 8.3               |                     |                 | 8.4     |
| Nebraska.....       |                       | 1.8           | .6              | 69.5              | 38.7                | 2.5             | 113.1   |
| Nevada.....         | 1.7                   |               |                 | 64.1              | 7.9                 |                 | 73.7    |
| New Hampshire.....  |                       |               |                 | 1.4               | 3.9                 |                 | 5.3     |
| New Jersey.....     | 1.0                   |               | .1              |                   | 1.9                 |                 | 3.0     |
| New Mexico.....     |                       |               |                 | 38.2              |                     |                 | 38.2    |
| New York.....       |                       |               |                 | 13.4              | .1                  | .5              | 14.0    |
| North Carolina..... |                       |               |                 | 55.6              | 21.3                | .1              | 77.0    |
| North Dakota.....   |                       |               |                 | 8.8               | 9.0                 | .5              | 18.3    |
| Ohio.....           |                       |               |                 | 21.6              | .9                  | 1.5             | 24.0    |
| Oklahoma.....       |                       |               |                 | 69.4              | 39.7                |                 | 109.1   |
| Oregon.....         | .2                    | 1.0           |                 |                   | 2.0                 |                 | 3.2     |
| Pennsylvania.....   |                       | .2            |                 | 22.5              | 36.9                |                 | 59.6    |
| Rhode Island.....   |                       |               |                 | 1.2               | 3.0                 |                 | 4.2     |
| South Carolina..... | 1.4                   |               | .5              | 36.8              | 48.7                | .7              | 88.1    |
| South Dakota.....   |                       |               |                 | 66.2              |                     | .5              | 66.7    |
| Tennessee.....      | 2.6                   |               |                 | 16.7              | 2.6                 |                 | 21.9    |
| Texas.....          |                       | 8.6           |                 | 94.6              | 128.4               | 12.8            | 244.4   |
| Utah.....           |                       |               |                 | 29.5              | 1.6                 |                 | 31.1    |
| Vermont.....        |                       |               |                 | 6.7               |                     | .2              | 6.9     |
| Virginia.....       | .3                    | .2            |                 | 65.6              | 22.1                | .5              | 88.7    |
| Washington.....     |                       |               | .5              | .3                | 32.6                | .5              | 33.9    |
| West Virginia.....  |                       |               |                 | 13.1              | 9.4                 | .3              | 22.8    |
| Wisconsin.....      |                       |               |                 | 56.5              | 6.6                 |                 | 63.1    |
| Wyoming.....        |                       |               |                 | 7.9               | 5.1                 |                 | 13.0    |
| Hawaii.....         |                       | .6            |                 | 8.8               |                     | 1.6             | 11.0    |
| Puerto Rico.....    |                       |               |                 |                   |                     | .6              | .6      |
| Total.....          | 9.1                   | 23.5          | 3.2             | 1,804.8           | 905.4               | 54.4            | 2,800.4 |



|                           |    |     |     |     |     |   |     |
|---------------------------|----|-----|-----|-----|-----|---|-----|
| Ohio.....                 | 16 | 16  | 7   | 7   | 11  | 7 | 11  |
| Oklahoma.....             | 19 | 19  | 8   | 8   | 38  | 8 | 38  |
| Oregon.....               | 7  | 10  | 1   | 1   | 1   | 1 | 1   |
| Pennsylvania.....         | 36 | 37  | 10  | 10  | 1   | 1 | 1   |
| Rhode Island.....         | 21 | 21  | 7   | 7   | 39  | 7 | 39  |
| South Carolina.....       | 35 | 35  | 2   | 2   | 41  | 2 | 41  |
| South Dakota.....         | 28 | 28  | 1   | 1   | 19  | 1 | 19  |
| Tennessee.....            | 27 | 31  | 2   | 2   | 107 | 2 | 107 |
| Texas.....                | 13 | 15  | 2   | 2   | 2   | 2 | 2   |
| Utah.....                 | 3  | 3   | 2   | 2   | 5   | 2 | 5   |
| Vermont.....              | 14 | 16  | 8   | 8   | 14  | 8 | 14  |
| Virginia.....             | 2  | 2   | 2   | 2   | 1   | 2 | 1   |
| Washington.....           | 15 | 6   | 3   | 3   | 3   | 3 | 3   |
| West Virginia.....        | 10 | 14  | 2   | 2   | 10  | 2 | 10  |
| Wisconsin.....            | 5  | 5   | 1   | 1   | 1   | 1 | 1   |
| Wyoming.....              | 1  | 1   | 1   | 1   | 1   | 1 | 1   |
| District of Columbia..... | 1  | 1   | 1   | 1   | 1   | 1 | 1   |
| Total.....                | 8  | 711 | 133 | 144 | 91  | 2 | 603 |
|                           |    | 20  | 11  | 5   | 43  |   | 744 |

UNDER CONTRACT

|                    |    |    |    |    |    |    |     |
|--------------------|----|----|----|----|----|----|-----|
| Alabama.....       | 4  | 8  | 12 | 6  | 2  | 6  | 6   |
| Arkansas.....      | 3  | 7  | 10 | 2  | 2  | 2  | 2   |
| California.....    | 3  | 3  | 4  | 4  | 4  | 4  | 4   |
| Colorado.....      | 4  | 1  | 4  | 4  | 4  | 4  | 4   |
| Connecticut.....   | 2  | 2  | 2  | 2  | 2  | 2  | 2   |
| Delaware.....      | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| Florida.....       | 22 | 22 | 13 | 13 | 45 | 23 | 23  |
| Georgia.....       | 1  | 1  | 1  | 1  | 33 | 33 | 33  |
| Idaho.....         | 13 | 8  | 7  | 6  | 1  | 1  | 1   |
| Illinois.....      | 8  | 27 | 6  | 6  | 32 | 86 | 118 |
| Indiana.....       | 8  | 19 | 1  | 1  | 21 | 21 | 21  |
| Iowa.....          | 5  | 20 | 1  | 1  | 6  | 6  | 6   |
| Kansas.....        | 12 | 17 | 3  | 5  | 31 | 31 | 36  |
| Kentucky.....      | 7  | 11 | 1  | 1  | 1  | 1  | 1   |
| Louisiana.....     | 2  | 3  | 2  | 2  | 1  | 1  | 1   |
| Maine.....         | 5  | 7  | 1  | 1  | 13 | 1  | 13  |
| Maryland.....      | 2  | 1  | 1  | 1  | 45 | 45 | 45  |
| Massachusetts..... | 1  | 3  | 1  | 1  | 1  | 1  | 1   |
| Michigan.....      | 1  | 9  | 1  | 1  | 1  | 1  | 1   |
| Minnesota.....     | 3  | 5  | 5  | 5  | 3  | 3  | 3   |
| Mississippi.....   | 4  | 3  | 2  | 2  | 3  | 3  | 3   |
| Missouri.....      | 5  | 6  | 1  | 1  | 5  | 5  | 5   |
| Montana.....       | 1  | 6  | 7  | 1  | 7  | 7  | 7   |
| Nebraska.....      | 2  | 11 | 13 | 3  | 5  | 2  | 7   |
| Nevada.....        | 1  | 1  | 1  | 1  | 1  | 1  | 1   |
| New Hampshire..... | 3  | 2  | 6  | 2  | 1  | 1  | 1   |
| New Jersey.....    | 1  | 1  | 1  | 1  | 1  | 1  | 1   |

TABLE 13.—*Status of grade-crossing elimination and protection projects on June 30, 1938—Continued*

UNDER CONTRACT—Continued

| State                 | Crossings eliminated |                 |                    |                 | Separation structures reconstructed |                               |                             | Crossings protected |                    |                 |             |        |
|-----------------------|----------------------|-----------------|--------------------|-----------------|-------------------------------------|-------------------------------|-----------------------------|---------------------|--------------------|-----------------|-------------|--------|
|                       | Works Program        |                 | Federal aid        |                 | Total                               | Works Program grade crossings | Federal-aid grade crossings | Total               | Works Program      |                 | Federal aid |        |
|                       | High-ways            | Grade crossings | High-ways, 1936-39 | Grade crossings |                                     |                               |                             |                     | High-ways, 1936-39 | Grade crossings | Total       |        |
| Public Works, 1884-35 | Number               | Number          | Number             | Number          | Number                              | Number                        | Number                      | Number              | Number             | Number          | Number      | Number |
| New Mexico.....       |                      | 4               | 4                  | 4               |                                     |                               |                             |                     | 1                  |                 |             | 1      |
| New York.....         |                      | 7               | 8                  | 15              | 2                                   | 4                             | 6                           |                     |                    |                 | 2           | 2      |
| North Carolina.....   |                      | 12              | 4                  | 16              |                                     | 2                             | 2                           |                     |                    |                 |             |        |
| North Dakota.....     |                      |                 | 1                  | 1               | 1                                   | 2                             | 3                           |                     |                    |                 |             |        |
| Ohio.....             |                      | 40              |                    | 40              |                                     | 1                             | 3                           |                     |                    |                 |             |        |
| Oklahoma.....         |                      | 2               | 1                  | 3               |                                     | 2                             | 2                           |                     |                    |                 |             | 1      |
| Oregon.....           |                      | 1               | 1                  | 2               |                                     | 5                             | 5                           |                     |                    |                 |             |        |
| Pennsylvania.....     |                      | 15              | 1                  | 18              |                                     | 1                             | 5                           |                     |                    |                 |             |        |
| Rhode Island.....     |                      |                 | 1                  | 1               |                                     | 4                             | 5                           |                     |                    |                 |             |        |
| South Carolina.....   | 1                    |                 |                    | 1               |                                     | 1                             | 1                           |                     |                    |                 |             |        |
| South Dakota.....     |                      | 4               |                    | 4               |                                     | 1                             | 5                           |                     |                    |                 |             |        |
| Tennessee.....        |                      | 21              | 3                  | 24              |                                     | 1                             | 1                           |                     |                    |                 |             | 28     |
| Texas.....            |                      | 4               |                    | 4               |                                     | 1                             | 1                           |                     |                    |                 |             | 10     |
| Texas.....            |                      | 1               |                    | 1               |                                     |                               | 1                           |                     |                    |                 |             | 1      |
| Texas.....            |                      | 2               | 2                  | 4               |                                     |                               | 5                           |                     |                    |                 |             | 5      |
| Texas.....            |                      | 2               | 2                  | 4               |                                     |                               | 4                           |                     |                    |                 |             | 4      |
| Texas.....            |                      | 2               | 6                  | 8               |                                     |                               | 1                           |                     |                    |                 |             | 1      |
| Texas.....            |                      | 6               | 6                  | 12              |                                     | 2                             | 2                           |                     |                    |                 |             | 4      |
| Vermont.....          |                      | 4               |                    | 4               |                                     |                               | 3                           |                     |                    |                 |             | 3      |
| Virginia.....         |                      | 5               | 1                  | 6               |                                     |                               | 3                           |                     |                    |                 |             | 4      |
| Washington.....       |                      | 12              | 5                  | 17              |                                     |                               | 3                           |                     |                    |                 |             | 4      |
| West Virginia.....    |                      | 4               |                    | 4               |                                     |                               | 1                           |                     |                    |                 |             | 4      |
| Wisconsin.....        |                      | 1               | 4                  | 5               |                                     | 1                             | 1                           |                     |                    |                 |             | 3      |
| Wyoming.....          |                      | 1               |                    | 1               |                                     |                               | 2                           |                     |                    |                 |             | 24     |
| Hawaii.....           |                      | 2               |                    | 2               |                                     |                               | 2                           |                     |                    |                 |             | 6      |
| Puerto Rico.....      |                      |                 |                    |                 |                                     |                               |                             |                     |                    |                 |             |        |
| Total.....            | 4                    | 2               | 232                | 422             | 39                                  | 45                            | 84                          | 52                  | 290                | 2               | 282         | 626    |





TABLE 14.—Mileage, by types of construction, of projects completed during the fiscal year 1938

| State          | Graded and drained |       | Sand-clay  |         | Gravel     |         | Macadam    |         | Low-cost bituminous mix | Bituminous macadam | Bituminous concrete | Portland cement concrete | Block | Bridges and approaches | Grade separations |       | Total |
|----------------|--------------------|-------|------------|---------|------------|---------|------------|---------|-------------------------|--------------------|---------------------|--------------------------|-------|------------------------|-------------------|-------|-------|
|                | Miles              | Miles | Un-treated | Treated | Un-treated | Treated | Un-treated | Treated |                         |                    |                     |                          |       |                        | Miles             | Miles |       |
| Alabama        | 12.3               | 4.3   | 18.4       | 50.3    | 7.7        | 7.7     | 10.9       | 51.0    | 26.5                    | 0.8                | 0.8                 | 0.8                      | 0.8   | 0.2                    | 0.3               | 0.3   | 100.3 |
| Arizona        | .....              | ..... | .....      | .....   | 20.0       | 78.5    | .....      | .....   | 2.9                     | 8.4                | 8.4                 | 8.4                      | 8.4   | .....                  | .....             | ..... | 134.0 |
| Arkansas       | 25.8               | ..... | .....      | 1.7     | 24.9       | 24.7    | 1.8        | .....   | 120.5                   | 42.9               | 2.9                 | 39.0                     | 39.0  | .....                  | .....             | ..... | 239.5 |
| California     | .....              | ..... | .....      | .....   | 116.8      | 24.7    | .....      | .....   | 118.4                   | 42.9               | 2.9                 | 39.0                     | 39.0  | 1.0                    | 0.6               | 0.6   | 226.5 |
| Colorado       | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | 4.4                     | 1.1                | 1.1                 | 1.1                      | 1.1   | .....                  | .....             | ..... | 226.5 |
| Connecticut    | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | 4.4                     | 9.5                | 1.1                 | 14.5                     | 14.5  | .....                  | .....             | ..... | 137.8 |
| Delaware       | .....              | ..... | .....      | .....   | 10.3       | 17.5    | .....      | .....   | .....                   | 10.3               | 10.3                | 16.7                     | 16.7  | .....                  | .....             | ..... | 37.3  |
| Florida        | 33.1               | ..... | .....      | .....   | 40.3       | .....   | .....      | .....   | .....                   | 1.1                | 1.1                 | 21.7                     | 21.7  | .....                  | .....             | ..... | 66.7  |
| Georgia        | 9.2                | 7.4   | 32.1       | 51.9    | 38.7       | 51.9    | 10.9       | 51.0    | 139.3                   | 4.1                | 3.3                 | 59.0                     | 59.0  | 1.7                    | 1.0               | 1.0   | 272.8 |
| Idaho          | 19.9               | ..... | .....      | .....   | 90.2       | .....   | .....      | .....   | .....                   | 4.1                | 3.3                 | 5.4                      | 5.4   | .....                  | .....             | ..... | 260.1 |
| Illinois       | 119.6              | ..... | .....      | .....   | 12.5       | .....   | .....      | .....   | 3.6                     | 4.1                | 3.3                 | 165.6                    | 165.6 | 2.7                    | .....             | ..... | 399.2 |
| Indiana        | 77.7               | ..... | .....      | .....   | 24.5       | 6.5     | 79.4       | 14.9    | 9.5                     | 4.0                | 4.0                 | 97.5                     | 97.5  | .....                  | .....             | ..... | 232.9 |
| Iowa           | 75.2               | ..... | .....      | .....   | 6.9        | .....   | .....      | .....   | .....                   | 4.0                | 4.0                 | 249.0                    | 249.0 | 1.2                    | 1.1               | 1.1   | 333.4 |
| Kansas         | 28.4               | ..... | .....      | .....   | 187.9      | .....   | .....      | .....   | 37.0                    | 4.3                | 4.3                 | 61.3                     | 61.3  | 1.2                    | 1.1               | 1.1   | 330.1 |
| Kentucky       | 10.0               | ..... | .....      | .....   | 137.7      | .....   | .....      | .....   | 17.3                    | 4.3                | 4.3                 | 30.5                     | 30.5  | 1.0                    | .....             | ..... | 224.0 |
| Louisiana      | 17.1               | ..... | .....      | .....   | 14.3       | 1.0     | .....      | .....   | .....                   | 19.0               | 14.8                | 30.5                     | 30.5  | .....                  | .....             | ..... | 69.9  |
| Maine          | .....              | ..... | .....      | .....   | 6.5        | 44.4    | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 96.1  |
| Maryland       | .....              | ..... | .....      | .....   | 6.5        | .....   | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 29.4  |
| Massachusetts  | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 41.1  |
| Michigan       | .....              | ..... | .....      | .....   | 12.6       | .....   | .....      | .....   | 1.3                     | 9.9                | 26.9                | 21.2                     | 21.2  | .....                  | .....             | ..... | 29.4  |
| Minnesota      | 108.5              | ..... | .....      | .....   | 80.7       | 24.5    | .....      | .....   | .....                   | 13.8               | 13.8                | 150.7                    | 150.7 | .....                  | .....             | ..... | 177.9 |
| Mississippi    | 119.1              | ..... | .....      | .....   | 38.5       | 2.3     | .....      | .....   | 114.5                   | 2.1                | 2.1                 | 101.4                    | 101.4 | .....                  | .....             | ..... | 432.2 |
| Missouri       | 37.9               | ..... | .....      | .....   | 231.8      | 296.7   | .....      | .....   | .....                   | 9.1                | 9.1                 | 104.2                    | 104.2 | .....                  | .....             | ..... | 284.3 |
| Montana        | 50.6               | ..... | .....      | .....   | 136.5      | 49.1    | .....      | .....   | 23.9                    | 23.7               | 23.7                | 181.2                    | 181.2 | .....                  | .....             | ..... | 769.1 |
| Nebraska       | 32.4               | ..... | .....      | .....   | 39.9       | .....   | .....      | .....   | 270.7                   | 5.6                | 5.6                 | 37.0                     | 37.0  | .....                  | .....             | ..... | 334.2 |
| Nevada         | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 418.3 |
| New Hampshire  | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 161.4 |
| New Jersey     | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | .....                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 19.9  |
| New Mexico     | 37.1               | ..... | .....      | .....   | 10.1       | 1.1     | .....      | .....   | 1.1                     | 3.2                | 2.4                 | 9.9                      | 9.9   | .....                  | .....             | ..... | 47.2  |
| New York       | 6.1                | ..... | .....      | .....   | 108.6      | 78.5    | .....      | .....   | 175.0                   | 4.3                | 4.3                 | 28.0                     | 28.0  | .....                  | .....             | ..... | 401.5 |
| North Carolina | 21.6               | ..... | .....      | .....   | 6.0        | 41.5    | .....      | .....   | .....                   | 21.8               | 65.1                | 193.0                    | 193.0 | .....                  | .....             | ..... | 337.8 |
| North Dakota   | 55.1               | ..... | .....      | .....   | 105.4      | 85.3    | 4.7        | .....   | 54.7                    | 9.4                | 9.4                 | 93.8                     | 93.8  | .....                  | .....             | ..... | 547.6 |
| Ohio           | 15.1               | ..... | .....      | .....   | 47.6       | 54.1    | .....      | .....   | 101.2                   | .....              | .....               | .....                    | ..... | .....                  | .....             | ..... | 317.3 |
| Oklahoma       | 24.8               | ..... | .....      | .....   | 106.4      | 5.6     | 3.1        | .....   | .....                   | 17.2               | 38.8                | 38.8                     | 38.8  | .....                  | .....             | ..... | 210.4 |
| Oregon         | 6.8                | ..... | .....      | .....   | 11.7       | 71.4    | .....      | .....   | 27.9                    | 27.9               | 27.9                | 112.9                    | 112.9 | .....                  | .....             | ..... | 280.2 |
| Pennsylvania   | 4.6                | ..... | .....      | .....   | 74.9       | .....   | .....      | .....   | 27.7                    | 61.1               | 39.2                | 19.6                     | 19.6  | .....                  | .....             | ..... | 223.7 |
|                | .....              | ..... | .....      | .....   | .....      | .....   | .....      | .....   | .....                   | .....              | .....               | 225.6                    | 225.6 | .....                  | .....             | ..... | 414.2 |

|                           |         |       |       |         |         |      |       |         |       |       |         |       |      |      |    |  |  |  |          |
|---------------------------|---------|-------|-------|---------|---------|------|-------|---------|-------|-------|---------|-------|------|------|----|--|--|--|----------|
| Rhode Island.....         | 41.0    | 29.1  | 246.7 | 3.8     | 2.9     |      |       |         | 5.9   | 1.0   | 2.2     | 8.6   |      |      |    |  |  |  | 14.7     |
| South Carolina.....       | 112.9   |       |       | 53.8    | 56.8    |      |       |         | 100.1 |       | 14.5    | 17.7  |      |      |    |  |  |  | 360.1    |
| South Dakota.....         | 2.9     |       |       | 63.2    |         |      |       |         |       | 5.3   | 12.9    | 52.9  |      |      |    |  |  |  | 379.4    |
| Tennessee.....            | 270.9   |       |       | 146.0   | 417.0   |      |       |         | 10.9  |       | 21.4    | 49.7  |      |      |    |  |  |  | 139.7    |
| Texas.....                | 1.7     |       |       | 63.9    | 3.7     |      |       |         |       |       | 6.3     | 268.5 |      |      |    |  |  |  | 1,145.9  |
| Utah.....                 |         |       |       |         | 12.4    |      |       |         | 112.9 |       |         | 16.9  |      |      |    |  |  |  | 1,199.9  |
| Vermont.....              | 5.9     |       |       | 52.3    | 31.0    |      |       |         | 23.4  | 2.6   |         | 11.6  |      |      |    |  |  |  | 52.2     |
| Virginia.....             | 3.7     |       |       | 28.0    |         |      |       |         | 1.6   |       | 9.3     | 14.0  |      |      |    |  |  |  | 296.0    |
| Washington.....           | 38.0    |       |       | 54.3    |         |      |       |         | 139.3 | 6.1   | 2.3     | 24.0  |      |      |    |  |  |  | 101.9    |
| West Virginia.....        | 44.4    |       |       | 71.8    |         |      |       |         | 9.0   |       | 10.2    | 21.5  |      |      |    |  |  |  | 107.8    |
| Wisconsin.....            | 35.8    |       |       | 30.0    | 9.9     |      |       |         | 13.1  |       | .9      | 174.5 |      |      |    |  |  |  | 343.3    |
| Wyoming.....              |         |       |       |         | 1.6     |      |       |         | 266.2 |       |         |       |      |      |    |  |  |  | 21.4     |
| Hawaii.....               |         |       |       |         |         |      |       |         |       |       |         |       |      |      |    |  |  |  |          |
| District of Columbia..... |         |       |       |         |         |      |       |         |       |       |         |       |      |      |    |  |  |  |          |
| Total.....                | 1,506.1 | 164.0 | 534.9 | 2,395.5 | 1,500.3 | 87.7 | 315.9 | 1,989.1 | 212.9 | 418.9 | 2,869.8 | 45.0  | 53.0 | 35.8 | .3 |  |  |  | 12,129.2 |

TABLE 15.—*Mileage, by types of construction, of projects under contract on June 30, 1938*

| State               | Graded and drained |       | Sand-clay  |         | Gravel     |         | Macadam    |         | Low-cost bituminous mix | Bituminous macadam | Bituminous concrete | Portland cement concrete | Block | Bridges and approaches | Grade separations |       | Total |
|---------------------|--------------------|-------|------------|---------|------------|---------|------------|---------|-------------------------|--------------------|---------------------|--------------------------|-------|------------------------|-------------------|-------|-------|
|                     | Miles              | Miles | Un-treated | Treated | Un-treated | Treated | Un-treated | Treated |                         |                    |                     |                          |       |                        | Miles             | Miles |       |
|                     |                    |       |            |         |            |         |            |         | Miles                   | Miles              |                     |                          |       |                        |                   |       |       |
| Alabama.....        |                    |       |            |         |            |         |            |         |                         |                    |                     |                          |       |                        |                   |       | 326.6 |
| Arizona.....        |                    |       |            |         |            |         |            |         |                         |                    |                     |                          |       |                        |                   |       | 121.9 |
| Arkansas.....       | 30.2               | 7.3   | 6.7        | 331.3   | 61.4       |         |            |         | 53.1                    |                    | 0.2                 | 1.9                      |       |                        |                   |       | 106.9 |
| California.....     | 1.8                | 5.1   | 11.8       | 21.9    |            |         |            |         | 125.0                   |                    | 78.8                | 2.6                      |       |                        |                   |       | 315.3 |
| Colorado.....       | 1.1                | 117.9 |            |         |            |         |            |         | 14.7                    |                    | .3                  | 57.9                     |       |                        |                   |       | 119.8 |
| Connecticut.....    |                    |       |            |         |            |         |            |         | .9                      |                    |                     |                          |       |                        |                   |       | 14.6  |
| Delaware.....       |                    |       |            |         |            |         |            |         |                         |                    |                     |                          |       |                        |                   |       | 19.1  |
| Florida.....        | 39.9               |       |            |         |            |         |            |         |                         |                    |                     |                          |       |                        |                   |       | 70.7  |
| Georgia.....        | 9.8                | 31.6  | 94.1       | 6.3     | 173.4      |         |            |         | 1.3                     |                    |                     |                          |       |                        |                   |       | 584.4 |
| Idaho.....          | 7.8                |       | 39.5       |         |            |         |            |         |                         |                    |                     |                          |       |                        |                   |       | 190.7 |
| Illinois.....       | 100.6              | 8.1   | 23.8       | 6.1     | 118.8      |         |            |         | 118.2                   |                    | 3.1                 | 4.5                      |       |                        |                   |       | 399.5 |
| Indiana.....        | 21.0               |       | 26.9       |         |            |         |            |         | 37.4                    |                    | 40.7                | 111.7                    | 1.5   |                        |                   |       | 324.2 |
| Iowa.....           | 37.6               |       | 6          |         |            |         |            |         | 98.6                    |                    | 20.3                | 193.1                    |       |                        |                   |       | 233.0 |
| Kansas.....         | 14.4               |       | 63.2       | 473.5   |            |         |            |         | 89.9                    |                    | 88.4                | 33.0                     |       |                        |                   |       | 708.6 |
| Kentucky.....       | 10.6               |       | 93.2       |         |            |         |            |         | 80.9                    |                    | 48.5                | 88.4                     |       |                        |                   |       | 303.8 |
| Louisiana.....      | 63.0               |       | 5.0        |         |            |         |            |         |                         |                    | 20.3                |                          |       |                        |                   |       | 120.8 |
| Maine.....          | 1.5                |       | 8          |         |            |         |            |         | 10.3                    |                    | 10.5                | 7.0                      |       |                        |                   |       | 84.6  |
| Maryland.....       | 1.9                |       | 3.1        |         |            |         |            |         | 6.6                     |                    | 52.2                |                          |       |                        |                   |       | 64.4  |
| Massachusetts.....  | 1.9                |       |            |         |            |         |            |         | 1.7                     |                    | 7.3                 | 5                        |       |                        |                   |       | 12.7  |
| Michigan.....       | 13.4               |       | 17.5       |         |            |         |            |         | .6                      |                    | 14.4                | 5                        |       |                        |                   |       | 144.6 |
| Minnesota.....      | 28.8               | 9.6   | 15.6       |         |            |         |            |         | 202.7                   |                    | 107.3               | 6                        |       |                        |                   |       | 311.7 |
| Mississippi.....    | 42.1               |       | 5.4        | 16.6    |            |         |            |         |                         |                    | 284.1               | 36.5                     |       |                        |                   |       | 319.6 |
| Missouri.....       | 33.9               |       | 76.2       | 46.3    |            |         |            |         | 5.7                     |                    | 5.7                 | 44.5                     |       |                        |                   |       | 209.8 |
| Montana.....        | 21.5               |       | 23.0       |         |            |         |            |         | 44.6                    |                    | 2.2                 | 2                        |       |                        |                   |       | 90.0  |
| Nebraska.....       | 86.8               | 87.1  | 242.3      |         |            |         |            |         | 244.0                   |                    | 56.3                | 2                        |       |                        |                   |       | 735.0 |
| Nevada.....         |                    |       | 88.6       |         |            |         |            |         | 51.7                    |                    |                     |                          |       |                        |                   |       | 140.4 |
| New Hampshire.....  |                    |       |            |         |            |         |            |         | 20.8                    |                    | 3.5                 | 3.1                      |       |                        |                   |       | 32.6  |
| New Jersey.....     | 2.4                |       |            |         |            |         |            |         |                         |                    | .3                  | 19.3                     |       |                        |                   |       | 22.9  |
| New Mexico.....     | 14.8               |       | 93.6       | 15.7    |            |         |            |         | 121.3                   |                    |                     |                          |       |                        |                   |       | 246.7 |
| New York.....       | 52.7               |       | 5.7        | 134.6   |            |         |            |         | 13.5                    |                    | 25.8                | 195.2                    |       |                        |                   |       | 451.0 |
| North Carolina..... | 64.9               | .7    | 17.8       | 87.0    |            |         |            |         | 57.6                    |                    | 2.8                 | 54.5                     |       |                        |                   |       | 421.6 |
| North Dakota.....   | 88.3               | .3    | 19.7       | 47.3    |            |         |            |         | 114.4                   |                    |                     | 4                        |       |                        |                   |       | 270.8 |
| Ohio.....           | 11.6               |       | 2.4        |         |            |         |            |         |                         |                    | 15.3                | 47.2                     | 31.0  |                        |                   |       | 109.4 |
| Oklahoma.....       | 15.9               |       | 125.7      | 2.3     |            |         |            |         | 13.1                    |                    | 3.3                 | 58.0                     |       |                        |                   |       | 227.6 |
| Oregon.....         | 5.9                |       | 52.1       | 64.8    |            |         |            |         | 7.1                     |                    | 5.7                 | 13.9                     |       |                        |                   |       | 154.7 |
| Pennsylvania.....   |                    |       | 45.9       |         |            |         |            |         | 18.1                    |                    | 56.7                | 72.9                     | 1.9   |                        |                   |       | 241.5 |
| Rhode Island.....   |                    |       |            |         |            |         |            |         | 3.2                     |                    | 6.1                 |                          |       |                        |                   |       | 18.2  |

|                     |         |         |         |         |       |         |      |      |          |
|---------------------|---------|---------|---------|---------|-------|---------|------|------|----------|
| South Carolina..... | 11.5    | 208.7   | 41.1    | 17.7    | 23.0  | 25.7    | 2.0  | .2   | 358.4    |
| South Dakota.....   | 199.7   | 7.0     | 67.0    | 147.1   | 54.9  | 60.8    | 2.8  | .2   | 421.8    |
| Tennessee.....      | 187.6   | 157.7   | 351.3   | 8.5     | 88.1  | 142.0   | 1.0  | .4   | 192.8    |
| Texas.....          | 234.6   | 187.6   | 8.9     | 74.0    | 4.2   | 9.9     | 8.4  | .6   | 1,035.8  |
| Utah.....           | .2      | 43.9    | 14.2    | 30.2    | 3.1   | 3.1     | 1.1  | .1   | 141.1    |
| Vermont.....        | 3.0     | 10.2    | 27.4    | 61.5    | 31.6  | 71.3    | 1.1  | .4   | 57.3     |
| Virginia.....       | 4.0     | 87.4    | 14.0    | 14.0    | 31.6  | 17.0    | 1.5  | .3   | 261.0    |
| Washington.....     | 8.8     | 3.6     | 28.8    | 28.8    | 28.4  | 15.2    | 1.1  | .9   | 124.4    |
| West Virginia.....  | 85.7    | 72.0    | 6.0     | 6.0     | .3    | 56.8    | 1.2  | .2   | 97.8     |
| Wisconsin.....      | 113.7   | 25.2    | 20.8    | 137.4   | .4    | 3.0     | 1.6  | .1   | 292.8    |
| Wyoming.....        |         |         | 34.2    |         |       |         | .3   |      | 297.0    |
| Hawaii.....         |         |         |         |         |       |         | .2   |      | 21.5     |
| Puerto Rico.....    |         |         |         |         |       |         |      |      | 34.6     |
| Total.....          | 1,474.3 | 1,627.8 | 1,894.1 | 1,976.7 | 563.5 | 2,242.9 | 66.4 | 17.9 | 11,486.0 |
|                     |         | 178.7   | 121.5   | 306.0   | 108.0 | 2,242.9 | 66.4 | 17.9 | .5       |

TABLE 16.—*Mileage, by types of construction, of projects approved but not under contract on June 30, 1938*

| State          | Graded and drained | Sand-clay  |         | Gravel     |         | Macadam    |         | Low-cost bituminous mix | Bituminous concrete | Portland cement concrete | Block | Bridges and approaches | Grade separations      |                    | Total |
|----------------|--------------------|------------|---------|------------|---------|------------|---------|-------------------------|---------------------|--------------------------|-------|------------------------|------------------------|--------------------|-------|
|                |                    | Un-treated | Treated | Un-treated | Treated | Un-treated | Treated |                         |                     |                          |       |                        | Railroad and high-ways | Re-tween high-ways |       |
|                |                    |            |         |            |         |            |         |                         |                     |                          |       |                        |                        |                    |       |
| Alabama        |                    |            |         |            |         |            |         |                         |                     |                          |       |                        |                        |                    | 139.2 |
| Arkansas       |                    |            |         |            |         |            |         |                         |                     |                          |       |                        |                        |                    | 4.5   |
| California     | 4.6                |            |         |            |         |            |         |                         |                     |                          |       |                        |                        |                    | 52.4  |
| Colorado       |                    | 1.0        |         | 2.1        | 5.5     |            |         | 29.1                    | 5.7                 | 3.5                      |       | 0.1                    |                        |                    | 14.9  |
| Connecticut    |                    |            |         |            |         |            | 0.8     |                         |                     | 2.8                      |       |                        |                        |                    | 4.5   |
| Delaware       | 4.5                |            |         |            |         |            |         |                         | 3.4                 | 1.4                      |       | .2                     |                        |                    | 9.5   |
| Florida        | 7.2                |            |         |            |         |            |         |                         |                     | 6.8                      |       | .6                     |                        |                    | 20.7  |
| Georgia        | 13.7               | 16.3       | 24.8    | 13.0       | 11.0    | 2.1        | 11.8    |                         | 17.8                | 12.6                     |       | .1                     |                        |                    | 123.8 |
| Idaho          |                    |            |         | 3.5        |         |            |         | 38.9                    |                     |                          |       |                        |                        |                    | 48.7  |
| Illinois       | 33.9               |            |         | 27.5       |         | 53.0       |         | 8.3                     |                     | 11.4                     |       |                        |                        | 0.2                | 77.3  |
| Indiana        | 9.0                |            |         | 19.3       | 3.4     |            |         | 34.2                    |                     | 39.7                     |       |                        |                        |                    | 65.4  |
| Iowa           | 8.4                |            |         | 17.0       |         |            |         | 18.0                    | 6.8                 | 17.8                     |       | 1.0                    |                        |                    | 145.8 |
| Kansas         | 78.7               |            | 13.7    | 66.8       | 51.8    |            |         | 5.0                     |                     | 21.6                     |       | 1.0                    |                        |                    | 39.9  |
| Kentucky       | 8.8                |            |         | 102.3      |         |            |         |                         |                     | 1.6                      |       | .2                     |                        |                    | 17.9  |
| Louisiana      | 9.3                |            |         | 28.0       |         |            |         |                         |                     | 10.7                     |       |                        |                        |                    | 13.3  |
| Maine          |                    |            |         |            | 3.1     |            |         | 3.4                     |                     |                          |       |                        |                        |                    | 3.2   |
| Maryland       | 1.8                |            |         | .7         |         |            |         | .4                      |                     | 2.8                      |       |                        |                        |                    | 41.5  |
| Massachusetts  |                    |            |         |            |         |            |         |                         |                     | 3.0                      |       |                        |                        |                    | 85.1  |
| Michigan       | 8.5                |            |         | 12.1       |         |            |         | 7.1                     |                     | 10.8                     |       |                        |                        |                    | 81.9  |
| Minnesota      | 10.3               | 4.2        |         | 2          | 13.4    |            |         | 57.0                    |                     |                          |       |                        |                        |                    | 169.5 |
| Mississippi    | 51.1               |            |         |            |         |            |         |                         |                     | 30.0                     |       | .7                     |                        |                    | 138.1 |
| Missouri       | 17.0               |            |         | 42.1       | 46.3    |            |         | 31.1                    |                     | 19.7                     |       | .3                     |                        |                    | 138.1 |
| Montana        | 8.3                |            |         |            |         |            |         | .1                      |                     | 4.5                      |       | .9                     |                        |                    | 13.1  |
| Nebraska       | 15.8               |            | 38.6    | 42.7       |         |            |         | 9.9                     |                     |                          |       |                        |                        |                    | 73.7  |
| Nevada         |                    |            |         | 12.8       |         |            |         | 60.9                    |                     |                          |       |                        |                        |                    | 3.3   |
| New Hampshire  |                    |            |         |            |         |            | 4.3     |                         | 1.0                 |                          |       |                        |                        |                    | 3.0   |
| New Jersey     |                    |            |         |            |         |            |         |                         | 1.1                 | 1.8                      |       | .1                     |                        |                    | 38.2  |
| New Mexico     |                    |            |         | 11.2       |         |            |         | 26.8                    |                     |                          |       |                        |                        |                    | 77.0  |
| New York       | 3.8                |            |         | .1         |         |            |         |                         |                     | 10.1                     |       |                        |                        |                    | 18.3  |
| North Carolina | 3.2                |            | 7.1     |            | 30.1    |            |         | 18.4                    |                     | 9.1                      |       | .1                     |                        |                    | 14.0  |
| North Dakota   |                    |            |         |            |         |            |         | 9.3                     |                     |                          |       |                        |                        |                    | 24.0  |
| Ohio           |                    | 9.0        |         |            |         |            |         | 6.1                     |                     | 7.2                      | 9.4   |                        | .2                     | .1                 | 109.1 |
| Oklahoma       | 7.9                |            |         | 9          |         |            |         |                         | 9.7                 | 16.5                     |       | 1.7                    |                        |                    | 59.6  |
| Oregon         |                    |            |         | 73.3       |         |            |         |                         | 1                   |                          |       |                        |                        |                    | 3.2   |
| Pennsylvania   |                    |            |         | 1.0        |         |            |         |                         | 2.8                 | 16.6                     |       |                        |                        |                    | 4.2   |
| Rhode Island   |                    |            |         | 27.7       |         |            |         | 2.0                     | .9                  | .1                       |       |                        |                        |                    | 4.2   |
| South Carolina | 10.6               | 14.7       | 59.8    |            |         |            |         | 12.5                    | 2.3                 |                          |       |                        |                        |                    | 88.1  |

|                    |       |      |       |       |       |      |       |       |      |      |       |       |      |     |    |         |
|--------------------|-------|------|-------|-------|-------|------|-------|-------|------|------|-------|-------|------|-----|----|---------|
| South Dakota.....  | 45.0  |      |       |       | 21.6  |      | 9     | 15.8  | .1   | .2   |       | 66.7  |      |     |    |         |
| Tennessee.....     |       | 5.0  |       |       |       | 4.3  |       | 2.8   | .2   |      |       | 21.9  |      |     |    |         |
| Texas.....         | 66.6  | 46.7 | 104.2 |       |       | 24.8 | 16.2  | 2.8   |      | 2.2  | 1.4   | 244.4 |      |     |    |         |
| Utah.....          |       | 5.7  |       |       |       | 6.7  |       | .6    |      |      |       | 31.1  |      |     |    |         |
| Vermont.....       |       |      | .2    |       |       |      |       |       | .4   |      |       | 6.9   |      |     |    |         |
| Virginia.....      | 2.7   | 13.4 |       | .1    | 21.9  |      | 11.1  | 16.0  |      | .1   |       | 88.7  |      |     |    |         |
| Washington.....    |       | 5.0  | 18.0  |       |       |      |       |       |      |      |       | 33.9  |      |     |    |         |
| West Virginia..... |       | 22.3 | 11.1  |       | 4.5   |      | 7.1   | 5.7   |      | .2   | .6    | 22.8  |      |     |    |         |
| Wisconsin.....     | 1.3   |      | 4.9   |       |       |      |       | 36.6  |      | .1   |       | 63.1  |      |     |    |         |
| Wyoming.....       | 5.0   | 25.0 |       |       |       | 7.9  |       |       |      | .2   |       | 13.0  |      |     |    |         |
| Hawaii.....        |       |      |       |       | 10.2  |      |       |       |      |      |       | 11.0  |      |     |    |         |
| Puerto Rico.....   |       |      |       |       | .4    |      | .6    |       |      | .2   |       | .6    |      |     |    |         |
| Total.....         | 437.0 | 82.8 | 207.3 | 592.5 | 411.8 | 55.2 | 113.0 | 388.6 | 20.7 | 93.4 | 370.5 | 9.4   | 13.9 | 3.9 | .4 | 2,800.4 |

## CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

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

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

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

Special authorizations for the construction of roads in public lands have been made by seven congressional acts, passed up to the end of the fiscal year 1938. These authorizations, totaling \$20,000,000, have made funds available for each fiscal year from 1931 through 1939, excepting 1932 and 1937. In addition \$1,000,000 has been authorized for the fiscal year 1940, and \$2,000,000 for the fiscal year 1941.

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

During the fiscal year 116 miles of initial improvement and 146 miles of further improvement of roads previously improved were completed. The total improved mileage now existing is 1,458 miles. Tables 17, 18, 19, and 20 show details concerning the work completed during the year and the status at the end of the year.

Early in the fiscal year the bridge across the Colorado River near Parker, Ariz., was completed and opened to traffic. This bridge, with its approaches, is approximately a half mile in length.

Notable from the standpoint of continuous Federal-land construction during the fiscal year 1938 are: the Flagstaff-Fredonia highway, in Arizona, and the Ely-Tonopah highway, in Nevada.

TABLE 17.—*Public-lands funds allotted to projects completed during the fiscal year 1938*

| State             | Public-lands funds | Estimated total cost | Miles  | State             | Public-lands funds | Estimated total cost | Miles  |
|-------------------|--------------------|----------------------|--------|-------------------|--------------------|----------------------|--------|
| Arizona.....      | \$127, 476         | \$129, 079           | 39. 0  | Oklahoma.....     | \$23, 162          | \$23, 162            | 0. 1   |
| California.....   | 277, 232           | 387, 742             | 20. 0  | Oregon.....       | 168, 722           | 187, 443             | 16. 4  |
| Idaho.....        | 159, 656           | 163, 004             | 22. 6  | South Dakota..... | 75, 924            | 76, 217              | 8. 1   |
| Nevada.....       | 718, 375           | 744, 926             | 106. 0 | Utah.....         | 180, 606           | 180, 815             | 17. 1  |
| New Mexico.....   | 265, 575           | 266, 631             | 10. 4  |                   |                    |                      |        |
| North Dakota..... | 31, 619            | 31, 619              | 22. 8  | Total.....        | 2, 028, 347        | 2, 190, 638          | 262. 5 |



TABLE 18.—Public-lands funds allotted to projects under contract and under construction, June 30, 1938

| State           | Public-lands funds | Estimated total cost | Miles | State             | Public-lands funds | Estimated total cost | Miles |
|-----------------|--------------------|----------------------|-------|-------------------|--------------------|----------------------|-------|
| Arizona.....    | \$190,843          | \$190,843            | 34.1  | South Dakota..... | \$3,144            | \$3,144              | 0.3   |
| Montana.....    | 159,129            | 164,891              | 14.0  | Utah.....         | 25,260             | 25,260               | 9.4   |
| Nevada.....     | 374,511            | 374,511              | 54.1  | Wyoming.....      | 142,390            | 142,390              | 23.1  |
| New Mexico..... | 107,744            | 107,744              | 13.0  |                   |                    |                      |       |
| Oklahoma.....   | 28,935             | 37,708               | .1    | Total.....        | 1,031,956          | 1,046,491            | 148.1 |

TABLE 19.—Public-lands funds allotted to projects approved but not under contract and balance available for programmed projects, June 30, 1938

| State             | Public-lands funds | Estimated total cost | Miles | Balance available for new projects | State             | Public-lands funds | Estimated total cost | Miles | Balance available for new projects |
|-------------------|--------------------|----------------------|-------|------------------------------------|-------------------|--------------------|----------------------|-------|------------------------------------|
| Arizona.....      | \$123,920          | \$123,920            | 13.8  | \$400,614                          | Oklahoma.....     |                    |                      |       | \$28,777                           |
| California.....   | 18,469             | 18,469               | 7.7   | 464,183                            | Oregon.....       | \$86,406           | \$86,406             | 7.1   | 80,990                             |
| Colorado.....     | 88,688             | 106,870              | 9.5   | 88,629                             | South Dakota..... |                    |                      |       | 108,651                            |
| Idaho.....        |                    |                      |       | 137,534                            | Utah.....         |                    |                      |       | 308,176                            |
| Montana.....      |                    |                      |       | 136,937                            | Washington.....   | 38,349             | 40,889               | 2.5   | 38,507                             |
| Nevada.....       | 174,886            | 174,886              | 25.0  | 209,305                            | Wyoming.....      |                    |                      |       | 241,131                            |
| New Mexico.....   |                    |                      |       | 215,856                            |                   |                    |                      |       |                                    |
| North Dakota..... |                    |                      |       | 102,026                            | Total.....        | 530,718            | 551,440              | 65.6  | 2,561,316                          |

TABLE 20.—Mileage of Federal-lands roads, by types of construction, completed as of June 30, 1938

| State             | Graded and drained | Gravel       |              | Macadam, treated | Low-cost bituminous mix | Bituminous macadam | Bituminous concrete | Portland cement concrete | Bridges      | Total        |
|-------------------|--------------------|--------------|--------------|------------------|-------------------------|--------------------|---------------------|--------------------------|--------------|--------------|
|                   |                    | Untreated    | Treated      |                  |                         |                    |                     |                          |              |              |
|                   | <i>Miles</i>       | <i>Miles</i> | <i>Miles</i> | <i>Miles</i>     | <i>Miles</i>            | <i>Miles</i>       | <i>Miles</i>        | <i>Miles</i>             | <i>Miles</i> | <i>Miles</i> |
| Arizona.....      | 12.4               |              | 32.1         |                  | 80.8                    |                    |                     |                          | 0.5          | 125.8        |
| California.....   | .3                 | 13.8         | 19.7         |                  | 60.2                    |                    |                     |                          | .3           | 94.3         |
| Colorado.....     |                    | 14.9         |              |                  | 7.9                     |                    |                     |                          | .1           | 22.9         |
| Idaho.....        | 9.2                | 46.8         |              |                  | 31.5                    |                    |                     |                          |              | 87.5         |
| Montana.....      | 19.1               | 18.2         |              |                  | 18.2                    |                    |                     |                          | .2           | 55.7         |
| Nevada.....       |                    | 20.8         |              |                  | 454.4                   |                    |                     |                          | .1           | 475.3        |
| New Mexico.....   |                    | 18.3         | 10.8         |                  | 28.8                    |                    |                     | 6.0                      | .3           | 64.2         |
| North Dakota..... | 9.5                | 16.1         |              |                  |                         |                    |                     |                          |              | 25.6         |
| Oklahoma.....     |                    |              |              |                  | 5.6                     |                    | 1.8                 | 2.5                      | .1           | 10.0         |
| Oregon.....       | 3.5                | 130.6        | 5.8          | 4.0              |                         |                    |                     |                          | .1           | 144.0        |
| South Dakota..... | 15.7               | 2.8          | 1.2          |                  |                         |                    |                     |                          |              | 19.7         |
| Utah.....         |                    | 44.4         |              |                  | 129.7                   |                    | 6.8                 |                          | .1           | 181.0        |
| Washington.....   | .4                 | 14.3         |              |                  |                         | 2.6                |                     | 3.7                      |              | 21.0         |
| Wyoming.....      | 8.8                |              | 15.6         |                  | 106.7                   |                    |                     |                          | .3           | 131.4        |
| Total.....        | 78.9               | 341.0        | 85.2         | 4.0              | 923.8                   | 2.6                | 8.6                 | 12.2                     | 2.1          | 1,458.4      |

The Flagstaff-Fredonia highway is 73 miles in length, and is a part of U. S. Route 89, a heavily traveled north-south highway. A bituminous surfacing was placed on this route for a distance of 46 miles. At the close of the fiscal year, 26 miles of the route were being improved with bituminous surfacing.

The Ely-Tonopah highway, in Nevada, a Federal-land route 102 miles in length, is part of U. S. Route 6, which carries traffic directly across the State. Three Federal-land projects on this route were completed. A gravel surfacing was converted to bituminous surfacing for a distance of 37 miles, and 9 miles were graded and gravel-surfacing placed preparatory to constructing a bituminous surface.

## RESTORATION OF FLOOD-DAMAGED ROADS

Funds for reconstruction of flood-damaged roads and bridges in 11 States were authorized by special acts during the period 1928-31 and this work is still active in three States. All authorized funds have been absorbed in completed work in Florida, New Hampshire, South Carolina, and Vermont. All work planned in Alabama, Georgia, Louisiana, and Mississippi has been completed.

During the year 12 miles of flood-relief construction was completed. At the close of the year 32 miles was under contract; 14 miles had been approved but contracts had not been awarded, as shown in table 21; and three States had unobligated balances as follows: Kentucky, \$148,195; Arkansas, \$187,762; and Missouri, \$1,232.

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

| Status and State                    | Flood relief funds | Estimated total cost | Miles |
|-------------------------------------|--------------------|----------------------|-------|
| Completed:                          |                    |                      |       |
| Kentucky.....                       | \$93,059           | \$213,005            | 12.2  |
| Under contract:                     |                    |                      |       |
| Arkansas.....                       | 86,458             | 173,467              | 25.1  |
| Kentucky.....                       | 69,275             | 138,550              | 7.3   |
| Total.....                          | 155,733            | 312,017              | 32.4  |
| Approved but contracts not awarded: |                    |                      |       |
| Arkansas.....                       | 48,086             | 96,173               | .2    |
| Kentucky.....                       | 103,308            | 206,616              | 10.8  |
| Missouri.....                       | 7,330              | 14,660               | 3.4   |
| Total.....                          | 158,724            | 317,449              | 14.4  |

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

During the year 28.8 miles of bridges and approaches costing \$8,103,776 was completed, bringing the total of this class of work completed to date to 34.9 miles costing \$9,380,072. Work under contract or approved for contract aggregated 3.3 miles estimated to cost \$3,449,678, as shown in table 22.

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

| Status and State  | Works Progress flood reconstruction funds | Estimated total cost | Miles | Status and State                   | Works Progress flood reconstruction funds | Estimated total cost | Miles |
|-------------------|---|----------------------|-------|------------------------------------|---|----------------------|-------|
| Completed:        |   |                      |       | Under contract:                    |   |                      |       |
| Connecticut.....  | \$175,699                                 | \$324,920            | 0.8   | Massachusetts....                  | \$1,237,808                               | \$2,290,166          | 1.6   |
| Maine.....        | 1,629,262                                 | 1,927,370            | 3.3   | New Hampshire....                  | 123,750                                   | 165,000              | .1    |
| Massachusetts.... | 1,254,175                                 | 1,696,730            | 4.7   | Pennsylvania.....                  | 444,603                                   | 629,500              | 1.3   |
| New Hampshire.... | 500,024                                   | 671,963              | 1.4   | Vermont.....                       | 41,689                                    | 91,012               | .1    |
| Pennsylvania..... | 2,727,333                                 | 3,123,121            | 16.6  | Total.....                         | 1,847,850                                 | 3,175,678            | 3.1   |
| Vermont.....      | 41,190                                    | 74,672               | .5    | Approved but contract not awarded: |   |                      |       |
| West Virginia.... | 142,500                                   | 285,000              | 1.5   | West Virginia....                  | 68,500                                    | 274,000              | .2    |
| Total.....        | 6,470,183                                 | 8,103,776            | 28.8  |                                    |   |                      |       |

Federal funds to aid the States in the immediate repair of highways and bridges on the Federal-aid system damaged by floods or other forces of nature have been made available by two congressional acts. The Hayden-Cartwright Act of June 18, 1934, authorized the Secretary of Agriculture to use an amount not to exceed \$10,000,000, from any funds available for expenditure under the Federal Highway Act, in the repair and reconstruction of flood-damaged highways and bridges on the Federal-aid system, and authorized future appropriation of funds expended for such purposes. An additional \$8,000,000 was provided by the Federal-Aid Highway Act of 1938, approved June 8, 1938. These acts make possible the immediate repair of damaged roads without waiting for specific authorization of funds. The States are required to match these funds in the same manner as regular Federal-aid funds.

Work financed by the above authorization was completed on 31.3 miles in 9 States, costing \$2,079,954 and involving \$972,749 of Federal funds. Work estimated to cost \$2,722,998 and involving \$1,396,850 of Federal funds was under contract or approved, as shown in table 23. Flood-damage funds paid to the States amounted to \$1,047,513, bringing the total paid to the States under the Hayden-Cartwright Act to \$2,569,876. Funds paid to States during the fiscal year were as follows:

|                    |           |               |           |
|--------------------|-----------|---------------|-----------|
| Kansas.....        | \$165,838 | Ohio.....     | \$314,659 |
| Kentucky.....      | 38,515    | Texas.....    | 90,473    |
| Maine.....         | 3,328     | Vermont.....  | 41,844    |
| Maryland.....      | 86,789    | Virginia..... | 76,794    |
| Nebraska.....      | 46,456    |               |           |
| New Hampshire..... | 37,364    | Total.....    | 1,047,513 |
| New York.....      | 145,453   |               |           |

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

| Status and State       | Emergency relief funds | Estimated total cost | Miles | Status and State                          | Emergency relief funds | Estimated total cost | Miles |
|------------------------|------------------------|----------------------|-------|---|------------------------|----------------------|-------|
| <b>Completed:</b>      |                        |                      |       | <b>Under contract—Con.</b>                |                        |                      |       |
| Kansas.....            | \$287,106              | \$629,339            | 0.5   | Maryland.....                             | \$124,319              | \$266,639            | 0.7   |
| Kentucky.....          | 31,332                 | 62,664               | 3.1   | Ohio.....                                 | 509,200                | 1,018,400            | 7.4   |
| Maryland.....          | 9,900                  | 20,615               | .1    | Vermont.....                              | 36,350                 | 72,700               | 2.2   |
| New Hampshire.....     | 65,294                 | 131,078              | .3    | Total.....                                | 783,036                | 1,584,073            | 11.2  |
| New York.....          | 126,886                | 308,485              | .1    | <b>Approved but contract not awarded:</b> |                        |                      |       |
| Ohio.....              | 260,001                | 537,188              | 23.9  | California.....                           | 353,413                | 611,004              | 12.9  |
| Texas.....             | 113,036                | 226,072              | .2    | Maryland.....                             | 68,500                 | 137,000              | .1    |
| Vermont.....           | 59,914                 | 125,953              | 2.4   | Missouri.....                             | 5,500                  | 14,800               | .2    |
| Virginia.....          | 19,280                 | 38,560               | .7    | Ohio.....                                 | 109,220                | 221,760              | 1.1   |
| Total.....             | 972,749                | 2,079,954            | 31.3  | Virginia.....                             | 77,181                 | 154,361              | .2    |
| <b>Under contract:</b> |                        |                      |       | Total.....                                | 613,814                | 1,138,925            | 14.5  |
| Kansas.....            | 98,996                 | 197,992              | .2    |   |                        |                      |       |
| Kentucky.....          | 14,171                 | 28,342               | .7    |   |                        |                      |       |

Including work completed in previous years the total obligations to the end of the fiscal year amounted to \$7,879,000, leaving a balance of \$2,121,000 for new projects, from funds provided by the Hayden-Cartwright Act. The \$8,000,000 provided by the Federal Aid Highway Act of 1938 became available at the end of the year and no part of this fund has been obligated.

### WORK-RELIEF HIGHWAY PROJECTS

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

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

During the year 365 miles of work of this kind costing \$2,300,490 was completed, bringing the total to date to 6,366 miles. At the close of the year work was under contract on 1,092 miles, estimated to cost \$9,381,947, as shown in table 24.

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

| Status and State | Federal funds | Total cost  | Miles  | Status and State | Federal funds | Total cost    | Miles     |
|------------------|---------------|-------------|--------|------------------|---------------|---------------|-----------|
| Completed:       |               |             |        | Under contract:  |               |               |           |
| Kansas.....      | \$57, 180     | \$192, 237  | 48. 5  | Minnesota.....   | \$743, 892    | \$3, 725, 311 | 28. 9     |
| Minnesota.....   | 57, 474       | 208, 103    | 30. 6  | Oklahoma.....    | 570, 000      | 2, 000, 000   | 442. 7    |
| Texas.....       | 561, 586      | 1, 900, 150 | 286. 1 | Texas.....       | 1, 064, 145   | 3, 656, 636   | 620. 8    |
| Total.....       | 676, 240      | 2, 300, 490 | 365. 2 | Total.....       | 2, 378, 037   | 9, 381, 947   | 1, 092. 4 |

### LOAN-AND-GRANT HIGHWAY PROJECTS

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

This work was begun in 1934 with funds provided by the National Industrial Recovery Act and has been continued with funds allocated under authorization of the Emergency Relief Appropriation Act of 1935. Up to the close of the year, loans and grants of \$56,436,272 had been made for specific projects 9,478 miles in length and estimated to cost \$126,391,251. This represents a net increase during the year of 438 miles involving \$4,798,385 of loan-and-grant funds and estimated to cost \$12,612,490. Table 25 shows details by States.

TABLE 25.—Status on June 30, 1938, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit

ALLOTMENTS FROM NATIONAL INDUSTRIAL RECOVERY ACT

| State               | Funds allotted by Public Works Administration         |                                | Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments |                      | Funds assigned |               |                |
|---------------------|---|--------------------------------|--|----------------------|----------------|---------------|----------------|
|                     | Tentative allotment by Special Board for Public Works | Alotment by contracts executed | Miles  | Estimated total cost | Grant          | Loan          | Other          |
|                     |   |                                |  |                      |                |               |                |
| Alabama.....        | \$70,247.99   | \$20,617.28                    | 6.7  | \$70,247.99          | \$20,617.28    | \$49,630.71   | .....          |
| California.....     | 1,310,863.65  | 1,310,863.65                   | 16.4   | 6,963,238.26         | 1,310,863.65   | .....         | \$4,752,374.61 |
| Connecticut.....    | 1,207,595.74  | 1,207,595.74                   | 68.7   | 8,825,941.10         | 1,207,595.74   | .....         | 3,618,345.36   |
| Illinois.....       | 2,418,911.71  | 2,418,911.71                   | 97.6   | 8,176,459.46         | 2,377,251.04   | .....         | 5,799,208.44   |
| Indiana.....        | 200,662.04  | 200,662.04                     | 34.5   | 765,293.83           | 200,662.04     | .....         | 564,631.79     |
| Iowa.....           | 307,586.75  | 307,586.75                     | 823.6  | 1,061,690.12         | 307,586.75     | .....         | 754,103.37     |
| Kansas.....         | 5,119,129.85  | 1,524,129.85                   | 410.0  | 5,686,101.24         | 1,524,129.85   | 3,595,000.00  | 568,971.39     |
| Louisiana.....      | 269,258.33  | 88,258.33                      | 47.3   | 3,000,515.08         | 88,258.33      | 181,000.00    | 31,256.75      |
| Maryland.....       | 5,411,866.00  | 1,411,866.00                   | 72.1   | 5,090,357.16         | 1,408,168.25   | 3,541,100.08  | 141,088.83     |
| Massachusetts.....  | 1,702,395.00  | 1,702,395.00                   | 105.1  | 5,449,602.94         | 1,616,939.64   | .....         | 3,832,663.30   |
| Michigan.....       | 10,000.00   | 10,000.00                      | 29.0   | 39,818.00            | 10,000.00      | .....         | 29,818.00      |
| Minnesota.....      | 1,337,211.57  | 952,211.57                     | 472.9  | 3,261,752.07         | 952,211.57     | 385,000.00    | 1,924,540.50   |
| Mississippi.....    | 559,135.62  | 161,149.30                     | 85.2   | 5,965,607.99         | 151,682.38     | .....         | 9,450.35       |
| Missouri.....       | 1,026,000.00  | 1,026,000.00                   | 50.6   | 3,473,587.39         | 1,026,000.00   | 844,475.26    | 2,447,587.39   |
| Montana.....        | 1,829,000.00  | 579,000.00                     | 697.8  | 1,955,462.56         | 579,000.00     | 1,250,000.00  | 136,462.56     |
| Nebraska.....       | 11,500.00   | 11,500.00                      | 59.5   | 40,120.22            | 11,500.00      | .....         | 58,620.22      |
| New York.....       | 736,814.48  | 375,033.67                     | 30.9   | 1,282,120.22         | 375,033.67     | 361,750.81    | 545,325.52     |
| Ohio.....           | 793,179.87  | 139,877.63                     | 27.1   | 9,847,817.75         | 139,877.63     | 653,902.24    | 9,668,037.88   |
| South Carolina..... | 76,082.97   | 21,283.31                      | 28.1   | 76,082.97            | 21,283.31      | .....         | 54,799.66      |
| Texas.....          | 1,471,020.71  | 931,420.71                     | 238.3  | 3,254,907.27         | 931,420.71     | 539,600.00    | 1,783,886.56   |
| Washington.....     | 2,270,571.22  | 2,270,571.22                   | 1,275.2  | 8,209,037.61         | 2,270,571.22   | .....         | 5,938,466.39   |
| West Virginia.....  | 2,000,000.00  | 2,000,000.00                   | 453.8  | 6,755,788.02         | 1,967,550.82   | .....         | 4,737,933.20   |
| Wisconsin.....      | 454,300.00  | 142,300.00                     | 86.4   | 526,176.96           | 142,300.00     | 312,000.00    | 71,876.96      |
| Total.....          | 30,593,333.50   | 18,813,233.76                  | 5,216.8  | 67,865,793.99        | 18,670,863.86  | 11,267,688.76 | 37,927,301.37  |

TABLE 25.—Status on June 30, 1938, of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit—Continued

ALLOTMENTS FROM EMERGENCY RELIEF APPROPRIATION ACT OF 1935

| State               | Funds allotted by Public Works Administration         |                                 |         | Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments |                      |                |               |
|---------------------|---|---------------------------------|---------|--|----------------------|----------------|---------------|
|                     | Tentative allotment by Special Board for Public Works | Allotment by contracts executed |         | Miles  | Estimated total cost | Funds assigned |               |
|                     |   | Grant                           | Loan    |  |                      | Grant          | Loan          |
| California.....     | \$57,821.22   | \$57,821.22                     | 0.4     | \$128,841.92   | \$57,821.22          |                | \$71,020.70   |
| Colorado.....       | 3,000,000.00  | 3,000,000.00                    | 265.6   | 7,576,275.02   | 2,994,301.16         |                | 1,581,973.56  |
| Florida.....        | 71,514.42   | 71,514.42                       | 6       | 158,920.94   | 71,514.42            |                | 87,403.52     |
| Illinois.....       | 586,673.50  | 586,673.50                      | 114.1   | 1,373,691.06   | 586,673.50           |                | 787,017.56    |
| Iowa.....           | 393,632.17  | 393,632.17                      | 862.1   | 889,873.00   | 387,693.76           |                | 502,200.81    |
| Kansas.....         | 14,463.00   | 14,463.00                       | 6       | 33,364.45  | 14,463.00            |                | 18,901.45     |
| Maryland.....       | 1,000,000.00  | 1,000,000.00                    | 25.4    | 1,852,197.07   | 833,623.67           |                | 1,018,873.40  |
| Michigan.....       | 119,135.60  | 119,135.00                      | 16.5    | 290,092.66   | 119,435.00           |                | 170,657.66    |
| Minnesota.....      | 152,389.18  | 152,389.18                      | 69.2    | 345,350.84   | 152,389.18           |                | 192,961.66    |
| Mississippi.....    | 15,325,682.77   | 15,325,682.77                   | 1,396.3 | 31,028,616.17  | 15,202,441.87        |                | 18,826,204.30 |
| Missouri.....       | 396,699.54  | 396,699.54                      | 364.5   | 881,689.86   | 396,699.54           |                | 484,900.32    |
| Nebraska.....       | 6,611.95  | 6,611.95                        | 18.0    | 14,914.82  | 6,611.95             |                | 8,302.87      |
| New Jersey.....     | 29,862.95   | 29,862.95                       | 3.1     | 66,362.13  | 29,862.95            |                | 36,469.18     |
| New York.....       | 212,872.41  | 212,872.41                      | 28.7    | 518,598.28   | 212,872.41           |                | 305,665.87    |
| Ohio.....           | 744,510.37  | 356,122.93                      | 229.5   | 805,398.87   | 356,122.93           | \$388,396.44   | 60,879.50     |
| Tennessee.....      | 349,969.34  | 349,969.34                      | 1.7     | 625,682.15   | 281,662.97           |                | 344,125.18    |
| South Carolina..... | 712,728.27  | 479,728.27                      | 249.7   | 1,655,670.58   | 467,993.57           |                | 355,707.01    |
| Texas.....          | 2,930,192.72  | 2,440,192.72                    | 381.9   | 5,857,570.83   | 2,440,192.72         |                | 2,927,373.11  |
| Utah.....           | 45,900.00   | 45,900.00                       | 29.1    | 116,352.95   | 45,900.00            |                | 70,452.95     |
| Washington.....     | 730,883.06  | 730,883.06                      | 202.9   | 1,904,722.67   | 738,272.99           |                | 1,176,449.63  |
| Total.....          | 26,881,830.87   | 25,770,454.43                   | 4,290.9 | 58,925,456.87  | 25,386,383.11        | 1,111,396.44   | 32,027,677.32 |

## NATIONAL FOREST ROAD CONSTRUCTION

The area of the national forests is extensive, covering parts of 42 States. The greater part of this area is in the Western States, where in some instances the national-forest area is a relatively large percentage of the area of the State.

Transcontinental United States routes, Federal-aid highways, and State highways are coincident with a considerable part of the forest-highway system. Of the forest-highway system, of approximately 22,000 miles, over 39 percent is on the Federal-aid system, and an additional 39 percent is on the respective State systems, and roads of lesser importance make up only about 22 percent. It is therefore necessary that the system be constructed according to standards comparable with those used on the Federal-aid and State systems.

Construction of the forest-highway system has been under way for about 20 years, starting at a time when high standards had not come into use and when funds were relatively small. Routes could be opened up through the forests only by constructing roads having narrow widths, sharp curves, and steep grades when judged according to present standards. Surfacing was largely with local materials, such as clay-bound gravel, crushed stone, or gravel; all of which resulted in considerable mileage of low-standard roads which, while adequate for the traffic when constructed, has been gradually improved to meet constantly increasing traffic demands.

Crushed stone has been generally used for surfacing in recent years and a variety of types of bituminous construction have been developed to preserve surfaces from wear and loosening under high-speed traffic. Reconstruction has been necessary at times, in the interest of safety, to straighten roads of sharp curvature and reduce excessive grades.

With the general increase in highway traffic and expansion of highway systems it has been necessary continually to add to the original system. Approximately 1,700 miles was added during the past year. This mileage is largely in the Eastern States where new forest areas have been acquired.

The Bureau has constructed a substantial mileage on the forest-highway system, which carries interstate and transcontinental traffic, a large portion of which is recreational in character. These roads furnish millions of tourists an opportunity for recreation and enjoyment in forest areas, many of which are at a high elevation and have unusual scenic beauty. Recreation in forest areas is increasing yearly and is recognized in the design and location of forest roads by providing vistas, parking areas, and convenient accommodations for observation, camping, fishing, and hunting.

Landscaping and erosion control are of particular importance by reason of character of traffic and because of the wealth of natural beauty in the forests to be preserved. Effort is made to remove all scars of construction operations by sodding, seeding, and placing checks on washes, to control drainage and to prevent erosion. Where traffic is predominantly recreational many vistas and parking areas are provided. Emphasis is placed on the exterior appearance of the bridges, attention being given to pleasing proportions and to coordination between substructure and superstructure. Bridge railings are designed to give unobstructed vision of the surrounding country.

The two principal classes of forest roads are designated forest highways and forest-development roads, respectively. The latter class, as the name implies, serve primarily the development of the forests; the former are roads of a higher order of traffic importance, generally connecting with sections of the Federal-aid or State-highway systems outside the forests, or important community-service roads. This class requires improvement to higher standard than that required on forest-development roads.

In the main, the work supervised by the Bureau is limited to the construction and maintenance of forest highways; forest-development road work is generally administered by the Forest Service. While this definition of the work of the two classes, defining the responsibility for construction, is approximately correct, the exact line of separation is drawn between what are termed major and minor projects. Work in connection with major projects is administered by the Bureau. Major projects include all projects on the forest-highway system except those that do not require the technical services of a highway-engineering organization or those having an estimated average cost of less than \$2,000 per mile. Forest-development road projects of estimated average cost greater than \$5,000 per mile, and those requiring the technical services of a highway-engineering organization, are also classed as major projects.

Funds for the improvement of forest roads and trails have been authorized at a rate of \$10,000,000 for each of the fiscal years 1935-37 and \$14,000,000 was authorized for 1938. At the beginning of the fiscal year the active program involved \$9,694,602 and \$18,420,772 additional was available for new work, being in part composed of funds remaining from authorizations for previous years.

The active program involving \$9,694,602 included work amounting to \$6,208,594 under construction, surveys costing \$1,626,750, maintenance work costing \$1,447,408, and \$411,850 involved in miscellaneous items. Of the \$18,420,772 available for new work, \$6,419,902 was assigned to projects not then under contract, and \$12,000,870 was available for projects to be selected. This \$12,000,870 was comprised of \$9,333,333 of funds authorized for the new fiscal year and a remainder of \$2,667,537 from previous years. During the year \$8,475,643 was assigned to major projects and \$162,767 was assigned to minor projects, leaving a balance of old funds available for programming of \$3,362,460.

Major work costing \$8,166,648 was put under contract and completed work amounted to \$7,636,503.

At the close of the year, the active program of forest road work under the supervision of the Bureau amounted to \$10,224,747, of which \$6,825,767 was involved in work under construction, \$1,647,091 in surveys, \$1,426,578 in maintenance operations, and \$325,311 in miscellaneous work. The amount available for new work was \$10,091,357, of which \$6,728,897 had been assigned to projects not then under contract. These amounts include the \$14,000,000 authorized for the fiscal year 1939.

In accordance with requirements of the governing rules and regulations, the 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. 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 Chief of the Forest Service 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 Chief of the Forest Service 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, have been classified as forest highways have an aggregate length, as of June 30, 1938, of 21,969.8 miles, classified as shown in table 26.

TABLE 26.—Classification of the mileage of the forest-highway system at end of fiscal year 1938

| Region and State  | Class 1      | Class 2      | Class 3      | Total        | Region and State    | Class 1      | Class 2      | Class 3      | Total        |
|-------------------|--------------|--------------|--------------|--------------|---------------------|--------------|--------------|--------------|--------------|
|                   | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> |                     | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> | <i>Miles</i> |
| Western:          |              |              |              |              | Eastern—Con.        |              |              |              |              |
| Alaska.....       |              |              | 352.8        | 352.8        | Louisiana.....      | 66.1         | 369.4        | 21.9         | 457.4        |
| Arizona.....      | 345.8        | 268.6        | 445.0        | 1,059.4      | Maine.....          |              |              | 11.0         | 11.0         |
| California.....   | 635.6        | 291.0        | 501.8        | 2,428.4      | Michigan.....       | 466.7        | 283.8        | 274.4        | 1,024.9      |
| Colorado.....     | 533.0        | 163.0        | 94.0         | 1,790.0      | Minnesota.....      | 179.4        | 217.7        | 207.4        | 604.5        |
| Idaho.....        | 721.3        | 165.3        | 191.5        | 1,078.1      | Mississippi.....    | 201.0        | 264.0        | 71.0         | 539.0        |
| Montana.....      | 666.0        | 304.6        | 231.0        | 1,201.6      | Missouri.....       | 426.2        | 160.1        | 247.3        | 833.6        |
| Nevada.....       | 104.7        | 282.2        | 31.0         | 417.9        | Nebraska.....       | 10.4         |              | 18.4         | 28.8         |
| New Mexico.....   | 162.0        | 522.0        |              | 684.0        | New Hampshire.....  | 40.9         | 92.1         | 41.7         | 174.7        |
| Oregon.....       | 718.5        | 352.5        | 304.4        | 1,375.4      | North Carolina..... | 483.6        | 279.0        | 20.5         | 783.1        |
| South Dakota..... | 227.0        |              | 85.0         | 313.0        | Oklahoma.....       | 31.5         | 17.0         | 13.5         | 62.0         |
| Utah.....         | 191.4        | 471.4        | 67.2         | 730.0        | Pennsylvania.....   | 134.0        | 250.9        | 39.0         | 423.9        |
| Washington.....   | 401.8        | 123.1        | 246.8        | 771.7        | Puerto Rico.....    |              |              | 21.0         | 21.0         |
| Wyoming.....      | 387.3        | 37.0         | 217.7        | 642.0        | South Carolina..... | 196.0        | 128.6        | 23.4         | 348.0        |
| Total.....        | 5,094.4      | 4,980.7      | 2,769.2      | 12,844.3     | Tennessee.....      | 131.6        | 133.6        | 80.2         | 345.4        |
|                   |              |              |              |              | Texas.....          | 123.5        | 168.4        | 111.2        | 403.1        |
| Eastern:          |              |              |              |              | Vermont.....        | 32.7         | 43.2         | 58.6         | 134.5        |
| Alabama.....      | 4.0          |              | 31.0         | 35.0         | Virginia.....       | 79.0         | 117.9        | 220.0        | 416.9        |
| Arkansas.....     | 274.6        | 310.3        | 44.6         | 629.5        | West Virginia.....  | 131.0        | 168.2        | 66.6         | 365.8        |
| Florida.....      | 27.3         | 218.9        |              | 246.2        | Wisconsin.....      | 85.7         | 177.0        | 206.9        | 469.6        |
| Georgia.....      | 110.3        | 36.5         | 58.5         | 205.3        | Total.....          | 3,564.0      | 3,596.2      | 1,965.3      | 9,125.5      |
| Illinois.....     | 192.7        | 27.5         | 48.7         | 268.9        | Grand total.....    | 8,658.4      | 8,576.9      | 4,734.5      | 21,969.8     |
| Kentucky.....     | 132.8        | 132.1        | 28.5         | 293.4        |                     |              |              |              |              |



The work done in further improving roads previously constructed considerably exceeded the building of entirely new roads. The further improvement of roads, called stage construction, totaled 374 miles. New work on the forest-highway system totaled 129.4 miles, bringing the total mileage improved to date with Federal funds to 6,694.7. Of the new mileage, 95.9 miles was in the Western States and Alaska, and the remaining 33.5 miles was in forests of the Eastern States. Of the total mileage improved, 460.1 miles is in the west and 43.3 miles is in the east. The mileage of forest highways completed by the Bureau, both stage and new, is shown in table 27.

TABLE 27.—Mileage of completed forest-highway projects by States, fiscal year 1938<sup>1</sup>

| Region and State  | Initial improvement and stage construction | Initial improvement | Total to June 30, 1938 | Region and State    | Initial improvement and stage construction | Initial improvement | Total to June 30, 1938 |
|-------------------|--|---------------------|------------------------|---------------------|--|---------------------|------------------------|
| Western:          | <i>Miles</i>                               | <i>Miles</i>        | <i>Miles</i>           | Eastern—Continued.  | <i>Miles</i>                               | <i>Miles</i>        | <i>Miles</i>           |
| Alaska.....       | 22.0                                       | 7.7                 | 238.2                  | Georgia.....        |  |                     | 21.0                   |
| Arizona.....      | 24.0                                       | 5.3                 | 575.7                  | Illinois.....       |  |                     | 4.7                    |
| California.....   | 44.1                                       | 18.7                | 781.4                  | Kentucky.....       | .1   | .1                  | .1                     |
| Colorado.....     | 40.9                                       | 4.3                 | 536.5                  | Louisiana.....      | .5   | .5                  | .5                     |
| Idaho.....        | 64.8                                       | 4.2                 | 692.0                  | Michigan.....       | 6.2  | 6.2                 | 56.7                   |
| Montana.....      | 42.3                                       | 16.7                | 609.3                  | Minnesota.....      | 21.6                                       | 18.3                | 131.8                  |
| Nevada.....       | 18.7                                       | 2.6                 | 176.4                  | Missouri.....       |  |                     | 8.1                    |
| New Mexico.....   | 46.0                                       | 8.8                 | 313.6                  | Nebraska.....       | 6.5  |                     | 8.7                    |
| Oregon.....       | 100.2                                      | 14.9                | 1,021.8                | New Hampshire.....  | 2.8  | 2.8                 | 28.0                   |
| South Dakota..... | 7.1  |                     | 61.2                   | North Carolina..... |  |                     | 50.9                   |
| Utah.....         | 19.5                                       | 3.1                 | 355.5                  | Oklahoma.....       | .9   | .9                  | 16.1                   |
| Washington.....   | 15.4                                       | 7.5                 | 333.1                  | Pennsylvania.....   | 1.5  | 1.5                 | 10.6                   |
| Wyoming.....      | 15.1                                       | 2.1                 | 360.3                  | South Carolina..... | .4   | .4                  | 16.0                   |
| Total.....        | 460.1                                      | 95.9                | 6,055.0                | Tennessee.....      |  |                     | 47.4                   |
| Eastern:          |  |                     |                        | Virginia.....       |  |                     | 22.9                   |
| Alabama.....      |  |                     | 5.1                    | West Virginia.....  |  |                     | 8.7                    |
| Arkansas.....     | 2.7  | 2.7                 | 125.0                  | Wisconsin.....      |  |                     | 15.7                   |
| Florida.....      | .1   | .1                  | 61.7                   | Total.....          | 43.3                                       | 33.5                | 639.7                  |
|                   |  |                     |                        | Grand total.....    | 503.4                                      | 129.4               | 6,694.7                |

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

Tables 28 and 29, respectively, show the mileage of highways under construction and completed by the Bureau, segregated by types of construction and by States.

TABLE 28.—Mileage of forest highways under construction as of June 30, 1938

| Region and State  | Graded and drained | Water-bound macadam | Bituminous surface treatment | Low-cost bituminous mix | Bituminous macadam | Portland-cement concrete pavement | Bridges          | Highway-railroad grade separations | Total        |
|-------------------|--------------------|---------------------|------------------------------|-------------------------|--------------------|-----------------------------------|------------------|------------------------------------|--------------|
| Western:          | <i>Miles</i>       | <i>Miles</i>        | <i>Miles</i>                 | <i>Miles</i>            | <i>Miles</i>       | <i>Miles</i>                      | <i>Miles</i>     | <i>Miles</i>                       | <i>Miles</i> |
| Alaska.....       | 0.8                | 18.0                |                              |                         |                    |                                   | 0.2              |                                    | 19.0         |
| Arizona.....      | 24.3               |                     | 13.2                         |                         |                    |                                   | .1               |                                    | 37.6         |
| California.....   | 50.8               | 8.0                 | 16.2                         | 4.3                     |                    |                                   | .2               |                                    | 79.5         |
| Colorado.....     |                    | 33.0                |                              |                         |                    |                                   | ( <sup>1</sup> ) |                                    | 33.0         |
| Idaho.....        | 26.9               | 15.6                |                              |                         |                    |                                   | .1               |                                    | 42.6         |
| Montana.....      | 10.2               |                     | 5.5                          | .5                      |                    |                                   | .1               | 0.1                                | 16.4         |
| Nevada.....       | 7.6                |                     |                              |                         |                    |                                   |                  |                                    | 7.6          |
| New Mexico.....   |                    | .8                  |                              | 12.9                    |                    |                                   |                  |                                    | 13.7         |
| Oregon.....       | 11.3               |                     | 15.5                         |                         |                    | 0.2                               | ( <sup>1</sup> ) |                                    | 27.0         |
| South Dakota..... |                    |                     |                              | 3.9                     |                    |                                   |                  |                                    | 3.9          |
| Utah.....         | 2.2                | 7.2                 |                              |                         |                    |                                   | ( <sup>1</sup> ) |                                    | 9.4          |
| Washington.....   | 11.1               |                     |                              |                         |                    |                                   |                  |                                    | 11.1         |
| Wyoming.....      |                    | 2.3                 |                              | 8.1                     |                    |                                   |                  |                                    | 10.4         |
| Total.....        | 145.2              | 84.9                | 50.4                         | 29.7                    |                    | .2                                | .7               | .1                                 | 311.2        |

<sup>1</sup> Mileage less than 0.1 mile.

TABLE 28.—*Mileage of forest highways under construction as of June 30, 1938—*  
Continued

| Region and State    | Graded and drained | Water-bound macadam | Bituminous surface treatment | Low-cost bituminous mix | Bituminous macadam | Portland-cement concrete pavement | Bridges      | Highway-railroad grade separations | Total        |
|---------------------|--------------------|---------------------|------------------------------|-------------------------|--------------------|-----------------------------------|--------------|------------------------------------|--------------|
| Eastern:            | <i>Miles</i>       | <i>Miles</i>        | <i>Miles</i>                 | <i>Miles</i>            | <i>Miles</i>       | <i>Miles</i>                      | <i>Miles</i> | <i>Miles</i>                       | <i>Miles</i> |
| Arkansas.....       |                    | 6.6                 |                              |                         |                    |                                   |              | .1                                 | 6.7          |
| Florida.....        |                    |                     |                              |                         |                    |                                   |              | .2                                 | .2           |
| Georgia.....        |                    | 7.9                 |                              |                         |                    |                                   | (1)          |                                    | 7.9          |
| Minnesota.....      | 8.3                |                     |                              |                         |                    |                                   |              |                                    | 8.3          |
| Mississippi.....    | (1)                |                     |                              |                         |                    |                                   |              | .1                                 | .1           |
| New Hampshire.....  |                    |                     | 1.1                          |                         |                    |                                   |              |                                    | 1.1          |
| North Carolina..... |                    | 12.4                |                              |                         |                    |                                   | (1)          |                                    | 12.4         |
| Texas.....          | 5.0                |                     |                              |                         |                    |                                   |              | .1                                 | 5.1          |
| Virginia.....       |                    |                     | 6.5                          |                         |                    |                                   | (1)          |                                    | 6.5          |
| West Virginia.....  | 1.6                |                     |                              |                         |                    |                                   |              |                                    | 1.6          |
| Wisconsin.....      | 6.8                |                     |                              |                         |                    |                                   |              |                                    | 6.8          |
| Total.....          | 21.7               | 26.9                | 7.6                          |                         |                    |                                   |              | .5                                 | 56.7         |
| Grand total.....    | 166.9              | 111.8               | 58.0                         | 29.7                    |                    | .2                                | 1.2          | .1                                 | 367.9        |

<sup>1</sup> Mileage less than 0.1 mile.TABLE 29.—*Completed forest highways by States and by types to June 30, 1938*

| Region and State    | Graded and drained | Sand-clay    | Traffic-bound surfaces of miscellaneous material | Bituminous surface treatment | Low-cost bituminous mix | Bituminous macadam | Portland-cement concrete | Bridges      | Total        |
|---------------------|--------------------|--------------|--|------------------------------|-------------------------|--------------------|--------------------------|--------------|--------------|
| Western:            | <i>Miles</i>       | <i>Miles</i> | <i>Miles</i>                                     | <i>Miles</i>                 | <i>Miles</i>            | <i>Miles</i>       | <i>Miles</i>             | <i>Miles</i> | <i>Miles</i> |
| Alaska.....         |                    |              | 235.8  |                              |                         |                    |                          |              | 238.2        |
| Arizona.....        | 213.2              |              | 298.4  | 24.6                         | 15.4                    | 23.4               |                          |              | 575.7        |
| California.....     | 240.8              |              | 170.4  | 262.3                        | 105.4                   |                    |                          |              | 781.4        |
| Colorado.....       | 153.6              |              | 265.3  | 2.0                          | 115.3                   |                    |                          |              | 536.5        |
| Idaho.....          | 291.5              |              | 260.0  |                              | 138.2                   |                    | 0.1                      | 2.2          | 692.0        |
| Montana.....        | 216.1              |              | 228.5  | 37.5                         | 125.2                   |                    |                          | 2.0          | 609.3        |
| Nevada.....         | 46.9               |              | 51.4   | 16.1                         | 62.0                    |                    |                          | (1)          | 176.4        |
| New Mexico.....     | 47.9               |              | 197.0  | 15.3                         | 53.2                    |                    |                          | .2           | 313.6        |
| Oregon.....         | 160.8              |              | 612.7  | 157.3                        | 72.3                    | 14.6               | .3                       | 3.8          | 1,021.8      |
| South Dakota.....   |                    |              | 46.4   |                              | 14.8                    |                    |                          |              | 61.2         |
| Utah.....           | 133.5              |              | 162.3  |                              | 59.1                    |                    |                          | .6           | 355.5        |
| Washington.....     | 86.5               |              | 239.8  | 4.6                          |                         |                    |                          | 2.2          | 333.1        |
| Wyoming.....        | 38.6               |              | 255.4  |                              | 66.0                    |                    |                          | .3           | 360.3        |
| Total.....          | 1,629.4            |              | 3,023.4  | 519.7                        | 826.9                   | 38.0               | .4                       | 17.2         | 6,055.0      |
| Eastern:            |                    |              |  |                              |                         |                    |                          |              |              |
| Alabama.....        |                    |              | 5.1  |                              |                         |                    |                          |              | 5.1          |
| Arkansas.....       | 95.9               |              | 28.5   |                              |                         |                    |                          | .6           | 125.0        |
| Florida.....        |                    | 4.3          |  | 26.6                         | 29.8                    |                    |                          | 1.0          | 61.7         |
| Georgia.....        | 11.0               |              | 9.9  |                              |                         |                    |                          | .1           | 21.0         |
| Illinois.....       |                    |              | 4.7  |                              |                         |                    |                          |              | 4.7          |
| Kentucky.....       |                    |              |  |                              |                         |                    |                          | .1           | .1           |
| Louisiana.....      |                    |              | .4   |                              |                         |                    |                          | .1           | .5           |
| Michigan.....       |                    |              | 56.7   |                              |                         |                    |                          | (1)          | 56.7         |
| Minnesota.....      | 55.5               |              | 60.1   |                              | 16.0                    |                    |                          | .2           | 131.8        |
| Missouri.....       |                    |              | 8.1  |                              |                         |                    |                          | (1)          | 8.1          |
| Nebraska.....       | 2.2                | 6.5          |  |                              |                         |                    |                          |              | 8.7          |
| New Hampshire.....  |                    |              | 14.8   | 13.1                         |                         |                    |                          | .1           | 28.0         |
| North Carolina..... | 14.2               |              | 6.6  | 30.1                         |                         |                    |                          | (1)          | 50.9         |
| Oklahoma.....       | .2                 |              | 15.9   |                              |                         |                    |                          | (1)          | 16.1         |
| Pennsylvania.....   |                    |              | 1.8  |                              |                         | 8.8                |                          |              | 10.6         |
| South Carolina..... |                    |              |  | 16.0                         |                         |                    |                          | (1)          | 16.0         |
| Tennessee.....      |                    |              | 47.4   |                              |                         |                    |                          |              | 47.4         |
| Virginia.....       | 3.5                |              | 2.3  | 10.6                         |                         | 6.5                |                          | (1)          | 22.9         |
| West Virginia.....  | 6.0                |              | 2.6  |                              |                         |                    |                          | .1           | 8.7          |
| Wisconsin.....      | 1.5                |              | 14.2   |                              |                         |                    |                          |              | 15.7         |
| Total.....          | 190.0              | 10.8         | 279.1  | 96.4                         | 45.8                    | 15.3               |                          | 2.3          | 639.7        |
| Grand total.....    | 1,819.4            | 10.8         | 3,302.5  | 616.1                        | 872.7                   | 53.3               | .4                       | 19.5         | 6,694.7      |

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

Important through routes are being developed progressively by improvements made from year to year. Examples of recent improvements are as follows.

- Montana:
  - Libby-State line on U. S. 2.
  - Pleasant Valley highway on U. S. 2.
  - Yellowstone Trail, U. S. 10.
- Oregon:
  - Willamette highway on U. S. 30.
  - Santiam highway on U. S. 30.
  - Columbia River highway on U. S. 30.
  - Fremont highway on U. S. 395.
  - Pendleton-John Day highway on U. S. 395.
  - John Day-Burns highway on U. S. 395.
  - Cascades Lakes highway.
- Washington:
  - Stevens Pass highway.
  - Randle-Yakima highway.
- Arizona:
  - Fredonia-Houserock Valley highway on U. S. 89.
- California:
  - Placerville-Lake Tahoe highway on U. S. 50.
- Colorado:
  - Loveland-Fremont Pass highway on U. S. 6.
  - Rabbit Ears Pass highway on U. S. 40.
  - Berthoud Pass highway on U. S. 40.
- New Mexico:
  - Navajo Canyon highway on U. S. 285.
  - Cedro Canyon highway.
  - Carrizozo-Roswell highway on U. S. 380.
- South Dakota:
  - Deadwood-Custer-Hot Springs highway on U. S. 85-A.
- Wyoming:
  - Wind River highway on U. S. 287.
  - Hoback Canyon highway on U. S. 187.
  - Buffalo-Tensleep highway on U. S. 16.
- Idaho:
  - Clark Fork highway.
  - Fayette highway.
  - Sawtooth Park highway on U. S. 93.

**ROAD CONSTRUCTION IN NATIONAL PARKS AND MONUMENTS**

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

The construction of roads in and approaching national parks and monuments is a responsibility of the Bureau under an inter-Bureau agreement with the National Park Service.

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

TABLE 30.—Highways completed in or leading to national parks and monuments, fiscal year 1938

| Park, monument, or parkway              | Initial improve-<br>ment<br>and<br>stage<br>construc-<br>tion | Initial improve-<br>ment<br>com-<br>pleted | Total to<br>June 30,<br>1938 | Park, monument, or parkway  | Initial improve-<br>ment<br>and<br>stage<br>construc-<br>tion | Initial improve-<br>ment<br>com-<br>pleted | Total to<br>June 30,<br>1938 |
|---|---|--|------------------------------|-----------------------------|---|--|------------------------------|
|   | Miles   | Miles                                      | Miles                        |                             | Miles   | Miles                                      | Miles                        |
| Acadia.....                             | 3.2   | 3.2  | 15.3                         | Hawaii.....                 |   |  | 35.6                         |
| Blue Ridge.....                         | 74.0  | 74.0                                       | 124.5                        | Hot Springs.....            |   |  | 3.5                          |
| Bryce Canyon.....                       |   |  | 21.7                         | Kill Devil Hill.....        |   |  | 1.6                          |
| Carlsbad Caverns.....                   |   |  | 8.4                          | Lassen Volcanic.....        | 4.7   |  | 35.1                         |
| Chalmette.....                          |   |  | .5                           | Meriwether Lewis.....       |   |  | 11.8                         |
| Chickamauga-Chatta-<br>nooga.....       |   |  | 17.6                         | Mesa Verde.....             | 31.9  | 11.4                                       | 32.0                         |
| Colonial.....                           |   |  | 1 12.3                       | Morristown.....             |   |  | 2.6                          |
| Crater Lake.....                        |   |  | 57.9                         | Mount Rainier.....          | 29.7  | 1.2  | 1 81.7                       |
| Devil's Tower.....                      |   |  | .3                           | National Capital Parks..... | .4  | .4   | 5.7                          |
| Fort Donelson.....                      |   |  | 1 2.7                        | Petersburg.....             |   |  | 7.3                          |
| Fort Matanzas.....                      | .6  | .6   | .6                           | Petrified Forest.....       | 4.8   | 4.8  | 31.1                         |
| Fort Pulaski.....                       | .3  | .3   | .3                           | Rocky Mountain.....         | 46.9  |  | 51.4                         |
| Fredericksburg - Spot-<br>sylvania..... | .3  | .3   | 23.5                         | Scotts Bluff.....           | 1.6   |  | 1.6                          |
| General Grant.....                      | 6.3   | 3.9  | 10.3                         | Sequoia.....                | 3.8   |  | 46.1                         |
| George Washington<br>Birthplace.....    |   |  | 2.6                          | Shenandoah.....             | 18.2  | 18.2                                       | 89.8                         |
| Gettysburg.....                         | 4.2   | 4.2  | 7.3                          | Shiloh.....                 |   |  | 10.3                         |
| Glacier.....                            | 19.9  | 16.4                                       | 74.4                         | Vicksburg.....              | .5  | .5   | 5.3                          |
| Grand Canyon.....                       | 7.7   |  | 162.1                        | Wind Cave.....              |   |  | 15.9                         |
| Great Smoky Moun-<br>tains.....         | 7.7   | 4.1  | 27.0                         | Yellowstone.....            | 43.3  | 1.9  | 289.7                        |
| Guilford Courthouse.....                | 2.6   | 2.6  | 2.6                          | Yosemite.....               | 17.1  | 5.5  | 104.0                        |
|   |   |  |                              | Zion.....                   |   |  | 18.7                         |
|   |   |  |                              | <b>Total.....</b>           | <b>329.7</b>  | <b>153.5</b>                               | <b>1,442.7</b>               |

1 Revised figure resulting from final survey.

Highway construction in national parks and monuments is carried on under the same general plan and according to the same standards as have been described for work in the national forests with the exception that the landscaping branch of the Park Service participates actively in locating and planning highways to fit them into and preserve the natural beauty of the parks.

At the close of the year, 1,443 miles of road had been constructed in the national parks and monuments, an increase of 153 miles during the past year. This mileage includes both approach roads and parkways. In addition, 176 miles of road previously constructed was further improved, in most instances by placing a better surface. The completed mileage is shown by parks and monuments in table 30, and by types in table 31.

TABLE 31.—Highways completed in or leading to national parks and monuments at end of fiscal year 1938, by types

| Park, monument, or parkway         | Graded and drained | Gravel | Bituminous treatment | Bituminous mixture | Bituminous macadam | Bituminous concrete | Portland-cement concrete | Bridges | Total   |
|------------------------------------|--------------------|--------|----------------------|--------------------|--------------------|---------------------|--------------------------|---------|---------|
|                                    | Miles              | Miles  | Miles                | Miles              | Miles              | Miles               | Miles                    | Miles   | Miles   |
| Acadia.....                        |                    | 0.2    | 7.1                  |                    | 8.0                |                     |                          |         | 15.3    |
| Blue Ridge Parkway.....            | 2.5                | 122.0  |                      |                    |                    |                     |                          |         | 124.5   |
| Bryce Canyon.....                  |                    |        |                      | 21.7               |                    |                     |                          |         | 21.7    |
| Carlsbad Caverns.....              |                    |        |                      | 8.4                |                    |                     |                          |         | 8.4     |
| Chalmette.....                     |                    |        |                      |                    |                    |                     | 0.5                      |         | .5      |
| Chickamauga-Chattanooga.....       |                    |        |                      | 10.4               |                    |                     | 7.2                      |         | 17.6    |
| Colonial.....                      | 2.7                |        | .6                   |                    |                    |                     | 8.8                      | 0.2     | 12.3    |
| Crater Lake.....                   | 4.1                | 18.6   | 1.9                  | 26.4               | 6.8                |                     |                          | .1      | 57.9    |
| Devil's Tower.....                 |                    |        |                      |                    |                    |                     |                          |         | .3      |
| Fort Donelson.....                 |                    |        |                      | 2.7                |                    |                     |                          |         | 2.7     |
| Fort Matanzas.....                 |                    |        |                      | .5                 |                    |                     |                          |         | .6      |
| Fort Pulaski.....                  | .1                 |        |                      |                    |                    |                     |                          | .2      | .3      |
| Fredericksburg-Spotsylvania.....   |                    |        | 18.0                 | 5.3                |                    | 0.2                 |                          |         | 23.5    |
| General Grant.....                 | 7.9                |        | 2.4                  |                    |                    |                     |                          |         | 10.3    |
| George Washington Birth-place..... |                    |        | 2.6                  |                    |                    |                     |                          |         | 2.6     |
| Gettysburg.....                    |                    |        |                      | .8                 |                    | 6.5                 |                          |         | 7.3     |
| Glacier.....                       | 16.4               | 23.7   | 34.1                 |                    |                    |                     |                          | .2      | 74.4    |
| Grand Canyon.....                  |                    | .7     |                      | 146.7              | 14.6               |                     |                          | .1      | 162.1   |
| Great Smoky Mountains.....         |                    | 3.6    | 19.4                 | 4.0                |                    |                     |                          |         | 27.0    |
| Guilford Court House.....          |                    |        |                      |                    |                    | 2.6                 |                          |         | 2.6     |
| Hawaii.....                        |                    |        | 10.6                 | 9.0                | 16.0               |                     |                          |         | 35.6    |
| Hot Springs.....                   |                    |        | 3.5                  |                    |                    |                     |                          |         | 3.5     |
| Kill Devil Hill.....               |                    |        |                      | 1.6                |                    |                     |                          |         | 1.6     |
| Lassen Volcanic.....               |                    |        |                      | 35.1               |                    |                     |                          |         | 35.1    |
| Meriwether Lewis.....              |                    |        |                      | 1.8                |                    |                     |                          |         | 1.8     |
| Mesa Verde.....                    |                    |        |                      | 32.0               |                    |                     |                          |         | 32.0    |
| Morristown.....                    |                    | 2.6    |                      |                    |                    |                     |                          |         | 2.6     |
| Mount Rainier.....                 | 20.5               | 24.7   |                      | 20.7               | 15.5               |                     |                          | .3      | 81.7    |
| National Capital parks.....        | 1.1                |        | .4                   |                    |                    | 4.0                 |                          | .2      | 5.7     |
| Petersburg.....                    | 1.3                |        | 6.0                  |                    |                    |                     |                          |         | 7.3     |
| Petrified Forest.....              |                    |        | 4.9                  | 26.0               |                    |                     |                          | .2      | 31.1    |
| Rocky Mountain.....                |                    |        | 8.0                  | 43.4               |                    |                     |                          |         | 51.4    |
| Scotts Bluff.....                  |                    |        |                      |                    |                    |                     | 1.6                      |         | 1.6     |
| Sequoia.....                       | 6.2                |        | 14.3                 | 25.5               |                    |                     |                          | .1      | 46.1    |
| Shenandoah.....                    | 6.4                | 18.1   | 12.5                 | 52.8               |                    |                     |                          |         | 89.8    |
| Shiloh.....                        |                    |        |                      | 3.7                |                    |                     | 6.6                      |         | 10.3    |
| Vicksburg.....                     | .2                 | .3     |                      |                    |                    |                     | 4.7                      | .1      | 5.3     |
| Wind Cave.....                     |                    |        |                      | 15.9               |                    |                     |                          |         | 15.9    |
| Yellowstone.....                   |                    | 36.6   | 98.2                 | 154.2              |                    |                     |                          | .7      | 289.7   |
| Yosemite.....                      | 19.4               |        | 26.3                 | 27.7               | 14.1               | 10.0                | 6.2                      | .3      | 104.0   |
| Zion.....                          |                    |        |                      | 17.6               |                    |                     | 1.0                      |         | 18.7    |
| Total.....                         | 88.8               | 251.1  | 270.8                | 693.9              | 75.0               | 23.3                | 36.6                     | 3.2     | 1,442.7 |

In Glacier National Park a surfaced road has been constructed through the park and across the continental divide at Logan Pass at an elevation of 6,654 feet. In Mount Rainier National Park both the Westside and Stevens Canyon routes, which are of considerable length, are being improved by including sections in each year's program. Work is now being concentrated in Stevens Canyon. In Crater Lake National Park the last section of the loop around the lake between Government Camp and Kerr Notch is approaching completion. In Yosemite the Big Oak Flat road route, involving difficult location and construction, is approaching completion. The tunnels on this route will soon be lined and sections between these tunnels graded and surfaced. There still remains a long uncompleted gap in the Tioga Road in Yosemite. This is a superb mountain highway through some of the most rugged of the high Sierras, crossing the Sierras at Tioga Pass at an elevation of nearly 10,000 feet. Additional work on this road is planned. Roads

within Yellowstone National Park and the approach road from the east are being improved.

In the Eastern States attention is being focused on the construction of parkways. The Blue Ridge Parkway following closely the crest of the Blue Ridge Mountains for approximately 480 miles passes through Virginia and North Carolina into Tennessee and connects the Shenandoah and Great Smoky Mountains National Parks. Approximately 124 miles has been completed and 157 miles is under construction, a portion of which is surfacing of roads previously graded.

The Natchez Trace Parkway passes through historic sections of Mississippi, Alabama, and Tennessee for approximately 455 miles. No mileage is as yet completed but 36 miles is under construction.

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

TABLE 32.—Highways under construction in or leading to national parks and monuments at end of fiscal year 1938, by types

| Park, monument, or parkway         | Graded and drained | Gravel | Bituminous treatment | Bituminous mixture | Bituminous macadam | Bituminous concrete | Portland-cement concrete | Bridges | Total |
|------------------------------------|--------------------|--------|----------------------|--------------------|--------------------|---------------------|--------------------------|---------|-------|
|                                    | Miles              | Miles  | Miles                | Miles              | Miles              | Miles               | Miles                    | Miles   | Miles |
| Acadia.....                        |                    |        | 3.1                  |                    |                    |                     |                          | 0.1     | 3.2   |
| Blue Ridge Parkway.....            |                    | 51.8   | 56.6                 | 49.1               |                    |                     |                          | .3      | 157.8 |
| Boulder Dam Recreational Area..... |                    |        |                      | 9.4                |                    |                     |                          |         | 9.4   |
| Colonial.....                      |                    |        | .2                   |                    |                    |                     | 1.7                      |         | 1.9   |
| Crater Lake.....                   | 4.9                |        | 24.6                 | 12.4               |                    |                     |                          |         | 41.9  |
| Glacier.....                       |                    |        | 16.4                 |                    |                    |                     |                          |         | 16.4  |
| Grand Canyon.....                  |                    |        | 30.4                 | 14.6               |                    |                     |                          |         | 45.0  |
| Great Smoky Mountains.....         |                    | 3.1    |                      |                    |                    |                     |                          |         | 3.1   |
| Mount Rainier.....                 | 4.6                |        | 13.7                 |                    |                    |                     |                          | (1)     | 18.3  |
| Natchez Trace.....                 | 36.3               |        |                      |                    |                    |                     |                          |         | 36.3  |
| National Capital parks.....        |                    |        |                      |                    |                    | 0.6                 |                          | .1      | .7    |
| Petrified Forest.....              |                    |        | 4.8                  |                    |                    |                     |                          |         | 4.8   |
| Rocky Mountain.....                |                    |        |                      | 8.1                |                    |                     |                          |         | 8.1   |
| Sequoia.....                       |                    |        |                      | 12.5               |                    |                     |                          |         | 12.5  |
| Shenandoah.....                    |                    | 13.8   |                      |                    |                    | 9.5                 |                          |         | 23.3  |
| Vicksburg.....                     |                    |        | .4                   |                    |                    |                     | 2.2                      |         | 2.6   |
| Yellowstone.....                   | 10.0               | .9     |                      | 2.1                |                    |                     |                          |         | 13.0  |
| Yosemite.....                      | 2.7                | 12.6   |                      |                    |                    |                     |                          |         | 15.3  |
| Zion-Bryce Canyon.....             | 1.9                |        |                      |                    |                    |                     |                          |         | 1.9   |
| Total.....                         | 60.4               | 82.2   | 150.2                | 108.2              |                    | 10.1                | 3.9                      | .5      | 415.5 |

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

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

TABLE 33.—Location and length of approach roads to national parks and monuments, June 30, 1938

| Road                         | Park                       | Designated | Under construction | Completed |
|------------------------------|----------------------------|------------|--------------------|-----------|
|                              |                            | Miles      | Miles              | Miles     |
| Fresno-General Grant.....    | General Grant.....         | 3.9        |                    | 3.9       |
| Cameron-Desert View.....     | Grand Canyon.....          | 28.1       |                    | 28.1      |
| South Approach.....          | do.....                    | 52.3       |                    | 52.3      |
| Jacobs Lake-North Rim.....   | do.....                    | 31.2       | 31.2               | 1 31.2    |
| Mineral-Lassen Volcanic..... | Lassen Volcanic.....       | 8.8        |                    | 4.7       |
| Sequoia-General Grant.....   | Sequoia-General Grant..... | 13.5       |                    | 4.1       |
| Custer-Wind Cave.....        | Wind Cave.....             | 8.6        |                    | 13.5      |
| Southwest Approach.....      | Yellowstone.....           | 13.9       |                    | 8.9       |
| Moran-Yellowstone.....       | do.....                    | 24.0       |                    | 13.9      |
| Red Lodge-Cooke City.....    | do.....                    | 59.6       |                    | 5.8       |
| East Approach.....           | do.....                    | 23.0       |                    | 59.7      |
| Zion-Bryce Canyon.....       | Zion-Bryce Canyon.....     | 35.0       | 1.9                | 13.7      |
| Total.....                   |                            | 301.9      | 33.1               | 204.2     |

<sup>1</sup> Graded as a forest-road project. Figure not included in total.

<sup>2</sup> Completed as a forest-road project. Figure not included in total.

## INTER-AMERICAN HIGHWAY

Work on the Inter-American highway continued throughout the year, and substantial progress was made in the construction of bridges and in assisting the various countries in locating and planning links in the highway. This highway, which is to extend from Laredo, Tex., to Panama City, Panama, follows a route recommended by the Bureau in 1934, as the result of a reconnaissance survey made at the request of the Department of State and the countries concerned. Recent work has been done under an authorization of \$1,000,000 made in 1934 for cooperation in the survey and construction of the highway.

Under a cooperative arrangement assistance has been given to Panama, Costa Rica, Nicaragua, Honduras, and Guatemala in the erection of bridges. The United States agreed to furnish all needed engineering supervision and products of American heavy industry such as steel, cement, and equipment necessary in the work, and to transport such articles to the construction sites. The other countries agreed to furnish local materials needed for the bridges; to furnish all labor needed for construction; to build all substructures of bridges and approaches wherever necessary; and to construct the necessary sections of road to make all bridges serviceable on or immediately following construction.

Cooperation has also included the making of additional reconnaissance surveys in Guatemala, Nicaragua, and Costa Rica, and location surveys in Panama, Nicaragua, Guatemala, and Costa Rica; additional bridge investigations and surveys in all countries mentioned except Guatemala; and the designing of a group of standard bridge plans considered most useful for the immediate future programs of the several countries. A complete list of the 39 projects included under the entire program follows:

|  | <i>Total length</i>  |
|--|----------------------|
| <b>Bridges built under contract (9):</b>                                       |                      |
| Río Chiriqui, Panama.....  | 787 feet.            |
| Río Choluteca, Honduras.....   | 1,088 feet.          |
| Río Tamazulapa, Guatemala.....   | 486 feet.            |
| Río Las Maderas, Nicaragua.....  | 96-foot span.        |
| Río Platanar, Panama.....  | 120-foot span.       |
| Río Grande, Nicaragua.....   | 120-foot span.       |
| Río Esteli, Nicaragua.....   | 96-foot span.        |
| Río Amatal, Guatemala.....   | 96-foot span.        |
| Río Tahuapa, Guatemala.....  | 30-foot span.        |
| <b>Bridges erected by force account (6):</b>                                   |                      |
| Río Chirigagua, Panama.....  | 96-foot span.        |
| Río San Cristobal, Panama.....   | 100-foot span.       |
| Río Tincal, Guatemala.....   | 20-foot span.        |
| Río Zonjon, Guatemala.....   | 8-foot span.         |
| Río Mongoy (1) Guatemala.....  | 12-foot span.        |
| Río Mongoy (2) Guatemala.....  | 31-foot 4-inch span. |
| <b>Bridges surveyed and designed (5):</b>                                      |                      |
| Río Tenorio, Costa Rica.....   |                      |
| Río Ochomogo, Nicaragua.....   |                      |
| Río Viejo, Nicaragua.....  |                      |
| Río Istaca, Honduras.....  |                      |
| Río La Leona, Honduras.....  |                      |
| <b>Bridges investigated (4):</b>   |                      |
| Río Mula, Panama.....  |                      |
| Río Chico, Panama.....   |                      |
| Río Caimito, Panama.....   |                      |
| Río Agua Caliente, Honduras.....   |                      |
| <b>Road surveys completed (4):</b>   |                      |
| David-Concepcion-Frontera, Panama.....   | 65 miles.            |
| Tipitapa-Río Las Maderas, Nicaragua.....                                       | 20.5 miles.          |
| Asuncion Mita-Frontera, Guatemala.....   | 12.5 miles.          |
| Cartago-San Marcos, Costa Rica.....  | 25 miles.            |
| <b>Road reconnaissance surveys completed (4):</b>                              |                      |
| La Conora Mountain, Guatemala.....   | 8 miles.             |
| Progreso Mountain, Guatemala.....  | 8 miles.             |
| Las Maderas-Sehaco, Nicaragua.....   | 30 miles.            |
| Naranjo-Las Canas, Costa Rica.....   | 116 miles.           |
| <b>Roads under construction on which assistance was given in planning (3):</b> |                      |
| Tipitapa-Río Las Maderas, Nicaragua.....                                       | 18 miles.            |
| Asuncion Mita-Frontera, Guatemala.....   | 12.5 miles.          |
| Cartago-San Marcos, Costa Rica.....  | 25 miles.            |
| <b>Standard plans designed (4):</b>  |                      |
| Three pony truss bridges.....  |                      |
| Three through truss bridges.....   |                      |
| Five cantilever I-beam bridges.....  |                      |
| One concrete box culvert, 10 by 10 feet.....                                   |                      |

The Chiriqui, Choluteca, and Tamazulapa Bridges which were included in a single contract were major structures of suspension design.

All of the larger bridges are now completed except those at the Río Chirigagua and Río San Cristobal in Panama, which are now being erected.

Shipments from the United States to the several countries for this work have amounted to a total of 6,357 tons. The more important items were cement, fabricated bridge steel, reinforcing steel, and road and bridge equipment. Miscellaneous items included culvert pipe, corrugated sheet metal, steel piling, and a small quantity of quarry supplies.

The delivery of materials and equipment from shipside to bridge site was in every case a serious problem. Deliveries of materials for the Choluteca and Tamazulapa Bridges are typical of the difficulties encountered. All shipments to Choluteca were landed at the port of Amapala, Honduras. This port is on Tigre Island, 16 miles from the mainland port. Ships anchored in the roadstead, and as there are no wharf facilities freight was discharged into open lighters. The lighters were then towed or sailed 16 miles to the mainland port where freight was discharged, loaded into carts or trucks, and hauled approximately 25 miles to the bridge site.

Deliveries for the Tamazulapa Bridge in Guatemala were made by ocean steamer at Puerto Barrios on the Caribbean side, shipped by rail to Santa Lucia, El Salvador, there unloaded, and hauled by truck 52 miles to the bridge site.

In each country where cooperative work has been conducted, a Bureau engineer has been placed in charge as resident engineer. All other positions have been filled with local engineers, most of whom have been trained in the United States. It has been the policy to aid each country in developing its own highway engineers capable of carrying on future highway programs according to the most modern standards.

Approximately 90 percent of the \$1,000,000 made available in 1934 has been expended. Slightly more than 70 percent has been expended for materials produced in this country and about 20 percent has been paid for services and personnel.

Although work has been done at many points along 1,000 miles of the route and has often been accompanied by unusual difficulties and the necessity of resorting to primitive means, the cost of engineering services and overhead expenses has been kept down to about 12 percent. Expenditures by the United States for construction have been slightly exceeded by corresponding expenditures by the cooperating countries. On work for which the United States provided \$680,000 the cooperators provided \$710,000.

Efforts by the United States to foster the development of the Inter-American highway have been highly successful. In every country interest in road construction has been aroused and efforts are being concentrated on the route from Panama to the United States. There has been no direct cooperation with Mexico but relations with Mexican highway officials have been amicable at all times. The section of the highway from Laredo to Mexico City was completed by the Mexican Government more than a year ago and a program is now under way to complete the road from Mexico City to Guatemala, although the original plan of the Mexican authorities was to direct the next effort to a route on the Pacific coast from Arizona to Mexico City.

In Guatemala the highway organization has been notably strengthened and reconstruction and betterments now in progress will make the road across Guatemala entirely serviceable at all seasons of the year by 1940.

Very friendly relations have been maintained with the highway authorities of El Salvador but there has been no active participation in highway work there. Encouraged by the work in neighboring countries the Government of El Salvador is carrying on a program under which the entire route across this Republic will be three-quarters completed in 1940, and probably entirely completed in 1941.

In Honduras only about 90 miles of highway are included in the inter-American route, and one-third of this is now passable at all seasons. The Government of Honduras has requested further engineering assistance, and if possible, further cooperation in improving this section.

In Nicaragua the Government has tried twice to enter into a satisfactory contract with private contractors for a considerable mileage of highway construction, but difficulties in independently financing a large program have so far prevented success in this direction. The Government is able, however, to expend from 40,000 to 60,000 cordobas (\$8,000 to \$12,000) a month and has requested further surveys and engineering assistance in extending the improved road in that country. At the last session of the Congress of Costa Rica, 1,050,000 colones (\$187,200) was appropriated to provide for cooperative construction under the direction of Bureau engineers, and also for about 12½ miles of additional road, all on the inter-American route.

The Government of Panama has committed itself to complete approximately 65 miles of road north of David, where assistance has been given in the construction of three bridges. This work will complete the road from Panama City to the Costa Rica line. Owing to the present financial condition of Panama, construction is proceeding slowly but steadily.

The present general status of the inter-American highway from Laredo, Tex., to Panama City is given in table 34.

TABLE 34.—*Status of improvement of the inter-American highway, Laredo, Tex., to Panama, June 30, 1938*<sup>1</sup>

| Section                             | Paved road | Gravel road | Graded earth road | Ungraded road or trail |
|-------------------------------------|------------|-------------|-------------------|------------------------|
|                                     | Miles      | Miles       | Miles             | Miles                  |
| Nuevo Laredo-Mexico City.....       | 765        |             |                   |                        |
| Mexico City-Oaxaca.....             | 40         |             |                   | 300                    |
| Oaxaca-Guatemala line.....          |            |             |                   | 635                    |
| Mexico line-Quetzaltenango.....     |            |             |                   | 80                     |
| Quetzaltenango-Asuncion Mita.....   |            | 212         |                   |                        |
| Asuncion Mita-El Salvador line..... |            |             | 24                |                        |
| Guatemala line-Santana.....         |            | 20          | 4                 |                        |
| Santana-San Vicente.....            | 30         | 49          |                   |                        |
| San Vicente-Honduras line.....      |            |             |                   | 88                     |
| El Salvador line-San Lorenzo.....   |            |             |                   | 37                     |
| San Lorenzo-Choluteca.....          |            | 23          |                   |                        |
| Choluteca-Nicaragua line.....       |            |             |                   | 30                     |
| Honduras line-Esteli.....           |            |             |                   | 50                     |
| Esteli-Las Maderas.....             |            |             |                   | 60                     |
| Las Maderas-Managua.....            |            | 35          |                   |                        |
| Managua-Costa Rica line.....        |            |             |                   | 100                    |
| Nicaragua line-Naranjo.....         |            |             |                   | 163                    |
| Naranjo-Cartago.....                | 48         |             |                   |                        |
| Cartago-Panama line.....            |            |             |                   | 145                    |
| Costa Rica line-David.....          |            |             | 15                | 44                     |
| David-Panama City.....              | 200        | 108         |                   |                        |
| Total.....                          | 1,083      | 447         | 43                | 1,732                  |

<sup>1</sup> Mileage figures based on proposed new location in Mexico and Nicaragua.

If the programs in Mexico, Guatemala, and El Salvador are carried out as now projected, an all-weather road should be completed as far south as Choluteca, Honduras, by the end of 1941.

## TRANSPORTATION, ECONOMIC, AND STATISTICAL INVESTIGATIONS

### HIGHWAY-PLANNING SURVEYS

At the beginning of the year, 43 States had undertaken State-wide highway planning surveys in cooperation with the Bureau under authority contained in the Hayden-Cartwright Act of 1934 and subsequent legislation which authorized the Secretary of Agriculture to approve allotments of not to exceed 1½ percent of the amount of Federal highway funds apportioned for any year, for surveys, plans, and engineering and economic investigations of projects for future construction. Since then, three additional States, New Jersey, Mississippi, and Connecticut, have undertaken the work, bringing the total to 46.

Many States which undertook the surveys when they were first proposed by the Bureau have progressed to the point of interpreting the data for a series of reports to their citizens on the status of the highway plant, generally following an outline suggested by the Bureau. The planning surveys are demonstrating their value more convincingly as analysis of the data progresses and the results are used in supplying facts and figures to other branches of the highway departments and to interested agencies. In this way the surveys have served as an essential aid in the general administration and operation of government. Upon request copies of the county base maps prepared in connection with the surveys have been furnished to the National Park Service, the Agricultural Adjustment Administration, the Soil Conservation Service, and other agencies. Copies will also be furnished to the Census Bureau for use in taking the 1940 census. In a number of instances, traffic information has been furnished to the Forest Service for use in planning roads under their jurisdiction.



Field inventories of the rural road system have been completed in 38 States with 2,519,000 miles of road. In eight other States, with an estimated road mileage of 406,583, the mileage inventoried to June 30 was 170,429. Preparation of base maps showing all rural roads and other essential data, is progressing and most States expect to complete the majority of their maps by the middle of the 1939 fiscal year. Alabama, Arizona, Arkansas, Idaho, Illinois, Kansas, Montana, Nebraska, North Dakota, Oregon, and Wyoming have completed base map tracings. Approximately 4,080 base maps will be required for the 3,005 counties of the States now conducting planning surveys. Already 1,625 maps have been forwarded to Washington for examination. Base maps, in general, have been constructed on well established land coordinates in close cooperation with the General Land Office, the Geological Survey, and the Coast and Geodetic Survey. Nineteen States have reported the use of aerial photographs in making or checking county base maps, and Virginia in particular will have the advantage of aerial photographs of its entire area.

The surveys include the collection of data on sharp curves, steep grades, lack of superelevation, and limited sight distance on the primary highways, and a record is made of the location and nature of critical restrictions. These data are assembled under two general classes: (1) Nonmountainous roads having sight distances of less than 1,000 feet, curvature exceeding 6°, and grades exceeding 5 percent; and (2) mountainous roads having sight distances less than 650 feet, curvature exceeding 14°, and grades exceeding 8 percent. These data will reveal critical sections of the highway system requiring early attention and, when correlated with traffic density and accident records, will provide the basis for highway programs in which priority will be given to those improvements most urgently needed.

In cooperation with the Association of American Railroads, pertinent facts relating to rural and urban grade crossings are being obtained which will be combined with a field inventory of the crossings and traffic data to arrive at programs of abandonment, protection, and elimination by separation of grades, giving priority to the most dangerous crossings. Most of the data to be supplied by the railroads have been received and await the completion of the urban-crossing inventory.

Field work on traffic surveys has been completed by the majority of the States. At 3,323 weighing stations, the weights of trucks, commodities carried, as well as other data, were recorded for thousands of trucks, tractor-truck semitrailers, and trucks with full trailers. Information on the tonnage moved over the highways has been obtained from stations where portable weighing devices were used, while more detailed and precise data were obtained at pit-scale stations to determine loading practices. Such data have important bearing on regulation and taxation. Information regarding the weights and dimensions of busses and number of passengers carried was also obtained at these stations. Traffic-flow maps for the primary road system have been prepared by nine States.

Working continually are 353 automatic traffic-recording machines, recording the hourly passage of vehicles. The design of these units was originally conceived by the Bureau and later perfected by commercial organizations. Installed at strategically located points, these machines provide a long-period record of traffic volume. Completeness of the records permits the determination of characteristic traffic patterns and factors with which to expand short-period counts to annual averages and to show minimum, average, and maximum traffic volumes.

Summaries of road-life data, extracted from the records of State highway departments are being prepared in all States making the planning surveys. Life tables are being prepared and the probable average life determined for each surface type as well as construction costs, maintenance costs, and probable salvage value. From a careful interpretation of these data, more dependable estimates may be made of the public investment in highways, cost of ownership, and probable annual cost of present and future improvements.

The financial surveys involve studies of highway income, expenditure, and debt of the State and of all the subdivisions within the State. They will indicate where and how the money is now being spent and for what purpose. Motor-vehicle allocation studies, based on an analysis of questionnaires received from motor-vehicle owners, will show the location and occupation of persons paying motor taxes and the share paid by residents of cities, towns, and rural areas. The road-use surveys will show the benefits derived from roads, and the extent of use by the various classes of residents.

Information regarding land uses, present and potential, which will have a direct bearing on rural road improvements is to be obtained in an extensive survey

contemplated by the Bureau of Agricultural Economics in cooperation with a number of other agencies of the Department, including this Bureau. Plans for the survey include a classification of land according to its usefulness for agricultural purposes. This information will be used in preparing county maps which will show submarginal areas and the various degrees of usefulness of areas suitable for agriculture.

#### SAFETY RESEARCH

The results of the safety studies made during the previous year in cooperation with the Highway Research Board of the National Research Council were embodied in a detailed report and published in six parts as House Document No. 462, Seventy-fifth Congress, third session. The six parts are entitled:

- Part 1. Nonuniformity of State Motor-Vehicle Traffic Laws.
- Part 2. Skilled Investigation at the Scene of the Accident Needed to Develop Causes.
- Part 3. Inadequacy of State Motor-Vehicle Accident Reporting.
- Part 4. Official Inspection of Vehicles.
- Part 5. Case Histories of Fatal Highway Accidents.
- Part 6. The Accident-Prone Driver.

A summary report on these researches was also prepared and published as a bulletin of the Bureau, Highway Accidents, Their Causes and Recommendations for Their Prevention.

By cooperative agreement with the Highway Research Board, certain research projects in highway safety that could not be completed for inclusion in the report to Congress were continued, particularly an investigation of the validity and utility of driver test clinics in identifying and re-educating the accident-prone driver.

#### MAINTENANCE-COST STUDIES

Agreements with the State Highway Departments of Connecticut, New Hampshire, and Rhode Island for a study of highway-maintenance costs in relation to traffic volume were renewed for the fourth year. Traffic records for the third consecutive year were obtained for 31 sections of highway in Connecticut, 52 sections in New Hampshire, and 102 sections in Rhode Island. The States were furnished copies of the records with the average 24-hour traffic density on each section. A detailed report on each section was completed. Detailed maintenance costs on each of the sections are being kept by the States and supplied to the Bureau.

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

#### HIGHWAY-CAPACITY AND VEHICLE-PERFORMANCE STUDIES

Traffic-capacity studies in cooperation with the Illinois Highway Planning Survey were continued. Analysis of the field data was made in Washington and in Chicago. Attention was directed to the design of equipment to reduce the cost and labor of collecting data, and for use in broadening the field of study.

Under cooperative agreements with the Quartermaster Corps of the United States Army and the National Bureau of Standards, and with the assistance of a number of truck manufacturers, an exhaustive study of the performance of new trucks on highway grades was begun. Actual performance of a number of trucks will be determined on a series of grades, and laboratory tests will be conducted on the same vehicles to determine their engine efficiency.

Methods were developed and apparatus was designed and assembled for studying in detail the movements of vehicles over long sections of highway. The normal driving practices under various conditions of traffic and of physical alinement, as well as the distances required for passing under various conditions, will be determined with this apparatus.

Methods were developed, equipment was designed and assembled, and preliminary studies were conducted to determine the lateral placement of vehicles on the highway. This apparatus is to be used in conjunction with apparatus being developed that will automatically indicate the speed of vehicles. This equipment is to be used in a variety of localized studies of driving practices and how they are affected by various conditions of traffic volume and speed, width, surface, and alinement of the highway, and type and condition of the shoulders.

**NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY**

The Bureau continued to cooperate with the executive committee of the National Conference on Street and Highway Safety in the promotion of uniform traffic regulation. Copies of the Uniform Vehicle Code and other literature prepared by the Conference were widely distributed. A revised edition of the pamphlet Guides to Traffic Safety, originally prepared by the executive committee of the Conference in 1934, was published by the Bureau. The Conference reprinted a second large edition of the Manual on Uniform Traffic Control Devices for Streets and Highways compiled in 1935 by a joint committee representing the conference and the American Association of State Highway Officials. At the close of the year, plans were being made for meetings of the committee on uniform traffic laws and ordinances of the Conference to revise the Uniform Vehicle Code and the Model Traffic Ordinance. The joint committee on uniform traffic control devices was also making preparations for revision of the Manual on Uniform Traffic Control Devices for Streets and Highways.

**AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS**

Active cooperation was continued with the Association in its program of education and research to advance uniformity in State motor-vehicle laws, reciprocity between States, and in measures aimed at greater highway safety. During most of the year a member of the Bureau staff served as executive secretary of the Association. Under a subsequent arrangement, the Bureau is cooperating with the Automotive Safety Foundation and the National Conservation Bureau in establishing in Washington an administrative office for the Association, with an executive director.

**ESTIMATING HIGHWAY-TRAFFIC VOLUME**

Further research on the problem of estimating the volume of highway traffic for long periods by extending counts of limited duration made according to fixed schedules has been conducted to determine the most efficient procedure. It is desired to obtain estimates that are closely representative of actual traffic with the minimum number and duration of counts. Precision is affected not only by the number and length of the counting periods, but also by the parts of the day, the days of the week, and the months of the year during which the observations are made. Records from different parts of the country have been studied to determine periods of least dispersion and greatest reliability for sampling. A research report was presented at the annual meeting of the Highway Research Board in 1937.

**RAILROAD-ABANDONMENT STUDIES**

Abstracts were completed of the records from 1920 to May 31, 1937, of proceedings before the Interstate Commerce Commission for certificates of convenience and necessity permitting the abandonment of railroad lines.

The abstracted data were assembled in tabular form for each abandoned section of railroad to show the carrier, mileage of line, average investment per mile, population density, passenger and freight operating statistics for the last 5 years of operation, purposes for which the railroad was constructed, and reasons for the abandonment of operation. The data were summarized by States.

The proceedings of the Interstate Commerce Commission were also reviewed to determine the portions of the railroads abandoned that were later returned to operation.

The continuing purpose of these investigations is to ascertain what additional burden must be assumed by the highways as the abandonment of railroad lines progresses, especially the abandonment of unprofitable branches originally constructed as feeders to the main lines of railroads. It is desired to keep constantly informed as to the changing interrelationship between highway and railway patterns in each State.

By the orderly examination of causes and conditions surrounding former abandonments, it is hoped to arrive at ways of foreseeing future abandonments and the probable eventual relation between rail and highway transport which should so develop as to produce the largest public benefit from each form of transportation.

**PHYSICAL RESEARCH**

For a number of years the Bureau has been planning permanent laboratories for its research work at a location where there would be space for outdoor experiments. In previous years funds had been authorized for such an undertaking,

land had been acquired on the Mount Vernon Memorial Highway near Washington and plans had been prepared for laboratories and offices to house the Division of Tests.

Early in the fiscal year a contract for construction was awarded, work was begun soon thereafter, and is now nearing completion. It is expected that during the next fiscal year all the activities of the Bureau at the Arlington Experiment Farm of the Department will be transferred to the new research station.

#### SUBSURFACE EXPLORATION

The application of electrical resistivity and seismic methods in determining the distance from the ground surface to rock has been continued. Both types of apparatus have now been brought to a satisfactory state of development. Instruments of the types developed by the Bureau are now available commercially.

A complete set of seismic equipment has been purchased for use in the Bureau's work in the Western States and engineers are being given field instruction in its use.

During August and September 1938, at the request of the Corps of Engineers of the United States Army, demonstrations were made of the application of the seismic method of subsurface exploration to problems that arose in flood-control work in New York and New England. The tests indicated that information valuable in such work can be obtained with this equipment at relatively low cost.

In May 1938, at the request of the New Hampshire State Highway Department, demonstrations of both methods of exploration were conducted on a variety of highway projects in that State. By invitation the tests were observed by engineers from neighboring States, the Corps of Engineers and other interested agencies. The electrical-resistivity method was found to be unsatisfactory in the soils encountered, but the seismic method proved its value in detecting and locating the position of solid ledge rock. In the salt-water marshes the seismic method could not be used to determine the depth to solid sand layers where the overlying muck was in a fluid state.

An educational film strip, with text describing the principles and application of the two methods of exploration, has been prepared and copies are being distributed to State highway departments and universities.

#### MOTOR-VEHICLE IMPACT INVESTIGATIONS

The study of the elastic properties of concrete when acted upon by comparable static and impact forces, as mentioned in the last annual report, has been continued. This fundamental research is expected to furnish a connecting link between the considerable volume of data already obtained on (1) the effects of static loads on concrete pavement slabs, and (2) the magnitude and frequency of the impact forces developed on the highway by motor vehicles. This work is an important part of a broad research to rationalize the structural design of pavements.

A report was published describing the apparatus and method of test. It is anticipated that a progress report describing the results of the tests to date may be published during the coming year.

#### MEASUREMENT OF ROAD-SURFACE ROUGHNESS

Smoothness of road surface is necessary for comfort in travel and is a matter of concern to every highway engineer. There has been no reliable means for measuring degrees of road roughness. The Bureau has attempted to develop suitable apparatus, and definite progress has been made. A special standardizable one-wheel trailer has been built on which is mounted a device for integrating the successive vehicle spring deflections as the vehicle is towed along the road. This apparatus is ready for preliminary trials.

#### THE STRUCTURAL DESIGN OF CONCRETE PAVEMENTS

Work in this important field of investigation has been continued. Four reports on the recent researches at the Arlington Experiment Farm have already been published and a fifth report is in the course of preparation. The results presented in the fourth report of the series dealing with the design of joints in concrete pavements resulted in the submission to the Bureau for approval of many new designs, among which were a number of the dowel-plate type. In order to determine the merits of the designs, certain additional or supplementary tests were found to be necessary and are being made.

Final arrangements were made with the Indiana State Highway Commission for the construction of specially reinforced pavement sections on one of their current Federal-aid projects. This work will be done during the coming year. The purpose of this research is to determine the extent to which longitudinal steel reinforcement can be used economically to increase the spacing between transverse joints.

A survey of a considerable number of the older concrete pavements in Michigan was made in June 1938 in cooperation with the Michigan State Highway Department. These pavements were designed without provision for load transfer at the joints. The purpose of the survey was to determine the effect on pavement condition of the absence of provision for load transfer. The pavements studied were, in general, about 10 years old and were on the more heavily traveled routes.

#### EROSION TEST FOR CULVERT PIPE

Study of the erosion test for quality of bituminous coatings on corrugated-metal culvert pipe has been continued. In recent experiments, an abrasive charge of portland-cement mortar cubes has been used. A progress report covering these tests has been prepared.

The work that has been done indicates that the substitution of mortar cubes for the fragments of brick that are now specified improves the test in that more consistent results are obtained on duplicate samples. However, the test method appears to be deficient in certain respects and consideration is now being given to the possibilities of some other method.

#### THE STRUCTURAL DESIGN OF NONRIGID PAVEMENTS

Study of this important problem has been under way for some time and during the year a report reviewing past researches and summarizing present knowledge was published. Considerable study has been given to the development of needed instruments, particularly the development of devices for measuring pressures as distributed through nonrigid road surfaces.

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

The study of experimental installations of flexible culvert pipe buried in earth fills was continued and a progress report was published. This report presents a theoretical analysis of the problem, applicable to the design of flexible pipe culverts, and a comparison of the results of this analysis with the phenomena observed in the experimental installations. This investigation is to be extended to include observations in the field of the performance of a considerable number of culvert structures to determine, over a wide range of conditions, the value of certain constants that are required in theoretical computations of loads and supporting strength. These field observations will begin during construction of the culverts and will continue for some time thereafter. This is a cooperative study by the Bureau and the Engineering Experiment Station of Iowa State College.

#### INVESTIGATION OF BRIDGE FLOORS

The cooperative investigation of the action under load of concrete floor slabs of bridges, begun at the University of Illinois in 1936, was continued. This involves theoretical mathematical analyses of various types of floors and the verification of these analyses by observation of experimental floor slabs constructed in the laboratory. Two valuable reports on this work were published as bulletins of the University. One describes a distribution procedure for the analysis of slabs continuous over flexible supports and the other gives solutions for a number of special cases. This work is conducted cooperatively by the Bureau, the Illinois Division of Highways, and the University of Illinois.

#### FATIGUE STRENGTH OF WELDED JOINTS

The use of arc welding in fabricating steel highway bridges has been hampered by a lack of knowledge of the strength of welded connections when subjected to repeated applications of stress. The fatigue strength of steel, or its resistance to a great number of load applications, is much less than its strength as measured by one load or a few loads, and therefore it is a characteristic of major importance in bridge design. Arrangements have been made for a comprehensive laboratory

study of the fatigue strength of various types of welded joints. In this investigation the Bureau is cooperating with the University of Illinois and the welding research committee of The Engineering Foundation. The tests are to be made at the University.

#### CEMENTS, AGGREGATES, AND CONCRETE

A laboratory study to determine the effect of using a blend of natural and portland cements on the strength and durability of concrete was completed and a report is being prepared for publication. The report will present the conclusion that, although the crushing and flexural strength of pavement concrete may be slightly reduced by substituting one of the natural cements studied for 14 or 28 percent of portland cement, the resistance of the surface of the pavement to alternate freezing and thawing will be materially increased. Similar tests made with another brand of natural cement of approximately the same chemical composition did not show the same improvement, indicating that the beneficial effect of the natural cement may be influenced by the method of manufacture. Further information along this line will be obtained during the coming year through the inspection of experimental pavements in New York State in which both brands of natural cement have been used.

The extended series of tests to determine the relative efficiencies of different methods of curing concrete were completed and a report is being prepared for publication. Preliminary indications pointing to the importance of applying moisture to the surface of concrete slabs during the early curing period rather than merely sealing the existing moisture within the slab were confirmed.

The Bureau was requested by a committee of the American Society for Testing Materials to cooperate in a series of laboratory tests as part of a study of methods of measuring the soundness of portland cement by the use of a high-pressure steam (autoclave) test. Thirty-five portland cements were tested and the results reported to the committee. In addition, numerous other special tests of cement, all designed to measure properties not revealed by the present standard tests, were investigated. These included methods of determining the bleeding characteristics of cements and various tests to determine the efficiency of the operation of burning the mixture of raw materials in the manufacture of portland cement.

A study of the causes of deterioration of concrete pavements in certain of the Southeastern States indicates the probability that variations in quality of cement not covered by the present specifications may account for at least some of the trouble. In view of this fact, the laboratory studies of cement described above are considered highly important and will be continued.

Work on aggregates has been confined largely to continuation of studies of the Los Angeles abrasion test. Additional data correlating the results of the test with service behavior have been obtained and a report was published. A paper discussing the relation between the results of the Los Angeles test and a special roller test designed to simulate the action of a road roller is in course of preparation.

#### BITUMINOUS ROAD MATERIALS

Research to determine the significant properties of bituminous materials and aggregates and to correlate those properties with service behavior was continued along the lines followed in previous years. Laboratory tests, performed by commonly accepted methods, were made on materials for (1) compliance with given specifications on routine construction, (2) standardization and perfection of procedure, and (3) determining the suitability of new materials and combinations of materials. Additional tests were also performed on materials and mixtures by methods more recently developed to provide more information on quality and serviceability and to determine the effectiveness of the methods used.

Correlation between laboratory test results and field behavior was attempted by observation of bituminous roads of known characteristics. Differences in service behavior were compared with test results obtained in the laboratory.

Studies of general or special significance, designed to verify accepted theories or to develop additional information on bituminous materials and mixtures, were initiated or continued by the Bureau alone or in cooperation with State highway departments and committees of technical organizations.

Laboratory investigations of the physical and chemical properties of asphaltic materials, tars, and emulsions, and the behavior of surfacing materials containing them, were continued. Changes in refinery procedure and the development of new paving mixtures make a continuation of these studies necessary.

The laboratory examination of asphalt cements in general use throughout the United States was completed, and the data, which are being embodied in a report, will be of considerable assistance in evaluating such changes in specification requirements as are often proposed and in suggesting changes that may be of value in the control of this class of material. This work is to be supplemented by mechanical tests on sand mixtures containing these materials in order to determine more definitely their probable service behavior.

In cooperation with the Minnesota State Highway Department and the University of Minnesota, the laboratory study of asphalts in use in that area was continued. The effect of various aging processes and the value of the various tests in showing the changes that occur in the asphaltic materials and mixtures were studied.

The field and laboratory investigation of sheet-asphalt construction and its service behavior on two projects in the District of Columbia were continued. The changes that occurred during the preparation of the mixtures have been determined, and changes that occur during service will be determined from time to time.

In cooperation with the Ohio Highway Department, a study of the character of the asphalts in old pavements was completed and a report on this investigation is being prepared.

The determination of the absolute viscosity of all grades of bituminous materials was continued. Determinations of the absolute viscosity of a large number of asphalts of 50-60 and 85-100 penetration was completed and a report will be prepared on this work.

A number of bituminous materials and bituminous mixes were subjected to accelerated weathering in a special apparatus.

A study is being made of the microscopic film test to determine its suitability as a specification requirement.

The study to determine the resistance in different bituminous mixtures to stripping of the bituminous films from the particles of aggregate due to the action of moisture is being continued.

The bituminous and nonbituminous joint-filling materials installed on a section of the Mount Vernon Memorial Highway are still under observation. Several new materials, untried but appearing to have promise, were installed.

The experimental roads built in Alabama, North Carolina, Tennessee, and South Carolina, to study the use of cotton fabric in bituminous construction, are under observation and reports of construction, maintenance, and service behavior of similar roads built by a number of States with cotton fabric furnished to them under the cotton diversion program are being received from the States participating.

#### SUBGRADE INVESTIGATIONS

The Bureau's investigations of subgrade soils and their utilization in highway construction are of a continuous nature and include a number of separate activities. Some of these are closely related, while others are related only in that they have the common objective of improving highway construction through a greater knowledge of the performance of soil materials when used for a variety of purposes.

Application of soil mechanics in the design of foundations for buildings, earth dams, and earth embankments for highways, is receiving much attention. Theoretical analyses of the various problems are being made and much work is being done in the development and interpretation of appropriate laboratory tests. This work has been and will continue to be supplemented by field observations as the opportunities arise. Studies are being made with two devices for making direct tests of shear resistance and with the stabilometer which establishes the relation between the horizontal pressure developed by a soil sample and the vertical pressure to which it is subjected. The data obtained in these tests disclose wide differences in the stress-deformation relations of different cohesive soils. A study is being made of the practical application of shear-test data in the design of structures. A report on the principles of soils mechanics involved in fill construction was published.

Investigations of soil stabilization as applied to fill construction and the construction of road bases continues to be a major activity. Progress was made in the study of the relation between moisture content, density, and stability of soils and a further study is being made of the volume changes of soils that have been compacted under a variety of conditions. Arrangements were made to study fill consolidation and the economic value of the control of moisture and

density in fill construction on three highway-construction jobs. The fills on these jobs will be consolidated by a number of methods, costs will be obtained, and settlements will be observed over a period of years. The projects are located in Indiana, Ohio, and South Carolina, and the experimental work is to be done in cooperation with the respective State highway departments.

Several series of tests of stabilized bases were made on the small circular tracks at the Arlington Experiment Farm. As a result, a report on the influence of grading and plasticity on the performance of sand-clay and sand-clay-gravel bases was prepared for publication. A similar report on the effect of chemicals on the properties of base-course materials and on the use of chert gravels, quarry screenings, etc., is in preparation. The data obtained in these studies have been utilized in the preparation of specifications for materials to be used in base-course construction.

Preliminary to the construction of an experimental road, a study of the use of portland cement as a stabilizing agent in base construction was made on one of the small circular tracks. The experiment in the stabilization of soil with cement will involve the construction of a number of different sections of road in which the proportion of cement and the thickness of the stabilized base will be varied. The experimental road is located in South Carolina and the Bureau is cooperating with the State Highway Department in its construction.

Different agencies use different tests to measure the desired characteristics of stabilized soils and to determine the optimum content of admixtures used for stabilization. The Bureau has started a comprehensive laboratory investigation to study the fundamentals of soil stabilization with admixtures such as bituminous materials and portland cement and to develop and standardize satisfactory test procedures.

For some years the Bureau has furnished to interested laboratories standard check samples of soils for use in the instruction of laboratory personnel and to improve and standardize the technique of testing. The demand for this service continues. An analysis of the test results obtained with these samples by the various laboratories provides information relative to errors in testing procedure and as to the degree of uniformity of results that may be expected when the tests are made by different laboratories in strict accordance with the standard methods. The standard methods of test are being studied constantly in order to improve and simplify them.

The Bureau is cooperating with the Forest Service in a laboratory investigation of the effect of various colloidal materials on the permeability of sandy soils. The purpose is to determine the best method of treating sandy soils used in the construction of earth dams.

Two special 2-week courses of instruction in soil surveying and sampling, soil testing, and soil mechanics were held in Washington. The attendance at both courses was large and was comprised of representatives of Federal bureaus, State highway departments, universities, foreign governments, and commercial organizations.