

VOLUME V.

Adjutant General, Biennial Report, 1920.  
Treasurer of State, Biennial Report, 1920.  
Apiarist, Annual Reports, 1919 and 1920.  
Dairy and Food Department, Annual Reports, 1919 and 1920.  
Mine Inspectors, Biennial Report, 1920.  
Fish and Game Department, Biennial Report, 1920.  
Historical Society, Biennial Report, 1920.  
Weather and Crops, Annual Reports, 1919 and 1920.  
Dental Examiners, Biennial Report, 1920.

STATE OF IOWA

1919

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REPORT OF THE

**State Highway Commission**

FOR THE

**Year Ending December 1, 1919**

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ISSUED BY THE

**STATE HIGHWAY COMMISSION**

AMES, IOWA

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H. C. BEARD, Chairman

J. W. HOLDEN,

S. W. BEYER,

State Highway Commissioners

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THOMAS H. MACDONALD, Chief Engineer

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Published by  
THE STATE OF IOWA  
Des Moines

LETTER OF TRANSMITTAL

Hon. W. L. Harding, Governor:

Pursuant to the provisions of Section 1527-s2, Supplemental Supplement to the Code 1915, the State Highway Commission presents herewith Part One of its Sixth Annual Report. This part of the report covers the principal operations of the Commission for the year December 1, 1918, to December 1, 1919.

Part Two of this report will contain a summary of the annual reports of the county engineers for the year December 31, 1918, to December 31, 1919. It will be presented later as the law provides.

J. W. Holden, Chairman,  
W. Collinson,  
Anson Marston,  
Commissioners.

Ames, Iowa, December 31, 1919.

# PART I

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## Chapter I. Summary of Work of 1919

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### SIXTH ANNUAL REPORT

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The Sixth Annual Report of the State Highway Commission is divided into two parts.

Part One is a report of the activities of the State Highway Commission for the year ending December 1, 1919, and of the expenditures of the Commission for the year ending June 30, 1919.

Part Two is a summary of the annual reports of the county engineers for the year ending December 31, 1919.

#### **The Year of 1917.**

From the standpoint of construction work accomplished, the year 1919 has been a disappointment to the road builder. During the war, highway work was among the first industries to feel the pinch of war conditions. Steel and other materials were commandeered by the Government. Highway work received only the materials that were not needed for other purposes. Then the railroad situation became acute. Priority orders were issued by the Government, giving preference in rail transportation to shipments immediately necessary in the prosecution of the war. Conditions with reference to shipment of highway materials became very uncertain, amounting almost to the exclusion of these materials from rail transportation. Funds for highway work were curtailed and many important projects could not be undertaken, due to the restrictions placed on the issuance of bonds or other certificates of indebtedness. Heavy demands were made on the working forces, for men to fill up the ranks of the army, and for war workers. The labor market became well-nigh impossible.

The highway builder accepted these restrictions and limitations in a patriotic spirit. He did the best he could under the circumstances

to provide the public with usable roads, feeling that in doing so he was making some contribution toward the winning of the war.

Then came the cessation of hostilities. The war had forcibly impressed on the minds of all, the necessity for better highway transportation facilities. Funds were made available. Government restrictions on highway work were released. Men were rapidly being discharged from the army. The highway builder looked forward to the year of 1919 with hope, a sense of relief, and a keen anticipation of a return to normal conditions. But the normal conditions did not return. The men discharged from the army failed to relieve the labor situation. Rail transportation became even more difficult and uncertain. Materials were hard to get. Weather conditions were very unfavorable, due to long continued wet weather in the spring and again in the fall. The construction program fell far short of accomplishment. Not a state in the Union completed all the work it had outlined. In many states, not only twenty per cent of the program was finished. The disappointment of the road builder was most keen. He found himself with authority to build roads, and with funds from which to make payments, but still unable to produce the finished product in anything like the quantity desired.

The conditions in Iowa were very much the same as in other states, but now that the season is over and can be reviewed in its entirety, it is apparent that much has been accomplished. The year of 1919 will long be remembered in Iowa highway history as the year of greatest achievement in highway matters, the year when the state embarked on a real program of modern highway building. The Primary Road Law passed by the Thirty-eighth General Assembly, would in itself have put the state in the forefront of the good roads movement. In addition to the Primary Road Law, there was enacted a Secondary Road Law, under the provisions of which any secondary road may be surfaced in a manner suited to the traffic requirements. Under the Primary Road Law, a program of highway construction and a system of highway maintenance second to none, has been inaugurated. A Primary Road System of about 6400 miles has been established, connecting every county seat and every market place in the state having a population of one thousand or more. Definite projects have been outlined for the improvement of 1536 miles, or approximately one-fourth of this system. Surveys have been made on about 1100 miles or approximately one-sixth of this system. Twenty-six counties have voted favorably on the hard surfacing of their primary road systems, thereby authorizing the

construction of 1700 miles of pavement. Thirteen counties have voted favorably on the issuance of a total of \$18,475,000 in bonds for road construction. A broad permanent foundation has been laid, on which Iowa can with safety erect her future highway structure. This is of immeasurably greater consequence to the state than the construction accomplishments of any one year.

#### Counties Voting on Hard Surfacing.

The Primary Road Law provides that before the hard surfacing of the primary road system in any county can be started, such hard surfacing shall have been authorized by a vote of the people of that county. Thirty-six counties have voted on this proposition. Twenty-six counties voted favorably. Thirteen voted negatively.

The following counties voted for hard surfacing:

|             |           |
|-------------|-----------|
| Allamakee   | Johnson   |
| Benton      | Kossuth   |
| Black Hawk  | Linn      |
| Buchanan    | Lyon      |
| Cerro Gordo | Marshall  |
| Clay        | O'Brien   |
| Clinton     | Osceola   |
| Des Moines  | Palo Alto |
| Dickinson   | Plymouth  |
| Emmet       | Polk      |
| Floyd       | Scott     |
| Greene      | Sioux     |
| Hancock     | Woodbury  |

The following counties voted against hard surfacing:

|             |        |
|-------------|--------|
| Boone       | Lee    |
| Buena Vista | Louisa |
| Calhoun     | Sac    |
| Carroll     | Story  |
| Cherokee    | Tama   |
| Franklin    | Wright |
| Hardin      |        |

It is of interest to note that in the above thirty-nine counties, 136,523 votes were cast. Of this number, 77,355 votes were for hard surfacing, and 59,168 were against hard surfacing. In the thirty-nine counties, there was a net majority of 18,187 in favor of hard surfacing.

**Counties Voting for Bond Issues.**

Twenty-two counties voted on the proposition of issuing bonds for improving the primary road system. In thirteen counties the proposition carried, thereby authorizing the issuance of \$18,475,000 worth of bonds. In nine counties the proposition lost.

The following counties approved the issuance of bonds:

| County                                       | Amount of<br>Bonds Authorized |
|--|-------------------------------|
| Black Hawk .....                             | \$ 1,500,000                  |
| Clay .....                                   | 800,000                       |
| Clinton .....                                | 1,800,000                     |
| Cerro Gordo .....                            | 750,000                       |
| Floyd .....                                  | 1,000,000                     |
| Greene .....                                 | 1,000,000                     |
| Hancock .....                                | 1,000,000                     |
| Kossuth .....                                | 1,500,000                     |
| Lyon .....                                   | 1,125,000                     |
| O'Brien .....                                | 1,500,000                     |
| Polk .....                                   | 2,000,000                     |
| Scott .....                                  | 2,000,000                     |
| Woodbury .....                               | 2,500,000                     |
| <b>Total Amount of Bonds Authorized.....</b> | <b>\$18,475,000</b>           |

The following counties disapproved the issuance of bonds:

| County             | Amount<br>Proposed |
|--------------------|--------------------|
| Allamakee .....    | \$ 500,000         |
| Boone .....        | 500,000            |
| Cherokee .....     | 800,000            |
| Carroll .....      | 1,000,000          |
| Louisa .....       | 1,500,000          |
| Palo Alto .....    | 750,000            |
| Story .....        | 1,000,000          |
| Tama .....         | 1,000,000          |
| Wright .....       | 1,000,000          |
| <b>Total .....</b> | <b>\$8,050,000</b> |

In the eighteen counties there were 75,401 votes cast on the question of issuing bonds. Of this amount, 41,908 votes were favorable, and 33,493 were unfavorable. The total majority in favor of the issuance of bonds was 8415.

**Men in Military Service.**

During the war, twenty-two men in the Commission's employ entered military service. All of these men have returned and are now in the Commission's employ except three, who of their own volition, have taken up employment elsewhere.

In expanding its forces this year, the Commission gave preference to former service men, other things being equal. In this way, many returning soldiers were given employment and the state benefited by the experience and seasoning these men received in the army.

**Bridge Surveys and Plans.**

Field surveys have been made for 1232 bridges and culverts. Plans have been prepared for 536 bridges and culverts, estimated to cost \$1,481,300. Plans have been approved for 307 bridges and culverts estimated to cost \$852,900. Shop drawings for eighty-six structures have been checked and approved. Fifty-eight new standard designs have been developed. In 1918, plans were prepared for 236 bridges, and plans for 163 bridges were checked and approved.

**Bridge and Material Contracts.**

Two hundred seventy-three bridge contracts, amounting to \$3,213,800 have been checked and approved. The amount for which such contracts were approved in 1918 was \$1,760,798, and in 1917 it was \$2,179,000. Thirty-five material contracts were approved.

**Railroad Crossing Work.**

Surveys were prepared for the improvement of fourteen railroad crossings. Plans were prepared for sixteen crossings. Ten crossing projects were completed.

**Road Projects Outlined.**

Ninety of the ninety-nine counties have outlined definite projects for the improvement of portions of the primary road system. These projects include 1536 miles of road, or about one-fourth of the whole primary road system.

**Federal Aid Projects Submitted to U. S. Bureau of Public Roads.**

Project statements have been submitted to the U. S. Bureau of Public Roads for fifty-six projects, involving the improvement of 899 miles of road, and estimated to cost \$8,919,357.

**Road Contracts Approved.**

Sixty-five road contracts, amounting to \$1,524,304 have been checked and approved. Twenty-eight of these contracts were for Federal Air work, and thirty-seven were for ordinary county road work.

**Changes in County Road Systems.**

The Commission investigated forty-seven requests for changes in the county road systems. Forty of these requests were approved, resulting in a net increase in the county road system, of ninety-two miles.

**Primary Road System.**

A primary road system, consisting of about 6400 miles was adopted, and numerous inspection trips were made to settle disputes or determine routes best suited for inclusion in this system. This system connects all county seats and all market centers having a population of one thousand or more.

**Road Surveys and Plans.**

Detailed surveys have been made for the improvement of 1093 miles of primary road. Plans have been prepared for 387 miles of such roads. Plans and specifications have been submitted to the U. S. Bureau of Public Roads for 262 miles of road, estimated to cost \$3,458,487.

County road plans, prepared by the county engineer, have been checked and approved for 321 miles.

**Road Construction.**

Nineteen Federal Aid projects were contracted or placed under construction. These projects contain 232 miles of road. In addition, work was done on two projects which were started in 1918. These projects include 73 miles of road. The above 305 miles of road include 4.85 miles of paving, 41.87 miles of graveling, and 257.94 miles of permanent grading.

The work completed consists of 4.34 miles of paving, 3.0 miles of gravel, and 140 miles of permanent grading.

**Government Equipment Received.**

War equipment valued at approximately \$721,709.00 has been received. This equipment consists of 228 motor trucks, twenty-nine Ford cars, thirteen tractors, two concrete mixers, three road graders, 130 tons spare parts for trucks, and a quantity of miscellaneous

equipment, tools, etc. It is expected that Iowa will receive a total of 600 motor trucks from the Government.

**State Institutional Roads.**

The work on state institutional roads consisted of tractor grading twenty miles, building three and one-fourth miles to finished grade, graveling one mile, and maintaining twenty-one miles under the patrol system.

**Road Maintenance.**

Ninety-four road complaints were investigated and adjusted. A Department of Road Maintenance was organized and an investigation made of the maintenance work and organization in Wisconsin and Minnesota. A bulletin outlining the maintenance work and organization for 1920 was prepared.

**District Engineers.**

The district engineering work was reorganized and the number of districts was increased from six to nine. District Engineers spent 1510 days in the field on road and bridge work. They have attended 209 road and bridge contract lettings, for work costing \$5,230,000, have attended 116 lettings for road and bridge materials, have supervised the making of the 1093 miles of primary road surveys, made reconnaissance surveys and estimates on the 1536 miles of road for which projects have been outlined, have supervised the taking of traffic census at 136 counting stations, and have given general supervision to the construction work on Federal Aid projects.

**Drainage Investigations.**

In co-operation with the U. S. Geological Survey and the State Geological Survey, the investigation of stream discharge has been continued. Twenty-five stream gauging stations, where water stages are measured at least once each day, are now in operation. At these stations, 164 actual measurements of the water flowing have been made. A study has been made of severe local floods which do not reach the gauging stations.

**Drainage and Sale of Lakebeds.**

Engineering assistance has been furnished the Executive Council in the drainage and sale of state lands included within the beds of Keokuk, Odessa, Swan, Elbow, and Goose Lakes.

**Fixing Surface Elevation of Lakes.**

A report was prepared and submitted to the Executive Council relative to fixing and controlling the elevation of the surface of Spirit Lake. Assistance has been rendered the Council in investigating complaints relative to the elevation of the surface of East and West Okoboji Lakes.

**Traffic Count.**

Actual counts have been made of the traffic at 136 counting stations. These counts show an average of 332 vehicles passing each station each day. Of this traffic, 89.7 per cent is motor driven, and 10 per cent is horse drawn.

**Materials and Tests.**

In preparation for the vast amount of investigation of material deposits and testing of materials necessary in connection with the enlarged road program, a Department of Materials and Tests was organized late in the fall of 1919. During the year, 341 samples of various materials were tested. In 1918, 67 of such samples were tested.

**Capitol Grounds Improvement.**

Engineering services and advice have been furnished the Executive Council and the Capitol Extension Engineer, in connection with the work on the Capitol grounds.

**Standard Specifications.**

The following standard specifications have been prepared:

- Highway Bridge and Culvert Construction,
- Concrete Road Construction,
- Bituminous Filled Brick Road Construction,
- Monolithic Brick Road Construction,
- Gravel Road Construction.

**Standard Plans.**

The following standard plans have been prepared:

- Concrete Box Culverts, from 2x2 feet to 12x12 feet (Twenty-four designs),
- Concrete Pipe Culverts,
- Wood Pile Abutment,
- Concrete Bridge Abutments,
- Cross Sections for Gravel Roads.

**Bulletin on Primary and Secondary Road Laws.**

Pursuant to the provisions of Section 57, Chapter 237, Laws of the Thirty-eighth General Assembly, a bulletin was issued, explain-

ing the primary and secondary road laws, and containing standard forms for use of county officers in operating under said laws.

**The Year of 1920.**

The year of 1920 should show a marked advancement in the amount of road construction accomplished. Contracts are now under way for 231 miles of road. Approximately 1200 miles additional have been surveyed and the plans are now prepared, or will be prepared ready for letting by spring. This mileage includes about 350 miles of paving, 230 miles of gravel, and the remainder is to be build to finished grade. Ample funds are available or will become available as follows:

|  |                        |
|--|------------------------|
| Primary road funds available December 1, 1919.....                                 | \$ 6,219,804.00        |
| Primary road funds to become available on or before July, 1, 1920 (estimated)..... | 9,881,000.00           |
| <b>Total</b> .....   | <b>16,100,804.00</b>   |
| Deduct Maintenance Fund (Estimated).....   | 1,500,000.00           |
| <b>Net Primary road funds available for Construction Work</b> .....                | <b>\$14,600,804.00</b> |

In addition to the above primary road funds that will be available, the counties have authorized the issuance of \$18,475,000 worth of bonds.

The amount of construction work that will be accomplished in 1920 is dependent, not on the amount of funds available nor on the amount of preliminary engineering work that can be accomplished, but is dependent on the contracting forces and material resources of the state, and the ability of the railroads to furnish the transportation facilities required. At present the contracting forces of the state are far too small to handle the work now outlined and surveyed. The available material resources are entirely inadequate to furnish the materials required. The railroads, if conditions are not vastly improved, will not be able to furnish half the transportation required. The Commission is endeavoring to improve conditions by interesting large contracting and material producing concerns in the work, and by developing local material supplies. It will take some time, however, to develop these forces and supplies, and no very great improvements need be expected until the present very uncertain condition shall have passed.

**Organization of the Commission.**

On December 1, 1918, there were sixty-two people on the Commission's force, exclusive of the Commissioners. There are now one hundred fifty-six people on the force.

The present organization of the Commission is as follows:

J. W. Holden, Chairman.

William Collinson.

Anson Marston.

Heads of departments are as follows:

Administrative department—F. R. White, Chief Engineer.

Accounting department—M. E. Davis, Assistant Auditor.

Department of Road Management—C. Coykendall, Engineer of Road Management.

Department of Road Surveys and Plans—W. E. Jones, Engineer of Road Surveys and Plans.

Department of Road Construction—F. H. Mann, Engineer of Road Construction.

Department of Road Maintenance—W. H. Root, Engineer of Road Maintenance.

Bridge department—J. H. Ames, Bridge Engineer.

Drainage department—R. W. Clyde, Drainage Engineer.

Department of Materials and Tests—R. W. Crum, Engineer of Materials and Tests.

Department of State Parks and Institutional Roads—Robert McCormick, Engineer State Parks and Institutional Roads.

Women's Drafting Department—Alda Wilson, Superintendent.

Information in regard to the nine districts, the personnel headquarters and territory included will be found under Chapter X.

**Chapter II. Recommended Legislation**

(Editor's Note—In view of the late date at which this report is being published, June, 1921, this chapter could be of little value except in a very comprehensive historical study of the development of Iowa road legislation. For such as may be interested the full text of this chapter is available in the official copies of this report on file in the office of the Governor and the State Highway Commission Headquarters in Ames.)

**Chapter III. Administrative Department****Organization.**

The Iowa Highway Commission was first established in 1904 under Chapter 105, Acts of the Thirtieth General Assembly, which constituted the Iowa State College as an institution, to act as a highway commission for the state. From 1904 until 1913, work was carried on under this law.

The Thirty-fifth General Assembly reorganized the entire system of road administration in the state and created a commission of three men, one of whom shall be the Dean of Engineering at the Iowa State College. The other two are appointed by the Governor, from opposite political parties. The term of the appointed members is four years. They each receive as compensation ten dollars per day, but not to exceed two thousand dollars in any one year. The Dean of Engineering receives no additional compensation for serving on the commission.

The Commission during 1919 consisted of J. W. Holden, of Scranton, Chairman; William Collinson, of Chariton, and Anson Marston, Dean of Engineering of the Iowa State College.

The Chief Engineer appointed by the Commissioners, is the chief executive of the organization, and is responsible for all details of organization and for the technical work of the department. From



April, 1913, to May, 1919, this position was held by Thomas H. McDonald. When he severed his connection with the Commission in April, 1919, F. R. White was appointed Chief Engineer.

Acts of the Thirty-eighth General Assembly of Iowa added to the duties of the Commission by creating a primary road system, providing funds for its improvement and maintenance, and placing the supervision of its construction and maintenance in the hands of the Commission. Upon the Administrative Department devolved the task of expanding the organization to meet the greatly increased volume of work created by the Federal Aid and Primary Road Laws. The work of the Commission as organized on December 1, 1919, is carried on under nine departments as follows:

Administrative Department,  
Accounting Department,  
Bridge Department,  
Department of Road Management,  
Department of Road Surveys and Plans,  
Department of Road Construction,  
Department of Road Maintenance,  
Department of Materials and Tests,  
Drainage Department.

#### Reorganization.

During the past year, the Commission was quite extensively reorganized. This reorganization was due in part to the changes in personnel which will ordinarily take place in an organization of this size, and in part to the large program of road work undertaken under the Federal Aid Road Law and the road laws of the Thirty-eighth General Assembly. A brief outline of the changes that have taken place follows:

#### Commissioners:

When the report was made a year ago, the Commission consisted of H. C. Beard, Mt. Ayr, Chairman; J. W. Holden, Scranton, and S. W. Beyer, Ames, Dean of Engineering, Iowa State College. Commissioner Beard resigned on January 1, 1919, to accept the position of Assistant District Attorney for the Southern Division of Iowa. Mr. William Collinson, of Chariton, was appointed to fill out Mr. Beard's term, which expired July 1, 1919. Mr. Collinson was then appointed for the four-year term, which expires July 1, 1923. The war being over, Lieutenant-Colonel Anson Marston returned to Ames and resumed his duties as Dean of the Engineering Division

of the College. In resuming his duties as Dean of Engineering, Mr. Marston also resumed his duties as a member of the Commission, thus succeeding Commissioner S. W. Beyer. Mr. Holden was made Chairman.

#### Chief Engineer:

In April, Mr. Thomas H. MacDonald resigned his position as Chief Engineer of the Commission, to accept the position as Chief of the United States Bureau of Public Roads. Mr. F. R. White, who has been with the Commission since 1911 (first as Field Engineer, and later as Road Engineer) was appointed Chief Engineer.

Mr. MacDonald had been with the Commission since 1904. To him is given the credit for building up the force from nothing to an organization capable of handling the manifold duties now devolving upon this Department.

#### Road Department:

Because of the appointment of Road Engineer White to the position of Chief Engineer, it was necessary to reorganize the Road Department. In view of the large amount of road work outlined under the Federal Aid Law and the Primary Road Law, the road work was divided among four departments as follows:

The Department of Road Management,  
The Department of Road Surveys and Plans,  
The Department of Road Construction,  
The Department of Road Maintenance.

Mr. C. Coykendall, formerly District Engineer, was recalled from Polk County, where he had been acting as County Engineer, and placed at the head of the Department of Road Management. This department handles the approval of road contracts, changes in the primary and county road systems, outlining of Federal Aid projects, the letting of contracts, and all other road administrative work.

Mr. W. E. Jones, who has been in charge of the approval of road plans prepared by the counties, was placed at the head of the Department of Road Surveys and Plans. This department has charge of all surveys and plans in connection with Federal Aid road work, and also has charge of the approval of all road plans prepared by the county engineers.

Mr. F. H. Mann, who has handled the road construction work, was placed at the head of the Department of Road Construction.

This department has charge of the construction work on Federal Aid projects, construction work on state institutional roads, and the receipt and distribution of surplus war machinery and equipment.

Mr. W. H. Root, District Engineer, was placed at the head of the Department of Road Maintenance. This department will have charge of the maintenance work on primary roads and will administer the Commission's general supervisory control over maintenance work on other roads.

#### Department of Materials and Tests:

The question of the source of supply and the quality of materials for hard surfaced road construction, is one of the most important problems to be solved in carrying out the provisions of the Federal Aid and Primary Road Laws. Every available source of materials should be investigated, tested, and a record kept of the results. It is only in this way that the whole material resources of the state can be utilized, and the most economical and best work can be secured. With this thought in mind, the testing work of the Commission was reorganized, and the Department of Materials and Tests was created. Mr. R. W. Crum, who has for many years had charge of the materials and testing work of the Iowa State College, was placed at the head of this department.

#### District Engineers:

In order to properly supervise the increased amount of work under the Federal Aid and Primary Road Laws, the number of district engineers was increased from six to nine. All work in each district, as well as all men employed on preliminary surveys and in superintending construction on Federal Aid road projects, were placed under the direct supervision of the district engineers. Each district office is supplied with room and equipment suitable for handling the preparation of plans for Federal Aid and Primary road work, and the necessary clerical work in connection with the work in that district. A regular office force is employed at the district office, on road plans, and in addition, the men employed on survey and construction parties during the summer, are employed in the district office during the winter, in the preparation of road plans. A detailed statement of the counties in each district, the names of the district engineers, and the location of the district offices, will be found in Chapter X.

#### Duties of the Commission.

Under the law of the Thirty-fifth General Assembly creating the Commission, it is given many duties to perform. These have been added to by the Thirty-sixth, Thirty-seventh, and Thirty-eighth General Assemblies. A statement of the principal duties follows:

- First: To devise and adopt plans of highway construction suited to the needs of the different counties of the state.
- Second: To disseminate information and instruction to road officers of the state.
- Third: To issue an annual report to the Governor, relative to the operations of the Commission.
- Fourth: To appoint such assistants as are necessary to carry on the work of the Commission.
- Fifth: To make investigations as to conditions of road and bridge work in the counties.
- Sixth: To have general supervision over the county and township officers.
- Seventh: To enforce the road laws.
- Eighth: To devise plans and conduct negotiations between railroad and local officials for the elimination of danger at railroad crossings.
- Ninth: To assist county boards of supervisors and the Attorney General in the defense of patent suits.
- Tenth: To have charge of the survey and administration of meandered lakes.
- Eleventh: To prepare plans and specifications for Federal Aid Road Projects.
- Twelfth: To supervise the construction and maintenance of the primary roads.
- Thirteenth: To check and approve or disapprove road and bridge contracts.
- Fourteenth: To select the primary road system and make necessary changes therein.
- Fifteenth: To review and pass on requests from county boards of supervisors for changes in or additions to the county road systems.

#### Sixth Annual Road Conference.

The Commission held its sixth annual road conference of county engineers and supervisors at Ames, on March 4th, 5th, and 6th, 1919. These annual conferences were first instituted for the county engi-

neers and employees of the Commission, but in recent years they have been quite largely attended by the county supervisors, many of whom have taken an active part in the general discussions.

The meeting in 1919 was attended by seventy-seven county engineers, fifteen assistant county engineers, one hundred forty-five supervisors, one county auditor, and one township trustee.

#### County Engineers.

There were a number of changes in the office of county engineer in several counties, but the close of the war saw many former county engineers back in their old positions. It is gratifying to note that twenty-five of the county engineers have held their positions since the office of county engineer was established in 1913, and that appreciation of their services has been shown by material increases in salaries by the boards of supervisors. In most of these counties the boards of supervisors have completely changed since 1913, yet there has been no thought of changing engineers. Instances such as these lend confidence in the freedom of the work from political influences, and promises well for the future.

No county engineers were removed from office by the Commission during 1919, but the Board of Supervisors of Jones County was requested to make other arrangements for their engineering work for 1920.

#### Appointments of Commissioners.

During the year, fifty-one formal Commission meetings were held, of which forty-seven were attended by Commissioner Holden, thirty-two by Commissioner Collison, thirty-six by Commissioner Marston, two by Commissioner Beyer, and one by Commissioner Beard. During 1918, the Commission held thirty-two formal meetings.

The Commissioners spent a total of 162 days on inspection trips in the several counties, and in conferring with county boards of supervisors, and county engineers, township trustees, and other road officers. Employees of the Administrative Department spent a total of 263 days on assignments outside the general office.

#### Official Communications.

During the year, the following official communications were sent to the county officials:

No. 45—to County Boards of Supervisors, County Auditors, County Engineers, and County Treasurers, regarding overdrafts in the motor vehicle road fund.

No. 46—to County Boards of Supervisors, County Engineers and County Auditors, regarding registration of motor vehicles owned by the state or counties.

#### Contract Approval.

All contracts approved are entered on the minutes of the Commission. During 1919, bridge and material contracts were approved by the Commission as follows:

|   |             |           |
|---|-------------|-----------|
| Federal Aid Roads.....  | 28          | contracts |
| County roads.....   | 37          | "         |
| Bridge .....  | 237         | "         |
| Material .....  | 26          | "         |
| <hr/>   |             |           |
| Total number of contracts.....  | 328         |           |
| Total value of the work included in the road<br>and bridge contracts..... | \$4,738,200 |           |

Sixteen road and bridge contracts for work costing approximately \$400,000, were disapproved.

#### Accounting.

During 1919, it became necessary to materially increase the force in the accounting department. Although all expenditures by the Commission are made through the Auditor and Treasurer of State, the bills are first carefully checked in the Commission's office, and approved by the Commissioners. A detailed and classified record of all expenditures made under the supervision of the Commission, is kept in the Commission's office. The law requires that the Commission shall audit all bills for the construction and maintenance of the primary road system, and shall annually report its expenditures in detail.

#### Publications.

During the year, nine issues of the regular Service Bulletin, were published. The following publications were issued:

The Primary and Secondary Road Laws of Iowa,  
Standard Specifications for Tile Underdrains,  
Standard Specifications for Federal Aid Road Work,  
(General Clauses and Earth Roads)  
Standard Specifications for Highway Bridges,  
Standard Specifications for State Institutional Roads,  
(General Clauses and Earth Roads)  
Standard Plans for High Riveted Truss Spans,  
Standard Plans for Timber Trestle Bridges,  
Standard Plans for Wood Pile Abutments,  
Standard Plans for Timber Truss Bridges,

Advance Sheets, New Standard Box Culvert Designs,  
Field Manual for Bridge and Culvert Surveys,  
Field Manual for Federal and State Aid Road Work,  
Field Manual for Concrete Inspectors.  
Maintenance Manual.

#### Designation of Primary Road System.

The Commission completed the designation of the primary road system as directed by law. In many instances, the selection of the most desirable route involved the inspection of various roads, and numerous conferences and public hearings. The selection of the primary roads was in itself a task which occupied a large part of the time of the Commissioners, the Chief Engineer, the Engineer of Road Administration, and the several district engineers.

The total length of the primary road system as finally designated, is approximately 6400 miles. The total length of the secondary roads in Iowa is approximately 98000 miles.

It is of interest to note that 91.5 per cent of the town and city population of the state is in towns and cities connected by the roads included in the primary system. Fifty-eight per cent of the rural population of the state is located within a maximum distance of three miles of the primary road system. Seventy-six per cent of the total population of the state is located along the roads included in the primary system, or within a maximum distance of three miles thereof.

#### Modifications in the County Road System.

The statutes provide that the county road system may be altered or added to:

1. To eliminate dangerous crossings,
2. To eliminate dangerous curves,
3. To materially decrease the cost of construction.
4. To materially decrease the cost of maintenance.
5. Whenever all the roads of the county systems have been improved according to the plans provided therefor.
6. To shorten the distance between market centers.

During the year ended December 1, 1919, forty-seven requests from thirty-six counties were made for modifications in the county road system. After investigation, the Commission approved forty of these requests, adding 132.47 miles to the county system, and removing 40.12 miles, making a net increase of 92.35 miles. A more detailed report of county road changes will be found in Chapter VI.

#### State Fair Exhibit.

Several years ago, at the request of the State Board of Agriculture, the Commission caused to be constructed on the State Fair

grounds, several models of road and bridge construction. These models have been shown from year to year with added features of interest to the general public. In 1919, the models of hard surfaced roads were revised and a more comprehensive exhibit was shown. The entire exhibit was examined by a large number of people.

#### Registration of Highway Routes.

In 1919, five routes were registered with the State Highway Commission as provided under Section 1527-s22, Supplement to the Code 1913. A complete list of the registered highways is given below. Numbers 43 to 47, inclusive, were registered during the year ended December 1, 1919:

| Number | Name of Route                               | Date Registered |
|--------|---|-----------------|
| 1      | Great White Way.....                        | July 30, 1914   |
| 2      | Green Crescent.....                         | July 30, 1914   |
| 3      | Center Point Motor Club.....                | Sept. 1, 1914   |
| 4      | Red Ball Route.....                         | Jan. 2, 1915    |
| 5      | King's Highway.....                         | June 28, 1915   |
| 6      | Southwest Trails.....                       | June 28, 1915   |
| 7      | Waubonsie Trail.....                        | April 3, 1916   |
| 8      | Chariton & Leon Short Line.....             | April 3, 1916   |
| 9      | John D. Parmalee Trail.....                 | April 3, 1916   |
| 10     | Capitol Highway.....                        | June 9, 1916    |
| 11     | Red Line.....                               | June 9, 1916    |
| 12     | Farmers Highway.....                        | June 9, 1916    |
| 13     | Black Hawk Trail.....                       | Sept. 25, 1916  |
| 14     | Jefferson Highway.....                      | Sept. 25, 1916  |
| 15     | Hamlin Short Route.....                     | Sept. 25, 1916  |
| 16     | Hawkeye Cut-Off.....                        | Sept. 25, 1916  |
| 17     | Black Diamond Trail.....                    | Sept. 25, 1916  |
| 18     | Lincoln Highway (Iowa Division).....        | Dec. 9, 1916    |
| 19     | Daniel Boone Trail.....                     | Dec. 22, 1916   |
| 20     | Perry Pike.....                             | Dec. 22, 1916   |
| 21     | Diamond Trail.....                          | Dec. 22, 1916   |
| 22     | Red X Route.....                            | Dec. 22, 1916   |
| 23     | Okoboji Trail.....                          | Mar. 23, 1917   |
| 24     | Cedar Rapids, Ottumwa & McGregor Trail..... | Mar. 23, 1917   |
| 25     | Tourist Trail.....                          | Mar. 23, 1917   |
| 26     | Grand Line.....                             | Mar. 23, 1917   |
| 27     | Washington Highway.....                     | Mar. 23, 1917   |
| 28     | Lineville-Indianola Short Line.....         | Mar. 23, 1917   |
| 29     | Blue J Highway.....                         | Mar. 23, 1917   |
| 30     | Hawkeye Highway.....                        | June 29, 1917   |
| 31     | Star Route.....                             | Dec. 1, 1917    |
| 32     | Burlington Way.....                         | Dec. 1, 1917    |
| 33     | Iowa Blue Grass Route.....                  | Dec. 1, 1917    |
| 34     | Denison-Sioux City Cut-Off.....             | Dec. 1, 1917    |
| 35     | Imperial Highway.....                       | Jan. 4, 1918    |
| 36     | Lincoln Hawkeye Pike.....                   | Jan. 22, 1918   |
| 37     | Muscatine-Des Moines Short Line.....        | Mar. 18, 1918   |
| 38     | River to River Route.....                   | April 16, 1918  |
| 39     | Everett Powers Highway.....                 | July 20, 1918   |
| 40     | Wilson Highway.....                         | Sept. 13, 1918  |
| 41     | Woodward-Ogden Cut-Off.....                 | Dec. 4, 1918    |
| 42     | Diagonal Trail.....                         | Dec. 4, 1918    |
| 43     | Pershing Way.....                           | Aug. 14, 1919   |
| 44     | Golden Red Hi-Way.....                      | Oct. 23, 1919   |
| 45     | Rainbow Trail.....                          | Oct. 23, 1919   |
| 46     | Custer Battlefield Highway.....             | Dec. 23, 1919   |
| 47     | M. C. Trail.....                            | Dec. 6, 1919    |

**Conference With State Railroad Commission.**

The Highway Commission is very desirous of eliminating danger at railroad crossings wherever possible. No railroad grade crossing can be called a "safe crossing" no matter how unobstructed the view may be. Neither is the victim who drives his car in front of a moving train, wholly to blame. The greater portion of the blame rests with the public, if adequate laws have not been provided for the elimination of such dangers, or with the road officers, if they have not exercised their full power under the law for the elimination of such danger.

With the thought of improving the work on railroad crossings, the State Railroad Commission and the State Highway Commission held a conference in Des Moines on July 29th, at which time the question of crossing improvements and laws relating thereto were carefully discussed. The conference resulted in a better understanding of the crossing problem by the two commissions, and may result in joint recommendations for crossing legislation.

**Conference With Gravel Producers.**

One of the principal problems to be solved in building a system of hard surfaced roads, is the question of materials. For this reason a conference was held on July 18th, with the Specifications Committee of the Iowa Gravel Producers' Association. Many helpful suggestions were secured. It is anticipated that such conferences will be held from time to time in the future.

## Chapter IV. Bridge Department

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During the period of one year as covered by this report the bridge department prepared detailed plans for 536 bridges and culverts located in sixty-one counties and estimated to cost \$1,481,300.00; approved 307 designs submitted from forty-four counties and estimated to cost \$852,900.00; checked and approved eighty-six detailed shop drawings for steel structures from forty-two counties and estimated to cost \$294,491.00; made field surveys for bridge and culvert notes for 1,232 structures in thirty-three counties; checked for approval 273 contracts totaling \$3,213,800.00 from seventy-nine counties; approved thirty-five material contracts from sixteen counties; developed fifty-eight new standard designs for bridges and culverts and made twenty-three special inspection trips to eighteen counties.

The district engineers representing the bridge department have attended 145 bridge lettings in eighty-one counties on advertised work totaling \$3,216,130.08; attended 116 material lettings in eighty-three counties; spent ninety-five days in examining bridge sites; spent 163 days in supervising and inspecting bridge work and spent two days in certifying to emergency bridge work.

In addition to the above, this department has handled all of the office and field work on the preparation and checking of plans and estimates of cost for railroad crossing improvements and attended a number of conferences on this work. A more detailed statement of the railroad crossing work appears in Chapter V.

The tabulation following shows the summary and comparative statements of the detailed work of this department during the past three years exclusive of the work done on railroad crossing improvements.

SUMMARY AND COMPARATIVE STATEMENT OF THE DETAILED  
WORK OF THE BRIDGE DEPARTMENT ON BRIDGES  
AND CULVERTS, 1917, 1918, 1919.

|                                |                                      | 1917        | 1918        | 1919         |
|--------------------------------|--------------------------------------|-------------|-------------|--------------|
| Bridge designs.....            | No. of designs.....                  | 343         | 236         | 536          |
|                                | No. of counties.....                 | 72          | 58          | 61           |
|                                | Estimated value.....                 | \$1,441,000 | \$1,298,500 | \$ 1,481,300 |
| Approval of bridge plans.....  | No. approved.....                    | 113         | 163         | 307          |
|                                | No. of counties.....                 | 30          | 36          | 44           |
|                                | Estimated value.....                 | \$ 413,500  | \$ 634,000  | \$ 852,900   |
| Approval of shop drawings..... | No. approved.....                    | 154         | 79          | 86           |
|                                | No. of counties.....                 | 56          | 41          | 42           |
|                                | Estimated value of steel.....        | \$ 355,000  | \$ 184,000  | \$ 294,451   |
| Approval of bridge contracts.. | No. approved.....                    | 197         | 159         | 228          |
|                                | No. of counties.....                 | 76          | 68          | 79           |
|                                | Total am't approved.....             | \$2,128,000 | \$1,589,746 | \$ 2,879,205 |
| Approval of material contracts | No. approved.....                    | 49          | 56          | 35           |
|                                | No. of counties.....                 | 30          | 36          | 16           |
|                                | No. lettings.....                    | 120         | 103         | 145          |
| Bridge lettings attended.....  | No. bridges.....                     | 2,359       | 1,714       | 2,234        |
|                                | Estimated amount<br>bridge work..... | \$2,631,000 | \$2,226,433 | \$ 3,216,130 |
|                                | No. bridges and<br>culverts.....     | -----       | -----       | 1,232        |
| Field surveys made.....        | No. of counties.....                 | -----       | -----       | 33           |
|                                | No. attended.....                    | 80          | 75          | 116          |
|                                | Number made.....                     | 68          | 103         | 23           |

Since the present highway law became effective in April, 1913, the engineers of the bridge department have designed, checked or approved 5,084 detailed individual plans for specific bridges with a total estimated cost above \$13,800,000.00; checked and reported for approval 1,161 bridge contracts with a total contract price of \$11,224.00; prepared detailed railroad crossing plans on work estimated at \$240,800.00; approved 247 material contracts; attended 647 bridge lettings for work estimated to cost \$12,072,000 and attended 434 material lettings.

#### Bridge Designs for Specific Locations.

The Commission each year is called upon by the counties to prepare designs for bridges and culverts in specific locations. These designs are prepared in the bridge department from notes either furnished by the county engineer or secured by the engineers of the bridge department and district engineers in co-operation with the county engineers. The plans so prepared are furnished to the counties without cost.

Ouring the past year the bridge department has prepared 536 designs for individual locations from notes sent in by the county engineers and those secured by engineers of the Commission. The total estimated cost of the bridges and culverts designed during 1919 by the Commission is \$1,481,300.

Since the present road law went into effect in April, 1913, the bridge department has prepared 2,875 designs for specific locations which are estimated to cost \$8,650,800.00. The average estimated cost of structures designed by the Commission during the past five years is as follows:

|           |         |
|-----------|---------|
| 1915..... | \$2,580 |
| 1916..... | 3,200   |
| 1917..... | 4,200   |
| 1918..... | 5,500   |
| 1919..... | 2,760   |

The bridge department has completed the design of several bridges of importance during the past year. Among these are the following:

A 200'x18' through riveted truss span on concrete abutments over Little River in section 19, Eden township, Decatur county, contract price \$32,091.00.

A three span concrete arch bridge over the Des Moines River in the City of Humboldt in Humboldt county. The bridge consists of 2-75' and 1-80' arch spans carrying a 20' roadway and sidewalk. The contract price for this bridge was \$27,988.00.

A 175'x18' through riveted truss span on concrete piers with 2-30' I-beam approach spans on concrete abutments. This bridge is located over the Turkey River in section 9, Millville township, Clayton county, contract price \$32,900.00.

Revised plans were made for a bridge over the Maquoketa River in the City of Manchester, Delaware county, which consists of 2-80' concrete arch spans with a 33' roadway and two sidewalks. Estimated cost \$42,000.00.

Plans were completed for a reinforced concrete cantilever girder bridge over Squaw Creek in the City of Ames in Story county. This bridge consists of five cantilever girder spans totaling 200 ft. in length. The estimated cost is \$37,000.00. Alternate plans for a steel girder bridge with a concrete deck are in the course of preparation as an alternate design for the one mentioned above.

Attention might well be called to the growing demand for bridges of a more permanent nature. This is particularly true of the larger bridges, the culverts and all structures located on important roads. The Commission is seldom requested to prepare a design for an important bridge or a structure on an important highway in which other than construction materials of a permanent nature are used. This growing tendency to replace the lighter and unsafe structures with permanent construction whenever practical is to be commended and will ultimately result in a substantial decrease in the annual expenditures for maintenance and repairs.

Schedule one gives a detailed statement of the bridge designs for specific locations as prepared by the bridge department in 1919.

#### Bridge Work on Federal Aid Projects.

The large mileage of roads included in federal aid and primary road projects for construction to permanent grade has necessitated the reconstruction and renewal of many bridges and culverts on such roads. It is the policy of the Commission to recommend the replacement of all bridges and culverts of a temporary character on these projects and particularly on those brought to grade preparatory to hard surfacing.

In order to facilitate the work of preparing plans for the new structures required the Commission has extended to the counties engineering service in securing the field information required to prepare the designs and in many cases to the preparation of the plans themselves. During the past year the bridge department has secured the field information or checked the field notes on 125 bridges and 1,107 culverts, a total of 1,232 structures, which are practically all located upon federal aid projects.

#### Approval and Analysis of Designs Submitted.

One of the important duties of the Commission is to check and analyze designs for structures submitted for approval under the standard specifications of the Commission. The work necessary to check and approve an individual design submitted depends largely upon the type of structure, its importance and the completeness and accuracy with which the plans have been prepared. Many of the more important structures require in addition to an actual computation of the stresses, a detailed study of the location the waterway opening provided the roadway requirements and many other features of the design. Often the mathematical calculations alone will require the work of a designer for several days or perhaps weeks. On steel bridges the Commission not only checks the original drawings but in addition checks in detail the shop or working drawings prepared by the fabricating shop. Copies of these approved shop drawings are furnished to the county engineers for the purpose of checking the material when delivered in the field.

During the past year the bridge department has checked the individual plans for 307 structures as submitted by county engineers or private engineers and in addition has approved the detailed shop drawings for eighty-six structures estimated to cost \$294,490.00. A detailed record of the approval of individual plans and shop draw-

ings is kept in the Commission's office but is not included in this report. Since April, 1913, the bridge department has checked 1,665 designs, the cost of which was estimated at \$3,520,000.00. During the same period of time and in addition to the above a total of 623 shop drawings was checked on work estimated to cost \$1,788,500.00.

#### Standard Plans.

The bridge department has during the past year prepared and issued a complete revision of the standard box culvert plans. The new series embodies many features of design not found in the old standards. The drawings have been prepared to give as much detailed information as possible for the preparation of plans for specific locations. The new series of box culverts consists of twenty-eight separate drawings for culverts from 2 ft. to 12 ft. span and for various heights of fill. They have been prepared in lithograph form for distribution among the counties.

A complete revision of the reinforced concrete through girder standards has been made and the new set of standard plans consisting of twenty-six sheets will soon be available for distribution in lithograph form. The new series provide for span lengths from 24 ft. to 42 ft. and for 18 ft. and 20 ft. roadways.

The following is a complete list of the standard bridge and culvert plans which have been issued by the Commission and are in effect January 1, 1920:

- Series C—Concrete box culverts for spans from 2 ft. to 12 ft., 24 sheets of designs, C-1 to C-24 inclusive and 4 sheets of typical designs TC-1 to TC-4 inclusive. Dated June, 1919.
- Series D—Circular concrete culverts from 18 inch to 42 inch diameter. Four sheets of designs and four sheets of estimates, D-1 to D-8 inclusive. Dated 1914.
- Series E—Metal culverts. One sheet E-1. Dated 1914.
- Series F—Concrete pipe culverts. F-1 concrete pipe culverts. Dated 1914. F-2 alternate design for pipe culverts. Dated 1919.
- Series G—Timber and steel construction. Three sheets of designs.
  - G-1. Pile trestle. Revised December, 1918.
  - G-2. Pile abutments for short pony truss spans, 18 ft. roadway. Dated January 1, 1917.
  - G-3. Pile abutments for long steel spans, 16 ft. roadway. Dated January, 1919.
  - G-3a. Pile abutment for long steel spans, 18 ft. roadway. Dated January, 1919.
  - G-4. Timber substructures for wood trusses. Dated December, 1918.
  - G-5 to G-10 inclusive. Six sheets timber trusses, spans 30 ft., 34 ft., 38 ft., 45 ft., 51 ft. and 57 ft., 16 ft. roadways. Dated December, 1918.

- Series H—Concrete deck girder bridges for spans from 24 ft. to 40 ft. inclusive. Two design sheets H-1. Dated November, 1915. Series C, J and H are published together in booklet form.
- Series I—Concrete through girder bridges for spans from 24 ft. to 42 ft. inclusive with 18 ft. and 20 ft. roadways. Twenty sheets.
- Series J—Concrete slab bridges for spans from 14 ft. to 24 ft. inclusive. One design sheet J-1. Dated November, 1915.
- Series K—Concrete bridge abutments. Five designs of two sheets each, dated November, 1917, and one design of two sheets dated May, 1919.
- K-1. Abutments for steel truss spans. Heights 10 ft. to 19 ft. inclusive.
- K-2. Abutments for steel truss spans. Heights 20 ft. to 30 ft. inclusive.
- K-3. Abutments for I-beam bridges. Heights 10 ft. to 24 ft. inclusive.
- K-4. Abutments for slab bridges. Heights 10 ft. to 19 ft. inclusive.
- K-5. Abutments for deck girder bridges. Heights 12 ft. to 24 ft. inclusive.
- K-1 to K-5 inclusive published in booklet form.
- K-6. Abutments for through girders. Heights 12 ft. to 24 ft. inclusive. Published in blue print form.
- Series M—Concrete bridge piers. One design sheet M-1. Dated July, 1916.
- Series T—Riveted high trusses with concrete floors on steel joists for spans from 90 ft. to 150 ft. inclusive and for both 16 ft. and 18 ft. roadways. 14 designs T-1 to T-14 inclusive. Published in booklet form.
- Series V—I-Beam spans. Four sheets of designs. V-1 beam spans with concrete floor and angle railing. Dated January, 1915.
- V-2. Beam spans with wood floor and pile abutments. Dated January 15, 1917. Supersedes and renders void design V-2, dated September 1, 1915, and printed in booklet of designs for beam spans and X series pony trusses.
- V-3. Beam spans with concrete floor and concrete railing. Dated September 15, 1915.
- V-4. Beam spans with concrete floor and gas pipe railing. Dated September 15, 1915. Series X and V are published together in booklet form.
- Series X—Riveted pony trusses with concrete floors and without joists for spans from 35 ft. to 100 ft. inclusive and for both 16 ft. and 18 ft. roadways. 28 designs X-1 to X-28 inclusive.
- Series Y—Riveted pony trusses with concrete floors on steel joists for spans from 40 ft. to 85 ft. inclusive and for both 16 ft. and 18 ft. roadways. 20 designs Y-1 to Y-20 inclusive. Published in booklet form.

### Standard Specifications.

During 1919 the standard specifications for highway bridge and culvert construction were completely revised and many important changes made. The new specifications were distributed among the counties early in the year. The list of standard specifications issued by the Commission for bridge and culvert work and for materials which are in effect January 1, 1920, are as follows:

- Highway Bridge and Culvert Construction (Series 1919)
- Reinforcing Steel (Series 1914 revised 1917)
- Corrugated Metal Culvert Pipe (Series 1918)
- Bridge Lumber and Piling (Revised Series 1918)

Some revision of the standard specifications on reinforcing steel will be made in 1920 and a new set of specifications issued.

### Trips by Members of the Bridge Department.

Inspection of work under construction as well as examination of existing structures, shop inspection of fabricated material, and preliminary examination of bridge sites necessitated a number of trips by members of the bridge department. Most of the special bridge problems of the counties are handled through the district engineers' offices but occasionally problems are presented which require special attention by an engineer from the central office. The total number of special inspection trips made by members of the bridge department for the past five years are as follows: 1915, 73; 1916, 79; 1917, 68; 1918, 103; 1919, 23.

### Approval of Contracts on Bridge Work.

The Commission is required by statute to approve all contracts for bridges and culverts costing over \$2,000 and all private contracts in amounts of \$1,000 or more. These contracts as awarded by the boards of supervisors are submitted to the Commission and must be approved before they are valid as contracts. The work of the approval of contracts for bridge work is one of the important duties of the Commission. During 1919 a total of 241 contracts for bridge work was submitted for approval. Two hundred and twenty-eight contracts were approved for work costing \$2,879,205.00. Thirteen contracts were rejected for work costing \$260,124.00. The tabulation below gives the summary and comparative statement of the bridge contracts submitted for approval from April, 1913, to December 1, 1919:



## BRIDGE CONTRACTS SUBMITTED FOR APPROVAL.

| Date of Report                     | Approved     | Average contract amt. | Total amt. approved    |
|------------------------------------|--------------|-----------------------|------------------------|
| Apr. 1, 1913, to Dec. 1, 1913..... | 53           |                       | \$ 344,182.24          |
| Dec. 1, 1913, to Nov. 1, 1914..... | 121          | \$ 7,774.00           | 731,205.38             |
| Nov. 1, 1914, to Dec. 1, 1915..... | 172          | 7,830.00              | 1,337,060.15           |
| Dec. 1, 1915, to Dec. 1, 1916..... | 208          | 9,950.00              | 2,043,393.47           |
| Dec. 1, 1916, to Dec. 1, 1917..... | 197          | 10,803.00             | 2,128,238.53           |
| Dec. 1, 1917, to Dec. 1, 1918..... | 159          | 10,735.00             | 1,700,797.85           |
| Dec. 1, 1918, to Dec. 1, 1919..... | 228          | 12,628.00             | 2,879,205.68           |
| <b>Total.....</b>                  | <b>1,138</b> |                       | <b>\$11,224,072.50</b> |

Since April, 1913, the Commission has approved 1,138 contracts for bridges and culverts with a total contract price of \$11,224,072.50.

Standard forms of contracts are prepared by the Commission and where the contracts submitted are on the standard form and the proceedings relative to the award made in the proper manner the time required for approval by the Commission is short. During 1919 eighty-three per cent of the contracts submitted for approval was approved by the Commission in less than four days from date of receipt. Seventeen per cent was retained for investigation or for correction and the average time required for approval was eighteen days. The average time required on all contracts was seven days.

Schedule Two shows in detail the contracts which were submitted for approval during the period from December 1, 1918, to December 1, 1919.

#### Approval of Material Contracts.

Although the approval by the Commission of material contracts awarded on the basis of bids received at a public letting is not required by law yet many of the counties voluntarily submit such contracts for review. When such contracts are properly made out on the standard forms supplied for this purpose the time required for approval is very short. During the period covered by this report a total of thirty-five material contracts were submitted for approval. A detailed statement of each of such contracts will be found under Schedule Three.

#### General Field Work in Connection With Bridge Department.

Much of the detailed field work of the Commission relating to bridges is handled by the district engineers. This work consists of assistance given at the request of the counties in determining the type and character of drainage structures, certification of emergency

work, inspecting work under construction, preliminary work on large bridge projects, adjustments of differences arising between the counties and contractors over interpretation of the specifications and contracts, and giving general advice pertaining to bridge and culvert work and the materials of construction.

During the period covered by this report the district engineers spent a total of ninety-five days in examining bridge sites, 128 days in attending bridge lettings, eighty-two days in attending material lettings, 163 days in supervising and inspecting bridge and culvert work and two days on the examination and certification of emergency bridge work.

#### Bridge and Material Lettings.

During 1919 the total estimated cost of bridge and culvert work included in lettings attended was \$3,216,130.00, which is an increase of \$989,697.00 over 1918. The records kept by the Commission on lettings attended are very complete and cover in detail the letting data on the 2,234 structures included in lettings attended during the past year. The total number of days spent in attending bridge lettings during 1919 was 128 and the total days spent in attending material lettings was 82.

#### Bridge Construction Work During 1919.

In the past year construction costs have increased materially as have the costs of almost everything else. Labor was scarce and inefficient. Materials were hard to get. Rail transportation was very unreliable. Both the contractors and the county forces were handicapped by their inability to secure sufficient labor to properly carry on their work. Delays in shipments of materials seriously impeded the progress of construction. Even with these unfavorable conditions the actual amount of work done will compare quite favorably with the amount of work accomplished in any previous year.

AVERAGE PRICE PAID FOR CORRUGATED CULVERTS IN  
1917, 1918 AND 1919.

| Diameter | Class | Price per lin. ft. Less Car Lots—F. O. B. County |      |                |      |                |      |
|----------|-------|--|------|----------------|------|----------------|------|
|          |       | 1917   |      | 1918           |      | 1919           |      |
|          |       | Range in price                                   | Avg. | Range in price | Avg. | Range in price | Avg. |
| 12 in.   | A     | \$ .75 to \$ .85                                 | .80  | \$.75 to \$.90 | .825 | \$.72 to \$.90 | .79  |
| 12 in.   | A     | 1.19 to 1.27                                     | 1.23 | 1.25 to 1.35   | 1.31 | 1.28 to 1.28   | 1.19 |
| 15 in.   | A     | 1.40 to 1.50                                     | 1.44 | 1.50 to 1.70   | 1.57 | 1.30 to 1.55   | 1.41 |
| 18 in.   | A     | 1.85 to 1.97                                     | 1.91 | 1.90 to 2.25   | 2.08 | 1.75 to 2.10   | 1.93 |
| 24 in.   | A     | 2.10 to 2.40                                     | 2.25 | 2.25 to 2.75   | 2.50 | 3.30 to 4.20   | 3.50 |
| 30 in.   | A     | 2.80 to 4.00                                     | 3.50 | 3.90 to 4.35   | 4.20 | 5.80 to 6.15   | 6.00 |
| 36 in.   | A     | 3.80 to 4.50                                     | 4.15 | 4.50 to 5.00   | 4.75 | 6.50 to 8.00   | 7.25 |
| 12 in.   | B     | .70 to .75                                       | .73  | .70 to .80     | .75  | .65 to .80     | .71  |
| 15 in.   | B     | 1.08 to 1.15                                     | 1.11 | 1.18 to 1.25   | 1.21 | .96 to 1.20    | 1.07 |
| 18 in.   | B     | 1.35 to 1.35                                     | 1.30 | 1.38 to 1.48   | 1.43 | 1.25 to 1.45   | 1.33 |
| 24 in.   | B     | 1.85 to 1.85                                     | 1.80 | 1.80 to 2.00   | 1.90 | 1.55 to 1.95   | 1.87 |
| 30 in.   | B     | 1.70 to 1.80                                     | 1.75 | 1.80 to 2.00   | 1.90 | 2.50 to 3.25   | 2.78 |
| 36 in.   | B     | 2.80 to 3.10                                     | 2.95 | 3.00 to 3.30   | 3.15 | 3.50 to 4.00   | 3.80 |
| 36 in.   | B     | 3.80 to 3.70                                     | 3.58 | 3.80 to 3.90   | 3.75 | 3.75 to 3.50   | 3.60 |

AVERAGE PRICE PAID FOR REINFORCING STEEL IN  
1917, 1918 AND 1919.

| Description                  | Price per Cwt. Stock Lengths, C. L.—F. O. B. County |         |                    |         |                    |         |
|------------------------------|---|---------|--------------------|---------|--------------------|---------|
|                              | 1917  |         | 1918               |         | 1919               |         |
|                              | Range in price                                      | Avg.    | Range in price     | Avg.    | Range in price     | Avg.    |
| ½ in. O. H. New Billet Stock | \$ 3.35 to \$ 3.75                                  | \$ 3.52 | \$ 3.45 to \$ 3.75 | \$ 3.60 | \$ 3.00 to \$ 3.50 | \$ 3.18 |
| ¾ in. O. H. New Billet Stock | 3.80 to 3.75  | 3.60    | 3.40 to 3.90       | 3.62    | 2.90 to 3.25       | 3.01    |

\*Less than car lots.

AVERAGE PRICE PAID FOR STRUCTURAL STEEL IN  
1917, 1918 AND 1919.

| Description      | Price per Cwt. Erected and F. O. B. County |         |                    |         |                    |         |
|------------------|--|---------|--------------------|---------|--------------------|---------|
|                  | 1917                                       |         | 1918               |         | 1919               |         |
|                  | Range in price                             | Avg.    | Range in price     | Avg.    | Range in price     | Avg.    |
| I Beams, Erected | \$ 5.00 to \$ 8.50                         | \$ 5.75 | \$ 5.50 to \$ 7.25 | \$ 6.10 | \$ 5.00 to \$ 8.25 | \$ 5.85 |
| F. O. B. County  | 5.00 to 5.50                               | 5.15    | 5.00 to 5.75       | 5.25    | 4.50 to 5.20       | 4.90    |
| Trusses, Erected | 6.00 to 7.75                               | 6.50    | 7.00 to 8.75       | 7.50    | 7.50 to 8.50       | 7.95    |
| F. O. B. County  | 5.00 to 6.50                               | 5.90    | 5.90 to 6.75       | 6.50    | 5.50 to 6.20       | 5.80    |

The following comparisons between the costs of materials for the years of 1917, 1918 and 1919 will indicate the advance in costs which have occurred during that time:

## AVERAGE PRICE PAID FOR LUMBER IN 1917, 1918 AND 1919.

| Size | Description  |           | Price per 1,000 Ft., B. M., C. L.—F. O. B. Factory |          |                |          |                |          |
|------|--------------|-----------|--|----------|----------------|----------|----------------|----------|
|      |              |           | 1917   |          | 1918           |          | 1919           |          |
|      |              |           | Range in price                                     | Avg.     | Range in price | Avg.     | Range in price | Avg.     |
| 2x12 | Stand. Sawed | Doug. Fir | \$ 24 to \$ 30                                     | \$ 28.75 | \$ 24 to \$ 29 | \$ 27.00 | \$ 33 to \$ 45 | \$ 38.00 |
| 2x12 | Stand. Sawed | Doug. Fir | 25 to 30   | 27.00    | 35 to 40       | 38.00    | 35 to 45       | 38.50    |
| 2x12 | Stand. Sawed | Doug. Fir | 25 to 30   | 27.00    | 35 to 40       | 38.00    | 35 to 45       | 39.00    |
| 2x12 | Full Sawed   | Doug. Fir | 27 to 31   | 29.00    | 28 to 32       | 30.50    | 30 to 50       | 41.00    |
| 2x12 | Full Sawed   | Doug. Fir | 28 to 30   | 33.00    | 29 to 45       | 35.00    | 39 to 51       | 41.00    |
| 2x12 | Full Sawed   | Doug. Fir | 28 to 32   | 30.00    | 30 to 42       | 35.00    | 39 to 51       | 42.50    |
| 2x12 | Stand. Sawed | White Oak |  | 22.00    |                | 28.00    |                | 46.00    |

## AVERAGE PRICE PAID FOR PILING IN 1917, 1918 AND 1919.

| Length  | Kind      | Price per Lined Foot Car Lots—F. O. B. County |         |                    |         |                    |         |
|---------|-----------|---|---------|--------------------|---------|--------------------|---------|
|         |           | 1917  |         | 1918               |         | 1919               |         |
|         |           | Range in price                                | Avg.    | Range in price     | Avg.    | Range in price     | Avg.    |
| 16 foot | Red Cedar | \$ 1.14 to \$ 1.17                            | \$ 1.15 | \$ 1.20 to \$ 2.15 | \$ 1.80 | \$ 1.18 to \$ 2.00 | \$ 2.14 |
| 20 foot | Red Cedar | .15 to .20                                    | .170    | .19 to .23         | .217    | .21 to .32         | .250    |
| 34 foot | Red Cedar | .17 to .21                                    | .187    | .22 to .25         | .234    | .22 to .31         | .270    |
| 16 foot | Cypress   | .12 to .14                                    | .130    | .15 to .17         | .158    | .17 to .27         | .220    |
| 20 foot | Cypress   | .13 to .15                                    | .135    | .15 to .18         | .178    | .18 to .29         | .220    |
| 34 foot | Cypress   | .14 to .16                                    | .140    | .17 to .20         | .188    | .20 to .31         | .245    |

## AVERAGE PRICE PAID FOR CEMENT IN 1917, 1918 AND 1919.

1917 dealer's net price per bbl. f. o. b. Cedar Rapids  
 Car lots range in price \$1.79 to \$2.08—Avg. \$1.98  
 1918 dealer's net price per bbl. f. o. b. Cedar Rapids  
 Car lots range in price \$2.05 to \$2.25—Avg. \$2.10  
 1919 dealer's net price per bbl. f. o. b. Cedar Rapids  
 Car lots range in price \$2.18 to \$2.68—Avg. \$2.40

Bids received from local dealers are from ten cents to twenty-five cents per bbl. above dealer's price on account of storage and handling charges made.

## SCHEDULE ONE.

## BRIDGE DESIGNS AND SPECIFIC LOCATIONS.

| County      | No. of Designs | Estimated Value | County        | No. of Designs | Estimated Value |
|-------------|----------------|-----------------|---------------|----------------|-----------------|
| Adair       | 1              | \$ 15,271.00    | Jones         | 1              | 28,911.00       |
| Appanoose   | 34             | 28,700.00       | Keokuk        | 1              | 18,217.00       |
| Benton      | 2              | 16,900.00       | Lee           | 2              | 3,097.00        |
| Black Hawk  | 2              | 5,611.00        | Louis         | 2              | 24,908.00       |
| Bremner     | 4              | 31,527.00       | Lyon          | 4              | 27,982.00       |
| Butler      | 1              | 3,453.00        | Marshall      | 1              | 7,136.00        |
| Carroll     | 1              | 5,863.00        | Mitchell      | 1              | 26,785.00       |
| Cerro Gordo | 1              | 3,570.00        | Monona        | 1              | 7,206.00        |
| Chickasaw   | 5              | 10,688.00       | Monroe        | 2              | 14,320.00       |
| Clay        | 2              | 3,963.00        | Montgomery    | 45             | 108,979.00      |
| Clayton     | 1              | 20,116.00       | O'Brien       | 6              | 29,913.00       |
| Dallas      | 31             | 22,615.00       | Oceola        | 4              | 35,295.00       |
| Decatur     | 3              | 54,499.00       | Page          | 1              | 18,965.00       |
| Delaware    | 3              | 56,582.00       | Palo Alto     | 3              | 20,557.00       |
| Dickinson   | 1              | 5,211.00        | Pocahontas    | 2              | 14,222.00       |
| Dubuque     | 1              | 1,113.00        | Polk          | 2              | 11,964.00       |
| Emmet       | 2              | 4,695.00        | Pottawattamie | 11             | 18,096.00       |
| Floyd       | 2              | 4,492.00        | Poweshiek     | 2              | 24,320.00       |
| Greene      | 7              | 42,397.00       | Ringgold      | 15             | 41,867.00       |
| Grundy      | 13             | 36,046.00       | Scott         | 1              | 1,876.00        |
| Hamilton    | 3              | 20,792.00       | Shelby        | 2              | 21,112.00       |
| Hancock     | 2              | 7,277.00        | Sioux         | 21             | 68,189.00       |
| Hardin      | 2              | 41,191.00       | Story         | 2              | 40,222.00       |
| Harrison    | 61             | 99,282.00       | Tama          | 2              | 5,548.00        |
| Howard      | 1              | 9,818.00        | Wapello       | 47             | 75,418.00       |
| Humboldt    | 1              | 28,574.00       | Warren        | 1              | 11,923.00       |
| Ida         | 2              | 6,780.00        | Winneshek     | 3              | 10,069.00       |
| Jasper      | 5              | 25,783.00       | Woodbury      | 2              | 17,737.00       |
| Jefferson   | 27             | 25,023.00       | Worth         | 1              | 1,740.00        |
|             |                |                 | Wright        | 3              | 23,049.00       |
|             |                |                 |               | 136            | \$1,481,305.00  |

## SCHEDULE TWO.

## BRIDGE CONTRACTS SUBMITTED FOR APPROVAL DECEMBER 1, 1918, TO DECEMBER 1, 1919.

| County     | Contractor                     | Date Approved  | Amount Approved |
|------------|--------------------------------|----------------|-----------------|
| Adams      | F. S. Bentley                  | July 10, 1919  | 6,922.10        |
| Adair      | A. Phelps & Sons               | Oct. 15, 1917  | 16,340.80       |
| Audubon    | Jensen Const. Co.              | Apr. 17, 1919  | 25,750.00       |
| Benton     | Jensen Const. Co.              | Sept. 10, 1919 | 4,628.00        |
|            | Field Const. Co.               | Mar. 20, 1919  | 11,492.16       |
|            | International Steel & Iron Co. | Mar. 20, 1919  | 8,740.00        |
|            | Waterloo Const. Co.            | May 1, 1919    | 2,558.00        |
| Black Hawk | Waterloo Const. Co.            | May 23, 1919   | 4,250.00        |
|            | Waterloo Const. Co.            | Sept. 29, 1919 | 7,750.00        |
|            | Miller-Field Const. Co.        | Sept. 29, 1919 | 12,944.00       |
|            | T. Michelson                   | Sept. 29, 1919 | 5,686.00        |
|            | A. Olson Const. Co.            | Nov. 1, 1918   | 10,774.00       |
| Bonne      | Waterloo Const. Co.            | May 16, 1919   | 10,780.00       |
|            | Witmer Co.                     | May 19, 1919   | 11,198.00       |
|            | N. E. Marsh & Son              | May 19, 1919   | 15,621.00       |
| Bremner    | C. H. & J. H. Russell          | Apr. 26, 1919  | 7,850.00        |
|            | C. H. & J. H. Russell          | July 5, 1919   | 18,171.00       |
| Buchanan   | F. E. Reinhold                 | Apr. 26, 1919  | 11,246.00       |
|            | J. B. Elliott                  | Apr. 26, 1919  | 6,290.00        |
|            | F. E. Reinhold                 | Aug. 7, 1919   | 1,825.00        |
|            | J. B. Elliott                  | Sept. 18, 1919 | 1,825.00        |

## SCHEDULE TWO—Continued.

| County      | Contractor                   | Date Approved  | Amount Approved |
|-------------|------------------------------|----------------|-----------------|
| Calhoun     | Iowa Bridge Co.              | Oct. 14, 1919  | 8,500.00        |
| Carroll     | Shackleton Const. Co.        | June 23, 1919  | 5,650.00        |
|             | Pickus Eng. & Const. Co.     | June 23, 1919  | 10,800.00       |
|             | Shackleton Const. Co.        | Sept. 9, 1919  | 3,080.00        |
| Cass        | Pickus Eng. & Const. Co.     | Sept. 9, 1919  | 6,000.00        |
| Cedar       | Wickham Bridge & Pipe Co.    | Apr. 18, 1919  | 47,840.00       |
|             | Fred J. Smith                | Mar. 29, 1919  | 12,684.00       |
|             | S. R. Johnston               | Mar. 29, 1919  | 9,900.00        |
|             | Alfred Vinal                 | Mar. 29, 1919  | 8,257.00        |
|             | John Anderson & Son          | Apr. 7, 1919   | 20,600.00       |
|             | C. M. Neal                   | Apr. 16, 1919  | 13,900.00       |
| Cerro Gordo | John Anderson & Son          | June 30, 1919  | 4,767.00        |
|             | Henkel & Brown               | Apr. 9, 1919   | 20,900.00       |
|             | Henkel & Brown               | July 14, 1919  | 8,290.00        |
| Cherokee    | Ward & Wighton               | Apr. 26, 1919  | 28,200.00       |
|             | Geo. Gardner & Sons          | Apr. 26, 1919  | 12,816.00       |
|             | Miller Eng. & Const. Co.     | Apr. 26, 1919  | 12,768.00       |
|             | Northwestern Const. Co.      | Apr. 26, 1919  | 12,871.00       |
|             | Federal Bridge Co.           | Apr. 26, 1919  | 15,880.00       |
|             | Ward & Wighton               | Apr. 26, 1919  | 39,100.00       |
|             | H. A. Holmes                 | June 17, 1919  | 12,100.00       |
| Chickasaw   | A. Olson Const. Co.          | July 26, 1919  | 10,525.00       |
| Clarke      | Standard Bridge Co.          | Nov. 6, 1919   | 1,662.00        |
| Clay        | Ernest Landsman              | July 22, 1919  | 15,240.00       |
| Clayton     | Pittsburg-Des Moines St. Co. | Nov. 18, 1919  | 32,900.00       |
| Clinton     | John Kans                    | Mar. 12, 1919  | 28,412.00       |
|             | Waterloo Const. Co.          | Mar. 12, 1919  | 15,900.00       |
|             | O. H. Eniel                  | Mar. 20, 1919  | 7,563.00        |
| Crawford    | Alfred Vinal                 | Mar. 29, 1919  | 15,110.00       |
|             | Deloit Bridge Co.            | Mar. 29, 1919  | 17,405.00       |
|             | Pickus Eng. & Const. Co.     | Mar. 29, 1919  | 7,680.00        |
|             | Pickus Eng. & Const. Co.     | May 12, 1919   | 15,000.00       |
|             | Iowa Bridge Company          | May 12, 1919   | 15,900.00       |
|             | Deloit Bridge Co.            | June 9, 1919   | 11,725.00       |
|             | Deloit Bridge Co.            | June 23, 1919  | 12,525.00       |
|             | Deloit Bridge Co.            | Aug. 18, 1919  | 2,300.00        |
|             | C. A. Hickey & Son           | Aug. 18, 1919  | 2,300.00        |
|             | Pickus Eng. & Const. Co.     | Aug. 18, 1919  | 10,985.00       |
|             | Iowa Bridge Company          | Aug. 18, 1919  | 16,700.00       |
| Dallas      | N. M. Stark & Co.            | Sept. 15, 1919 | 5,798.00        |
|             | Shackleton Const. Co.        | Sept. 15, 1919 | 9,845.00        |
|             | Pittsburg-Des Moines St. Co. | June 10, 1919  | 1,105.00        |
|             | N. M. Stark & Co.            | Nov. 15, 1919  | 11,759.00       |
| Davis       | Ottumwa Supply & Const. Co.  | Nov. 18, 1919  | 14,900.00       |
|             | Clinton Bridge Works         | June 10, 1919  | 1,928.00        |
| Decatur     | Koss Const. Co.              | May 12, 1919   | 22,696.00       |
|             | Standard Bridge Co.          | Aug. 12, 1919  | 22,091.00       |
| Delaware    | A. Olson Const. Co.          | June 24, 1919  | 23,171.00       |
| Dubuque     | Brand Bros.                  | Feb. 13, 1919  | 1,842.00        |
|             | J. O. Parsons                | Oct. 14, 1919  | 10,219.00       |
| Emmet       | Armstrong Cement Works       | Aug. 12, 1919  | 8,725.20        |
| Franklin    | G. E. Sargent                | Sept. 18, 1919 | 6,800.00        |
| Greene      | R. E. Shackleton             |                |                 |
|             | F. E. Marsh & Co.            | Apr. 20, 1919  | 5,390.00        |
|             | R. E. Shackleton             | Apr. 20, 1919  | 15,115.00       |
|             | F. E. Marsh & Co.            | Apr. 20, 1919  | 2,563.50        |
|             | F. E. Marsh & Co.            | Aug. 2, 1919   | 11,901.00       |
|             | F. E. Marsh & Co.            | Aug. 18, 1919  | 18,000.00       |
| Grundy      | F. E. Marsh & Co.            | Sept. 30, 1919 | 3,000.00        |
|             | T. Fuller & Son              | Apr. 26, 1919  | 15,500.00       |
|             | Des Moines Br. & Iron Works  | Apr. 29, 1919  | 11,500.00       |
|             | T. Fuller & Son              | July 5, 1919   | 24,423.00       |
|             | Des Moines Br. & Iron Works  | July 5, 1919   | 8,159.00        |
|             | A. Olson Const. Co.          | July 5, 1919   | 7,700.00        |
|             | Waterloo Const. Co.          | Aug. 2, 1919   | 2,140.00        |
|             | Waterloo Const. Co.          | Aug. 2, 1919   | 11,281.00       |
|             | A. Olson Const. Co.          | Sept. 15, 1919 |                 |
|             | Des Moines Br. & Iron Works  |                |                 |
| Guthrie     | Lana Const. Co.              | June 12, 1919  | 11,000.00       |
|             | F. H. Christensen            | June 24, 1919  | 11,825.00       |
|             | F. H. Christensen            | Oct. 7, 1919   | 11,300.00       |
|             | Lana Const. Co.              | Oct. 7, 1919   | 10,550.00       |
|             | Federal Bridge Co.           | Oct. 7, 1919   | 9,585.00        |

## SCHEDULE TWO—Continued.

| County    | Contractor                   | Date Approved  | Amount Approved |
|-----------|------------------------------|----------------|-----------------|
| Hamilton  | W. J. Zitterell & Co.        |                |                 |
|           | J. A. Dunkel                 | Apr. 3, 1919   | 6,250.00        |
|           | J. A. Dunkel                 | Apr. 3, 1919   | 4,697.00        |
|           | A. Swanson & Co.             | Apr. 3, 1919   | 15,202.00       |
|           | J. A. Dunkel                 | Apr. 3, 1919   | 3,600.00        |
|           | W. F. Baxter                 | Apr. 5, 1919   | 11,309.75       |
|           | A. Swanson & Co.             | May 23, 1919   | 16,416.00       |
|           | A. Swanson & Co.             | Oct. 15, 1919  | 4,480.00        |
|           | W. T. Baxter                 | Oct. 21, 1919  | 6,200.00        |
| Hancock   | R. F. Orr                    | May 15, 1919   | 3,016.15        |
|           | L. J. Kalvig                 | May 15, 1919   | 4,138.10        |
| Hardy     | Pfiffeld Const. Co.          | Apr. 16, 1919  | 5,286.00        |
|           | N. M. Stark & Co.            | Apr. 16, 1919  | 16,990.00       |
|           | T. J. Wagner                 | Apr. 16, 1919  | 9,092.00        |
|           | A. Olson Const. Co.          | Apr. 16, 1919  | 12,722.00       |
|           | Des Moines Br. & Iron Works  | Apr. 19, 1919  | 8,690.00        |
|           | N. M. Stark & Co.            | Apr. 23, 1919  | 13,580.00       |
|           | Miller-Pfiffeld Const. Co.   | Aug. 15, 1919  | 10,985.00       |
|           | A. Olson Const. Co.          | Aug. 15, 1919  | 10,988.00       |
|           | C. A. Holvik                 | Aug. 15, 1919  | 8,700.00        |
| Harrison  | Standard Bridge Co.          | Oct. 11, 1919  | 2,158.00        |
|           | Deloit Bridge Company        | Nov. 5, 1919   | 74,157.00       |
| Henry     | K. A. Bergdahl               | Mar. 20, 1919  | 18,600.00       |
| Howard    | Clinton Bridge Works         | May 12, 1919   | 3,870.00        |
| Humboldt  | Miller-Pfiffeld Const. Co.   | Sept. 4, 1919  | 27,988.00       |
| Ida       | Piekus Eng. & Const. Co.     | Aug. 26, 1919  | 16,327.00       |
| Iowa      | M. O. Burnett                | Mar. 8, 1919   | 2,385.00        |
|           | M. O. Burnett                | Apr. 7, 1919   | 4,300.00        |
|           | Federal Bridge Co.           | Apr. 11, 1919  | 35,938.00       |
|           | Iowa Bridge Company          | July 5, 1919   | 14,425.00       |
|           | M. O. Burnett                | July 5, 1919   | 8,175.00        |
|           | Iowa Bridge Company          | Sept. 22, 1919 | 6,200.00        |
| Jasper    | A. Phelps & Sons             | May 12, 1919   | 19,270.00       |
|           | N. M. Stark & Co.            | May 13, 1919   | 10,130.00       |
| Jefferson | Des Moines Br. & Iron Works  | May 1, 1919    | 20,000.00       |
|           | Cameron & Joyce              | May 10, 1919   | 19,176.65       |
|           | Pittsburg-Des Moines St. Co. | Sept. 6, 1919  | 13,570.00       |
| Johnson   | Iowa Bridge Company          | June 9, 1919   | 11,925.00       |
| Jones     | Bullock Bros.                | Aug. 23, 1919  | 5,732.00        |
| Keokuk    | John Ritzinger               | July 31, 1919  | 28,995.00       |
|           | John Ritzinger               | Apr. 26, 1919  | 23,268.00       |
| Kossuth   | F. E. Marsh & Co.            | Sept. 30, 1919 | 39,720.00       |
| Lee       | Stephen Schulte              | May 17, 1919   | 6,275.00        |
| Linn      | Perry Jayne                  | May 19, 1919   | 14,400.00       |
|           | Perry Jayne                  | Aug. 18, 1919  | 24,939.60       |
| Louisa    | John Ritzinger               | May 24, 1919   | 6,120.00        |
|           | L. R. Gabriel                | Aug. 12, 1919  | 16,000.00       |
| Lucas     | John H. Plows                |                |                 |
|           | C. M. Cox                    |                |                 |
|           | Pittsburg-Des Moines St. Co. | May 9, 1919    | 14,500.00       |
| Lyon      | Federal Bridge Co.           | May 13, 1919   | 13,591.00       |
| Mahaska   | H. E. Whitlatch              | June 30, 1919  | 21,900.00       |
|           | H. E. Whitlatch              | Aug. 12, 1919  | 3,175.00        |
|           | Clinton Bridge Works         | Sept. 22, 1919 | 20,581.00       |
|           | H. E. Whitlatch              | Nov. 7, 1919   | 2,290.00        |
| Marshall  | Cole Bros.                   | Mar. 14, 1919  | 14,736.00       |
|           | Ingersoll-Stouffer Co.       | Mar. 14, 1919  | 22,012.00       |
|           | A. P. Munson                 | Mar. 14, 1919  | 8,852.00        |
|           | Alexander & Higbie           | Mar. 20, 1919  | 12,373.00       |
|           | Ingersoll-Stouffer Co.       | July 15, 1919  | 31,900.00       |
| Mills     | Standard Bridge Co.          | Feb. 7, 1919   | 11,551.00       |
|           | Iowa Bridge Co.              | June 30, 1919  | 8,128.00        |
|           | E. E. Barber                 | Aug. 25, 1919  | 7,005.00        |
|           | J. O. Evans                  | Sept. 22, 1919 | 4,165.00        |
|           | E. E. Barber                 | Sept. 22, 1919 | 3,910.00        |
| Mitchell  | A. Olson Const. Co.          | July 31, 1919  | 14,927.00       |
|           | N. M. Stark & Co.            | Sept. 15, 1919 | 9,100.00        |
| Monona    | J. P. Riddle                 | May 12, 1919   | 12,793.00       |
|           | Illinois Steel Bridge Co.    | Aug. 15, 1919  | 1,969.00        |
|           | Standard Bridge Co.          | Sept. 2, 1919  | 4,089.00        |
|           | F. L. Barber                 | Sept. 23, 1919 | 2,700.00        |
| Monroe    | Koss Const. Co.              | June 9, 1919   | 6,181.00        |
|           | J. A. Lafferty               | June 11, 1919  | 14,410.00       |
|           | J. A. Lafferty               | July 14, 1919  | 12,200.00       |
|           | Ottumwa Supply & Const. Co.  | July 21, 1919  | 9,100.00        |
|           | J. A. Lafferty               | Sept. 11, 1919 | 8,680.00        |

## SCHEDULE TWO—Continued.

| County        | Contractor                   | Date Approved  | Amount Approved |
|---------------|------------------------------|----------------|-----------------|
| Montgomery    | Koss Const. Co.              | July 15, 1919  | 15,782.00       |
|               | Wilson Concrete Co.          |                |                 |
|               | Wickham Bridge & Pipe Co.    |                |                 |
|               | Illinois Steel Bridge Co.    | July 15, 1919  | 43,479.00       |
|               | Iowa Bridge Co.              | July 15, 1919  | 21,873.00       |
|               | Wickham Bridge & Pipe Co.    |                |                 |
|               | Wilson Concrete Co.          |                |                 |
|               | Illinois Steel Bridge Co.    | July 23, 1919  | 1,840.00        |
|               | Wilson Concrete Co.          | Aug. 4, 1919   | 12,485.00       |
|               | Henningson Const. Co.        | Aug. 4, 1919   | 25,840.00       |
|               | Standard Bridge Co.          | Oct. 14, 1919  | 4,557.00        |
|               | Iowa Bridge Co.              | Oct. 14, 1919  | 3,413.00        |
|               | Wickham Bridge & Pipe Co.    | Oct. 14, 1919  | 6,950.00        |
|               | A. Phelps & Son              | Oct. 14, 1919  | 5,685.00        |
| Muscatine     | S. R. Johnston               | Mar. 29, 1919  | 5,100.00        |
|               | L. H. Gabriel                | Mar. 29, 1919  | 10,855.00       |
| O'Brien       | Eugene Grant                 | Apr. 23, 1919  | 9,282.00        |
|               | Ernest Landsman              | Apr. 23, 1919  | 25,715.00       |
|               | E. A. Pyneon                 | Sept. 22, 1919 | 13,233.00       |
|               | Ernest Landsman              | Sept. 22, 1919 | 10,433.00       |
|               | Eugene Grant                 | Oct. 1, 1919   | 1,938.00        |
|               | B. L. Taylor                 | Oct. 3, 1919   | 7,479.00        |
| Osceola       | Pittsburg-Des Moines St. Co. | Aug. 18, 1919  | 13,200.00       |
|               | Piekus Eng. & Const. Co.     | Aug. 27, 1919  | 9,585.00        |
|               | Illinois Steel Bridge Co.    |                |                 |
|               | Pittsburg-Des Moines St. Co. |                |                 |
| Page          | Pittsburg-Des Moines St. Co. | Nov. 20, 1919  | 21,950.00       |
|               | Iowa Bridge Co.              | May 6, 1919    | 29,912.00       |
| Palo Alto     | Iowa Bridge Co.              | Aug. 1, 1919   | 4,905.00        |
|               | L. D. Brereton               | Aug. 7, 1919   | 7,191.00        |
| Pocahontas    | Carl Johnson                 | Sept. 22, 1919 | 20,493.00       |
| Polk          | Geo. F. Lambert & Co.        | Apr. 23, 1919  | 15,289.00       |
|               | N. M. Stark & Co.            | Aug. 12, 1919  | 31,958.00       |
|               | Wilson Bros.                 | Nov. 24, 1919  | 2,971.00        |
| Pottawattamie | Wickham Bridge & Pipe Co.    | May 23, 1919   | 22,449.00       |
| Ringgold      | Geo. F. Lambert & Co.        | May 19, 1919   | 8,551.00        |
|               | A. Phelps & Sons             | May 19, 1919   | 14,082.00       |
|               | Koss Const. Co.              | May 19, 1919   | 18,969.00       |
| Sac           | Iowa Bridge Co.              | Mar. 29, 1919  | 10,572.00       |
|               | Martin Pluth                 | Mar. 29, 1919  | 3,450.00        |
|               | Iowa Bridge Co.              | Aug. 12, 1919  | 1,842.40        |
| Scott         | Geo. Sheldon                 | Apr. 23, 1919  | 24,798.00       |
|               | T. J. McCarthy               | July 17, 1919  | 12,299.00       |
| Shelby        | Lana Const. Co.              | June 23, 1919  | 4,290.00        |
|               | Illinois Steel Bridge Co.    | Oct. 8, 1919   | 14,950.00       |
| Sioux         | Hamerlink & Van Zee          | Aug. 18, 1919  | 7,818.43        |
|               | Geo. Gardner & Sons          | Aug. 18, 1919  | 8,783.00        |
|               | Geo. Gardner & Sons          | Oct. 22, 1919  | 45,817.00       |
|               | Cole Bros.                   | Feb. 17, 1919  | 8,654.00        |
| Story         | Clinton Bridge Works         | Feb. 21, 1919  | 2,448.00        |
|               | Pittsburg-Des Moines St. Co. | July 28, 1919  | 1,620.00        |
|               | Cole Bros.                   | Aug. 12, 1919  | 4,793.40        |
| Tama          | A. P. Munson                 | May 1, 1919    | 26,648.00       |
|               | A. P. Munson                 | July 7, 1919   | 9,954.00        |
|               | Waterloo Const. Co.          | July 7, 1919   | 2,261.00        |
|               | A. P. Munson                 | July 15, 1919  | 3,282.00        |
| Wapello       | Ottumwa Supply & Const. Co.  | Aug. 25, 1919  | 23,439.20       |
|               | Ottumwa Supply & Const. Co.  | Nov. 5, 1919   | 59,999.00       |
| Warren        | Pittsburg-Des Moines St. Co. |                |                 |
|               | Pittsburg-Des Moines St. Co. | Oct. 20, 1919  | 14,500.00       |
| Washington    | Iowa Bridge Co.              | Mar. 12, 1919  | 34,850.00       |
|               | Iowa Bridge Co.              | June 28, 1919  | 1,164.84        |
|               | Iowa Bridge Co.              | Nov. 29, 1919  | 3,100.00        |
|               | Iowa Bridge Co.              | Mar. 20, 1919  | 11,036.00       |
| Webster       | A. Olson Const. Co.          | Mar. 20, 1919  | 11,737.66       |
|               | Carl Johnson                 | Mar. 29, 1919  | 11,737.66       |
|               | L. J. Olson                  | May 12, 1919   | 3,200.00        |
| Winneshiek    | E. B. Fowler                 | July 5, 1919   | 6,000.00        |
| Woodbury      | Standard Bridge Co.          | Mar. 20, 1919  | 6,849.00        |
|               | Standard Bridge Co.          | Aug. 27, 1919  | 4,224.00        |
|               | C. E. Cheeley                | Oct. 29, 1919  | 2,821.50        |
| Wright        | Iowa Bridge Co.              | May 26, 1919   | 30,378.00       |
|               | Iowa Bridge Co.              | May 26, 1919   | 7,197.00        |

## SCHEDULE THREE.

MATERIAL CONTRACTS SUBMITTED FOR APPROVAL DECEMBER  
1, 1918, TO DECEMBER 1, 1919.

| County     | Contractor                     | Material          | Date Approved  |
|------------|--------------------------------|-------------------|----------------|
| Adams      | A. L. Wheeler & Son            | Concrete mix      | March 15, 1919 |
|            | Neb. Br. Sup. & Lbr. Co.       | Piling            | March 15, 1919 |
|            | Neb. Br. Sup. & Lbr. Co.       | Lumber            | March 15, 1919 |
|            | E. B. Wadhams                  | Hardware          | March 15, 1919 |
|            | Standard Bridge Co.            | Reinforcing steel | March 15, 1919 |
|            | Dixon Lbr. Co.                 | Reinforcing mesh  | March 19, 1919 |
| Cedar      | W. J. Dixon Lbr. Co.           | Cement            | March 15, 1919 |
|            | Hatch & Brookman               | Lumber            | June 9, 1919   |
| Fayette    | Clinton Bridge Works           | Reinforcing steel | Feb. 20, 1919  |
| Fremont    | Wilson Concrete Co.            | Concrete pipe     | April 1, 1919  |
|            | Standard Bridge Co.            | Lumber, piling    | April 3, 1919  |
| Henry      | Clinton Bridge Works           | Reinforcing steel | March 31, 1919 |
|            | Burlington Sand and Gravel Co. | Gravel            | April 26, 1919 |
|            | Hammans Land & Lbr. Co.        | Lumber            | Nov. 5, 1919   |
| Jefferson  | Standard Bridge Co.            | Lumber, piling    | Feb. 5, 1919   |
|            | Chas. Lyon Lbr. Co.            | Lumber, piling    | Feb. 5, 1919   |
|            | Midland Metal Co.              | Corrugated pipe   | Sept. 6, 1919  |
| Lee        | Neb. Br. Sup. & Lbr. Co.       | Lumber            | Oct. 1, 1919   |
|            | Tri-State Lumber Co.           | Lumber            | Oct. 1, 1919   |
| Linn       | Klauer Mfg. Co.                | Corrugated pipe   | Feb. 7, 1919   |
| Lyon       | Klauer Mfg. Co.                | Corrugated pipe   | May 19, 1919   |
|            | Standard Bridge Co.            | Reinforcing steel | June 17, 1919  |
| Mitchell   | Waterloo Construction Co.      | Reinforcing steel | March 11, 1919 |
| Monroe     | Central Culvert Co.            | Corrugated pipe   | April 29, 1919 |
| Muscatine  | Neb. Br. Sup. & Lbr. Co.       | Lumber            | Feb. 18, 1919  |
|            | Western Boiler Pipe Co.        | Boiler pipe       | Feb. 20, 1919  |
|            | Midland Metal Co.              | Corrugated pipe   | Feb. 20, 1919  |
| Scott      | Mueller Lbr. Co.               | Cement            | July 17, 1919  |
|            | Des Moines Steel Co.           | Reinforcing steel | July 17, 1919  |
|            | Klauer Mfg. Co.                | Corrugated pipe   | July 17, 1919  |
| Tama       | Klauer Mfg. Co.                | Corrugated pipe   | June 6, 1919   |
| Washington | Standard Bridge Co.            | Lumber            | Feb. 18, 1919  |
| Woodbury   | Neb. Br. Sup. & Lbr. Co.       | Piling            | April 17, 1919 |
|            | Neb. Br. Sup. & Lbr. Co.       | Lumber            | May 12, 1919   |
|            | Clinton Bridge Co.             | I-beams           | Aug. 13, 1919  |

## Chapter V. Railroad Crossing Improvements

Below is given a comparative statement of the work accomplished on railroad crossing improvements from December 1, 1918, to December 1, 1919:

COMPARATIVE STATEMENT OF WORK ACCOMPLISHED—RAIL-  
ROAD CROSSING IMPROVEMENTS FROM DECEMBER  
1, 1918, TO DECEMBER 1, 1919.

|   | During<br>1918 | During<br>1919 | Grand<br>total to<br>Dec. 1, '19 |
|---|----------------|----------------|----------------------------------|
| Crossing projects listed  | 30             | 27             | 332                              |
| Number of railroad crossings involved on project listed                             | 32             | 36             | 411                              |
| Projects surveyed   | 11             | 14             | 157                              |
| Projects for which plans and estimates were prepared                                | 6              | 16             | 156                              |
| Number of conferences held  | 13             | 11             | 125                              |
| Number of projects satisfactorily adjusted  | 18             | 7              | 106                              |
| Projects completed during year  | 17             | 10             | 104                              |
| Number of projects listed which have been appealed to Railroad Commission           | 2              | 1              | 21                               |
| Projects adjusted by Railroad Commission  | 0              | 6              | 10                               |
| Crossings entirely eliminated   | 0              | 2              | 26                               |
| Grade crossings eliminated by grade separation                                      | 1              | 2              | 25                               |
| Crossings improved  | 12             | 4              | 112                              |
| Established cost of crossing improvements satisfactorily adjusted                   | \$ 14,827      | \$ 45,000      | \$ 317,582                       |
| Total estimated amount appropriated by railroad companies for crossing improvements | 4,600          | 20,748         | 192,798                          |
| Total estimated amount appropriated from public funds for crossing improvements     | 10,227         | 23,801         | 134,912                          |
| Average percentage of cost paid by railroad companies for crossing improvements     | 30%            | 45%            | 60%                              |
| Average percentage of cost paid from public funds for crossing improvements         | 70%            | 55%            | 40%                              |

The crossing projects listed include all of the crossings which have been referred to the Commission since 1914. Many of these projects have been satisfactorily adjusted and completed.

## Distribution of Dangerous Crossings.

By far the greater majority of the crossings listed for improvement during the past few years have been grade crossings. However, there are many complaints received and investigated by the Commission referring to dangerous conditions existing at under-



SCHEDULE FOUR—Continued.

| Project No. | County      | Location                           | Road System | Railroad         | Present Crossing | Improvement | Project Assigned | Field Inspection | Surveyed | Plans Prepared | Estimate Prepared | Plans Revised | Conferences Attended | Plans Approved | Cost Adjusted | Correspondence for Adj. | Appeal to R. R. Com. | Hearing R. R. Com. | Decision by R. R. Com. |
|-------------|-------------|------------------------------------|-------------|------------------|------------------|-------------|------------------|------------------|----------|----------------|-------------------|---------------|----------------------|----------------|---------------|-------------------------|----------------------|--------------------|------------------------|
| 309         | Clinton     | Sec. 26 Camanche Twp.              | Prim.       | C. & N. W.       | 2 Gr.            | Reloc.      | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 310         | Mills       | Town of Mafern.                    | Town        | C. B. & Q.       | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 313         | Cerro Gordo | Sec. 28 Lime Creek.                | Prim.       | C. M. & St. L.   | O. G.            | O. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 314         | Webster     | Sec. 11 Hardir Twp.                | Prim.       | C. N. R. W.      | U. G.            | U. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 315         | Osceola     | Sec. 8-17 E. Follman Twp.          | Prim.       | C. C. R. I. & P. | U. G.            | U. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 316         | Worth       | Town of Many                       | City        | C. C. R. I. & P. | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 317         | Worth       | Town of Many                       | City        | C. C. R. I. & P. | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 318         | Worth       | Town of Many                       | City        | C. C. R. I. & P. | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 319         | Worth       | Town of Many                       | City        | C. C. R. I. & P. | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 320         | Cass        | Sec. 33-34 Mosina Twp.             | Prim.       | C. A. T. & S. F. | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 321         | Lee         | Sec. 36 Charleston Twp.            | Prim.       | C. & N. W.       | O. G.            | O. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 322         | Stout       | Town of Alton.                     | Prim.       | C. & N. W.       | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 323         | Woodbury    | Sec. 23-24 Lisbn Twp.              | Town        | C. & N. W.       | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 324         | Lee         | Sec. 6-7 Montrose Twp.             | Prim.       | C. & N. W.       | 2 Gr.            | Reloc.      | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 325         | Delaware    | Sec. 26-27-34-35 Bremer Twp.       | Prim.       | C. & N. W.       | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 326         | Webster     | Sec. 26 Cooper.                    | Prim.       | I. C.            | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 327         | Jasper      | Sec. 4-9 Mount Prairie.            | Prim.       | C. M. & St. L.   | O. H.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 328         | Dubuque     | Sec. 1 Table Mount Twp.            | Prim.       | C. C. R. I. & P. | G. G.            | G. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 329         | Winneshiek  | Sec. 20 Decorah Twp.               | Prim.       | C. C. R. I. & P. | 2 Gr.            | Reloc.      | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 330         | Cass        | Sec. 2 Grove Twp.                  | Prim.       | C. C. R. I. & P. | O. G.            | O. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 331         | Polk        | Sec. 22 Delaware Twp.              | Prim.       | Interrurban      | G. G.            | O. H.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |
| 332         | Kossuth     | Sec. 2 Union Twp., City of Algona. | City        | O. M. & St. P.   | U. G.            | U. G.       | X                | X                | X        | X              | X                 | X             | X                    | X              | X             | X                       | X                    | X                  | X                      |

### Chapter VI. Department of Road Management

The administrative work pertaining to road matters is handled through the Department of Road Management. This work includes all dealings with the Federal Bureau of Public Roads in connection with the administration of Federal Aid road work, all dealings with county officials relative to changes in and additions to primary and county road systems, outlining the program of improvement for the primary road system, establishment of special assessment districts for both primary and secondary road districts, and the award and approval of contracts for road work.

During the year period covered by this report, forty-seven requests for a modification of the county road system in thirty-seven counties have been passed upon, forty of which were approved, resulting in a net increase of 92.35 miles in the county road system; ninety projects for the improvement of the primary road systems, contemplating the improvement of 1536.33 miles, have been outlined by resolution of the board of supervisors; one hundred thirty-six traffic counts have been taken; fifty-six project statements involving the improvement of 899.29 miles of road at an estimated cost of \$8,919,357.43, have been prepared; plans, specifications and estimates on twenty-three Federal Aid projects, contemplating the improvement of 261.82 miles of road at an estimated cost of \$3,458,487.19, have been submitted to the Bureau of Public Roads; project agreements whereby \$526,443.42 of Federal funds were obligated for the construction of sixteen projects, have been executed; lettings have been held on twenty-one Federal Aid projects, resulting in the award of twenty-nine contracts, twenty-eight of which, totaling \$998,844.92, have been approved; thirty-seven contracts totaling \$525,459.21, for road work other than Federal Aid projects have been approved, and twenty-two secondary districts for the gravel surfacing of 144.25 miles of the secondary road system have been established.

#### Primary Road System.

The primary road system as established by legislation enacted by the Thirty-eighth General Assembly constitutes the system of highways previously designated as the Inter-county Road System. A

number of additions to and changes in the system as originally designated have been made to provide "for more efficient service or more economical construction," and there are a few such changes and additions still pending. The elimination of railway grade crossings, the providing of more efficient service considering both community needs and the welfare of the traveling public as a whole, and the shortening of direct lines of travel, are the three factors most often responsible for initiating changes in the primary road system.

#### Changes in County Road System (Refer to Schedule 5).

The Commission has taken action on proposed additions to or alterations in the county road system in thirty-six counties, involving forty-seven separate requests by boards of supervisors. Forty of these requests were approved, involving the addition of 132.47 miles to the county road system and the removal of 40.12 miles from the county road system. The net increase in the mileage of the county road system was 92.35 miles.

#### Program of Improvement for Primary Road System.

The enactment of Federal and State legislation during the past year vastly increasing the amount of funds available for the improvement of the primary road system, has resulted in the outlining of a definite program of improvement for the primary road system in practically every county in the state. This program is initiated by resolution of the board of supervisors, in which resolution application is made to the Highway Commission for the improvement of certain positions of the primary road system. For convenience in administration, these applications are divided by the Highway Commission into two classes; (1) Federal Aid projects involving the use of Federal funds, and (2) Primary Road projects on which no Federal funds are requested.

#### Federal Aid Projects Outlined (Refer to Schedule 6).

Eighty-four Federal Aid projects have been outlined by resolution of the boards of supervisors in seventy-six counties, involving the improvement of 1481.29 miles of road, or an average of 17.63 miles per project. Twenty-six of these projects contemplate hard surfacing a total of 278.29 miles of road, eleven projects contemplate gravel surfacing a total of 130.96 miles of road, while on the remaining 1072.04 miles no surfacing is included, the improvement consisting of constructing to finished grades and providing the necessary drainage.

#### Primary Road Projects Outlined (Refer to Schedule 7).

Six Primary Road projects have been outlined by resolution of the board of supervisors in five counties, involving the improvement of 55.04 miles of road, or an average of 8.5 miles per project. One project contemplates the hard surfacing of 1.50 miles of road, three projects contemplate gravel surfacing 27.37 miles of road, while on the remaining 26.17 miles no surfacing is included, the improvement consisting of constructing to finished grades and providing the necessary drainage.

#### Preparation of Project Statements.

After projects have been outlined by resolution of the board of supervisors, project statements are prepared for the purpose of placing the project before the Highway Commission and the Bureau of Public Roads for consideration. These project statements give the location and length of the road to be improved, the character of improvement contemplated, a statement of the funds available for financing the proposed improvement, and a reconnaissance estimate of cost.

#### Traffic Census Work (Refer to Schedule 8).

In the case of Federal Aid projects, information regarding the nature and amount of traffic is required. In securing this information, seven-day counts were taken at one hundred thirty-six different stations located in fifty-seven counties. Traffic was classified as to origin and destination, in accordance with the instructions given by the Bureau of Public Roads, under the two main divisions of "Through Traffic" and "Local Traffic", each of these two main divisions being further subdivided as to type and motive power under the headings of "Motor Trucks", "Passenger Motor Vehicles", and "Horse Drawn". A summary of the results secured at the one hundred thirty-six stations follows:

| Through Traffic.             |                                  |                             |                            |
|------------------------------|----------------------------------|-----------------------------|----------------------------|
| Type                         | Avg. Daily Total<br>All Stations | Avg. per day<br>per Station | Per cent of<br>all Traffic |
| Trucks .....                 | 220                              | 1.62                        | 0.50                       |
| Passenger Motor Vehicles.... | 9830                             | 72.27                       | 21.77                      |
| Horse Drawn .....            | 27                               | 0.20                        | 0.06                       |
|                              | <hr/>                            | <hr/>                       | <hr/>                      |
|                              | 10077                            | 74.09                       | 22.33                      |
| Local Traffic.               |                                  |                             |                            |
| Type                         | Avg. Daily Total<br>All Stations | Avg. per day<br>per Station | Per cent of<br>all Traffic |
| Trucks .....                 | 1984                             | 14.60                       | 4.39                       |
| Passenger Motor Vehicles.... | 28470                            | 209.33                      | 63.07                      |
| Horse Drawn .....            | 4611                             | 33.90                       | 10.21                      |
|                              | <hr/>                            | <hr/>                       | <hr/>                      |
|                              | 35065                            | 257.83                      | 77.67                      |



Classified with respect to motive power and type, the traffic consisted of

|                               |       |          |
|-------------------------------|-------|----------|
| Trucks .....                  | 4.89  | Per cent |
| Passenger Motor Vehicles..... | 84.84 | " "      |
| Horse Drawn .....             | 10.27 | " "      |

A comparison with traffic data collected in 1917 and 1918 follows:

|                            | 1917      | 1918      | 1919      |
|----------------------------|-----------|-----------|-----------|
| Average daily traffic..... | 339 units | 260 units | 332 units |
| Motor driven .....         | 86.1%     | 78.5%     | 89.73%    |
| Horse drawn .....          | 13.9%     | 21.5%     | 10.27%    |
| Local traffic.....         | —         | 78.1%     | 77.67%    |
| Through traffic.....       | —         | 21.9%     | 22.33%    |

#### Federal Aid Projects Approved (Refer to Schedule 9).

Thirty-four Federal Aid projects involving the improvement of 506.78 miles of road, at an estimated total cost of \$6,389,973.83, have been approved by the Bureau of Public Roads. As approved, these projects contemplate the hard-surfacing of 113.96 miles of road, the gravel surfacing of 68.51 miles of road, and constructing to finished grades with no surfacing included, of 324.41 miles. Contemplated changes in these projects, however, as noted in Schedule 9, will result in a total program of construction covered by the projects listed, as follows:

|                                      |        |       |
|--------------------------------------|--------|-------|
| Hard surfacing .....                 | 122.76 | miles |
| Gravel surfacing .....               | 44.86  | "     |
| Construction to finished grades..... | 324.41 | "     |

In addition to projects approved by the Bureau of Public Roads, nineteen project statements involving the improvement of 365.39 miles of road at an estimated total cost of \$2,398,449.39, have been submitted to the Bureau of Public Roads and are now pending approval. The improvements contemplated in these projects consist of 13.97 miles of paving, 64.35 miles of gravel surfacing, and 287.07 miles of construction to finished grades with no surfacing included.

#### Primary Road Projects Approved (Refer to Schedule 10).

Three Primary Road projects, involving the improvement of 27.12 miles of road at an estimated total cost of \$130,934.21, have been approved by the Highway Commission. These projects contemplate the gravel surfacing of 22.87 miles, and constructing 4.25 miles to finished grades with no surfacing included.

#### Plans, Specifications and Estimates Submitted (Refer to Schedule 11).

Plans, specifications and estimates have been submitted to the Bureau of Public Roads for twenty-three projects involving the improvement of 261.72 miles of road, with an estimated total cost of

\$3,458,487.19. The improvements consist of 50.95 miles of hard surfacing, 68.75 miles of gravel surfacing, and 122.79 miles to be constructed to finished grades with no surfacing included.

Plans, specifications and estimates of quantities were also submitted to the Polk County board of supervisors for the paving of the Fort Des Moines Road. This project contemplated the grading and paving of one and one-half miles of primary road and one mile of county road.

#### Project Agreements Executed (Refer to Schedule 12).

Project agreements whereby \$526,443.42 of Federal funds were set aside as the Federal Government's share of the cost of construction of sixteen projects, were executed by the Secretary of Agriculture. The work contemplated in these sixteen projects involves the improvement of 220.63 miles of road, 7.17 miles by hard surfacing, 64.58 miles by gravel surfacing, and the remaining 148.87 miles by constructing to finished grades with no surfacing included.

#### Federal Aid Lettings Held—Contracts Awarded—Contracts Approved.

Lettings have been held on twenty-one Federal Aid projects, twenty-nine contracts awarded on nineteen projects, and twenty-eight contracts approved on eighteen projects. The total of the contracts approved for Federal Aid projects amounts to \$998,844.92, exclusive of contracts for a considerable amount of work being handled on a force account basis, and other items of an indeterminate nature. A brief description of the projects advertised and contracts awarded follows:

Federal Aid Project No. 25, Black Hawk County. This project involves the grading, draining and paving of the Whitney Road, 4.08 miles in length, between Waterloo and Cedar Falls. At a meeting held on June 10th a contract was awarded to Hansen & Christensen, of Waterloo, for the drain tile work on this project, with unit prices as follows:

|               |                                   |                   |
|---------------|-----------------------------------|-------------------|
| 8270 lin. ft. | 6-inch drain tile, avg. depth, 21 | 1-3c per lin. ft. |
| 3160 " "      | 10-inch " " " "                   | 30 1-3c " " "     |

This contract, amounting to \$2,694.70, was approved by the Highway Commission on June 19th.

At a letting held on June 20th a contract was awarded to the Moore-Young Construction Company, of Waterloo, for the grading and paving work on the project, with unit prices as follows:

|               |                                   |                    |
|---------------|-----------------------------------|--------------------|
| 16681 cu. yd. | earth excavation                  | \$0.65 per cu. yd. |
| 42749 sq. yd. | bituminous filled brick pavement. | 3.73 " sq. "       |

This contract, amounting to \$170,296.00, was approved by the Highway Commission on June 24th.

Federal Aid Project No. 10, Calhoun County. This project involves the draining and gravel surfacing of 18.3 miles of the Pomeroy-Rockwell City-Lake City Road. At a letting held on September 16th a contract was awarded to John J. Stark & Company, of Des Moines, for the gravel surfacing work, with unit prices as follows:

|                                       |                 |
|---------------------------------------|-----------------|
| 11250 cu. yd. of gravel loading.....  | 27c per cu. yd. |
| 16200 " " " " " " .....               | 24c " " "       |
| 27375 cu. yd. mi. gravel hauling..... | 55c per cu. yd. |
| 96000 " " " " " " .....               | 53c " " "       |

This contract, amounting to \$72,861.75, was approved by the Highway Commission on September 23rd. Since satisfactory bids were not received on the 6000 lin. ft. of 6-inch drain tile and the 1650 lin. ft. of standard guard rail included in this project, neither at the letting on September 16th nor at a re-advertised letting held on September 30th, all bids on these items were rejected and the county has been authorized to proceed with the construction by day labor.

Federal Aid Project No. 61, Cerro Gordo County. This project involves the grading, draining and paving of the first three miles of the Jefferson Highway south from Mason City and the first three miles of the North Iowa Pike east from Mason City. At a letting held on October 13th on the draining work only on this project, all bids were rejected and private contracts were later awarded, with unit prices as follows:

To the Mason City Brick and Tile Company, of Mason City, for material:

|                                    |                 |
|------------------------------------|-----------------|
| 18500 lin. ft. of 6-inch tile..... | \$ 50.00 per M. |
| 435 " " " 12-inch " .....          | 220.00 " "      |

This contract, amounting to \$1020.70, was approved by the Highway Commission on October 30th.

To J. W. Cox, of Clear Lake, for labor:

|                                    |                     |
|------------------------------------|---------------------|
| 18500 lin. ft. of 6-inch tile..... | \$ .15 per lin. ft. |
| 435 " " " 12-inch " .....          | .18 " " "           |
| 4 tile intakes.....                | 18.00 each          |

This contract, amounting to \$2925.30, was approved by the Highway Commission on October 30th.

Federal Aid Project No. 35, Chickasaw County. This project involves grading, draining, and gravel surfacing 3.3 miles of the New Hampton-Cresco Road, and 9.7 miles of the New Hampton-Waterloo Road. At a letting held on June 19th a contract for the grading work was awarded to O'Hanlon & Reilly, of Omaha, for the grading work on the project, with unit prices as follows:

|  |                |
|--|----------------|
| 61654 cu. yd. of earth excavation..... | 47c per cu yd. |
|--|----------------|

This contract, amounting to \$28,977.38, was approved by the Highway Commission on July 1st.

All bids received on the draining and graveling work on the project were considered too high and were rejected. After considerable trouble

had been experienced in finding satisfactory material and responsible contractors for the tile drainage work, the work was awarded by private contract as follows:

To the Cement Products Company, of Waterloo, for furnishing drain tile F. O. B. cars at New Hampton, at the following unit prices:

|  |                 |
|--|-----------------|
| 28000 lin. ft. of 6-inch drain tile..... | \$ 63.70 per M. |
| 3000 " " " 8-inch drain tile.....        | 100.10 " "      |
| 1000 " " " 10-inch drain tile.....       | 145.05 " "      |
| 500 " " " 12-inch drain tile.....        | 205.70 " "      |

This contract, amounting to \$2,331.80, was approved by the Highway Commission on September 6th.

To Hughes & David, of New Hampton, for hauling at a flat rate to all parts of the project, \$3.50 per ton.

This contract was approved by the Highway Commission on July 22nd.

To C. Sorenson, of Fredericksburg, for placing tile at the following unit prices:

|                   |                               |
|-------------------|-------------------------------|
| 6-inch tile.....  | 45c per rod per foot of depth |
| 8-inch tile.....  | 60c " " " " " "               |
| 10-inch tile..... | 70c " " " " " "               |
| 12-inch tile..... | 80c " " " " " "               |

This contract, amounting to \$4185.44, was approved by the Commission on August 22nd. Arrangements have been made for doing the gravel surfacing work on this project by day labor.

Federal Aid Project No. 12, Dallas County. This project involves grading and draining 16.8 miles of the Perry-Adel Road. At a letting held on July 10th a contract was awarded to E. W. Beaman, of Omaha, Nebr., for the 66831 cu. yd. of earth excavation work on the project at 58c per cu yd. This contract, amounting to \$38,761.98, was approved by the Highway Commission on July 16th.

All bids were rejected on the tile drainage work, and at a re-advertised letting held on July 24th a contract was awarded to the Dawson Cement Tile Company, of Dawson, for furnishing 17815 lin. ft. of 6-inch drain tile at a price of \$56.60 per M. for tile delivered at Perry, and \$59.00 per M. for tile delivered at Minburn. This contract, amounting to \$1036.55, was approved by the Highway Commission on August 12th.

In the meantime a private contract had been awarded to John Smithers, of Perry, for installing the tile at a unit price of \$1.50 per rod for four foot work, and 3c per inch rod for overdepth. This contract was approved by the Highway Commission on August 8th.

Federal Aid Project No. 8, Decatur County. This project involves grading and draining 9.83 miles of the Jefferson Highway between Lamoni and Leon. Lettings were held on this project on June 25th and again on July 22nd. All bids received at both lettings were rejected, and later a private contract for the grading work on the project was awarded to the W. R. Shipman Construction Company, of Sioux City, with unit prices as follows:

|                                      |                    |
|--------------------------------------|--------------------|
| 129339 cu. yd. earth excavation..... | \$ .57 per cu. yd. |
| 8215 " " " " (subway)....            | 1.25 " " "         |

This contract, amounting to \$83,991.98, was approved by the Highway Commission on September 27th.

Federal Aid Project No. 4, Delaware County. This project involves grading and gravel surfacing 12.62 miles of the Hawkeye Highway between Manchester and Dyersville. At a letting on the grading work held on September 30th a contract was awarded to Russell Condon, of Omaha, Nebr., for 66809 cu. yd. of earthwork at 55½c per cu. yd. This contract, amounting to \$37,079.00, was approved by the Highway Commission on October 4th.

Federal Aid Project No. 39, Greene County. This project involves grading, draining and paving a total of 7.41 miles on the three primary roads radiating from Jefferson. A letting was held on November 14th on a part of the grading work, and all of the drainage work included in this project. The bids received at this letting were not considered satisfactory and all were rejected.

Federal Aid Project No. 14, Harrison County. This project involves grading 15.6 miles of the Lincoln Highway between Woodbine and Missouri Valley. At a letting held on October 22nd a contract for the grading work, 154,332 cu. yds. of earth excavation, was awarded to the Phelan-Shirley Company, of Omaha, Nebr., at a unit price of 44c per cu. yd. This contract, amounting to \$67,906.08, was approved by the Highway Commission on November 18th.

Federal Aid Project No. 31, Howard County. This project involves grading, draining, and graveling 10.4 miles of the Cresco-Riceville Road. At a letting held on June 18th a contract for the grading work, 43,765 cu. yd. of earth excavation, was awarded to Frank Richardson, of Maxwell, at a unit price of 50c per cu. yd. This contract, amounting to \$21,887.50, was approved by the Highway Commission on June 20th.

All bids on the tiling work and graveling were rejected. Later a private contract was entered into with Frank Richardson, of Maxwell, for the graveling work at the following unit prices:

|                                      |                      |
|--------------------------------------|----------------------|
| Loading gravel.....                  | \$ 0.25 per cu. yd.  |
| Hauling and spreading, 1st mile..... | 1.00 per cu. yd. mi. |
| “ “ “ 2nd “ .....                    | .67 “ “ “ “          |
| “ “ “ 3rd “ .....                    | .60 “ “ “ “          |
| “ “ “ 4th “ .....                    | .57 “ “ “ “          |

This contract, amounting to \$33,300.00, was approved by the Highway Commission on October 11th.

Federal Aid Project No. 3, Jefferson County. This project involves grading and draining 20.53 miles of the Blue Grass Road, commencing at the Wapello County line. At a letting held on April 22nd a contract for the grading and draining work on the project was awarded to Cameron, Joyce & Company, of Keokuk, at the following unit prices:

|   |                  |
|---|------------------|
| 153,173 cu. yd. earth excavation.....                                 | 43c per cu. yd.  |
| 16,900 lin. ft. of 6-inch tile drain, four and five<br>foot work..... | 25c per lin. ft. |
| For six foot work.....  | 30c “ “ “        |

This contract, amounting to \$70,338.96, was approved by the Highway Commission on May 12th.

Federal Aid Project No. 9, Johnson County. This project, 11.1 miles in length, involves the grading work on the North Liberty and Kalona Roads, and the grading and paving of 1.1 mile on the Coralville Road, all three improvements radiating from the corporate limits of Iowa City. At a letting held on June 30th all bids were rejected. Later an agreement was entered into with W. A. Kettlewell, of Iowa City, for doing the grading work on the North Liberty and Kalona Roads on a modified force account basis whereby the percentages of profit which the contractor receives varies with the unit cost price, decreasing as the cost of the work increases above 45c per cu. yd. This agreement was approved by the Commission on September 12th.

Supplementary agreements approved by the Highway Commission were later entered into with W. A. Kettlewell covering the rental price on a tractor, and with W. L. Hartsock covering the rental price on a truck, both machines being used in connection with the construction work on this project.

Federal Aid Project No. 34, Keokuk County. This project involves grading 12¼ miles of the Great White Way east from the west line of the county. At a letting held on July 24th a contract for the grading work, 118,341 cu. yd. of earth excavation, was awarded to J. E. McAndrew, of Keokuk, at 56c per cu. yd. Approval of this contract was withheld pending the settlement of a proposed change in the location of the primary road at the west end of the project, though assurance was given the county and the contractor that such approval would be made as soon as a decision had been reached regarding the proposed change.

Federal Aid Project No. 22, Linn County. This project, 17.8 miles in length, involves the grading, draining and gravel surfacing of 10.5 miles of the Marion-Manchester Road, the grading of 6.6 miles of the Cedar Rapids-Mt. Vernon Road, and the paving of 1.25 miles thereof, and the graveling and paving of 0.75 miles on the Marion-Cedar Rapids Boulevard. At a letting held on July 16th a contract was awarded to the Ford Paving Company, of Cedar Rapids, for all the tiling work on the project and for the grading and paving on the Marion-Cedar Rapids Boulevard at unit prices as follows:

|  |                     |
|--|---------------------|
| 60180 lin. ft. 6-inch drain tile.....                | \$ .25 per lin. ft. |
| 8595 “ “ 8-inch “ “ .....                            | .27 “ “ “           |
| 1715 cu. yd. grading.....                            | .90 per cu. yd.     |
| 9400 “ “ bituminous filled brick pave-<br>ment ..... | 4.11 “ sq. “        |

This contract, amounting to \$55,600.47, was approved by the Highway Commission on July 22nd.

A contract was also awarded at this letting to J. Herbert & Sons, of Marshalltown, for the grading work, 60,000 cu. yd. of earth excavation, on the Cedar Rapids-Mt. Vernon Road, at 52½c per cu. yd. This contract, amounting to \$31,500.00, was approved by the Highway Commission on July 26th.

Federal Aid Project No. 20, Monroe County. This project involves grading 8.25 miles of the Air Line Road from Albia east to the county line. At a letting held on this project on June 4th all bids were rejected and the work re-advertised for letting on July 9th. At the letting on July 9th the contract was awarded to Buis & Olson, of St. Joseph, Mo., for the grading work on the project, 116,444 cu. yd. of earth excavation, at 53½¢ per cu. yd. This contract, amounting to \$62,297.50, was approved by the Highway Commission on July 14th.

Federal Aid Project No. 16, Montgomery County. This project involves grading 16.5 miles of the Stand Pipe Road from Red Oak east to the county line. At a letting held on the work on this project on June 24th all bids were considered too high and were rejected. Later an agreement was entered into with Ryan & Wilson, of Des Moines, for doing the earthwork on this project on a rental and force account basis. This agreement was approved by the Highway Commission on July 16th.

Federal Aid Project No. 6, Ringgold County. This project involves the grading of the four primary roads radiating from Mount Ayr for a distance of three miles in each direction. On July 23rd a letting was held on the work included in this project. All bids received were considered too high and were rejected. A second letting was held on August 27th, at which letting no bids were received. A private contract was later awarded for the earthwork on this project, 133,340 cu. yd. of earth excavation, to the W. R. Shipman Construction Company, of Sioux City, at 59½¢ per cu. yd. This contract, amounting to \$79,337.30, was approved by the Highway Commission on August 28th.

Federal Aid Project No. 54, Scott County. This project involves the grading, draining and paving of 8.46 miles of the Davenport-Durant Road. At a letting held on September 9th on the grading and draining work only a contract was awarded to Russell Condon, of Omaha, Nebr., for the grading work on the project, 34,298 cu. yd. of earth excavation, at a unit price of 58.9¢ per cu. yd. This contract, amounting to \$20,201.52, was approved by the Highway Commission on September 11th. At this letting a contract was also awarded to Wm. Rathlef, of Eldredge, for the tile drainage work on the project, 20,500 lin. ft. of 6-inch tile drain, at 24½¢ per lin. ft., and \$45.00 each for the construction of three tile inlets. This contract, amounting to \$5157.50, was approved by the Highway Commission on September 13th.

Federal Aid Project No. 28, Sioux County. This project involves the grading and draining of 24.27 miles of the Sioux Center-Maurice Road and the Orange City-Hawarden Road. At a letting held on August 27th the contract for the grading work, 165,410 cu. yd. of earth excavation, was awarded at a unit price of 47.694¢ per cu. yd. This contract, amounting to \$78,884.03, was approved by the Highway Commission on October 30th.

Federal Aid Project No. 84, Sioux County. This project involves the grading, draining and paving of the Orange City-Alton Road, approximately three miles in length. A letting was held on the work included in this project on November 12th, but all bids received were considered too high and were rejected.

Federal Aid Project No. 13, Webster County. This project involves grading, draining and graveling twelve miles of the Hawkeye Highway six miles each way from Fort Dodge. At a letting held on July 22nd all bids were considered too high and were rejected. At a re-advertised letting held on August 8th, a contract was awarded to Russell Condon, of Omaha, Nebr., for the earthwork on this project, 47,336 cu. yd. of earth excavation, at 55½¢ per cu. yd. This contract, amounting to \$26,271.48, was approved by the Highway Commission on August 9th.

#### Primary Road Project Lettings—Contracts Awarded—Contracts Approved.

Primary Road Project No. 1, Polk County. The project involves grading, draining and paving one and one-half miles of primary road from Des Moines to the northwest corner of Fort Des Moines, and one mile of county road along the north side of the Fort. At a letting held on August 25th all bids were rejected. At a re-advertised letting held on August 30th a contract was awarded Thos. Cary & Sons, of Des Moines, at the following unit prices:

|   |                    |
|---|--------------------|
| 12996 cu. yd. earth excavation.....         | \$ .85 per cu. yd. |
| 2800 lin. ft. concrete curb and gutter..... | 1.54 per lin. ft.  |
| 29260 sq. yd. of bitulithic pavement.....   | 4.09 per sq. yd.   |

This contract, amounting to \$140,377.63, was disapproved by the Highway Commission on September 16th.

Primary Road Project No. 3, Polk County. This project involves the grading of the Carlisle Road from Des Moines to the Warren County line. At a letting on this project on November 15th no bids were received.

#### Contracts Approved Aside from Federal Aid and Primary Road Projects (Refer to Schedule 13).

Thirty-seven contracts totaling \$525,359.21, for road work aside from Federal Aid and Primary Road projects, in thirteen different counties, were approved. Eleven of these contracts are for work in connection with secondary road districts, the remaining twenty-six being either for work awarded privately after bids had been received, or contracts on which the board of supervisors desired the Highway Commission's approval even though such approval was not required by law.

#### Secondary Road Districts Established (Refer to Schedule 14).

The legislation enacted by the Thirty-eighth General Assembly providing for the establishment of secondary road districts has proven very popular, especially in those counties having a considerable supply of local gravel available for surfacing purposes. Twenty-two secondary road districts have been established in eight counties, involving the gravel surfacing of 144.25 miles of road. Approximately 127,760 acres of land have been included in the special assessment districts established in connection with these secondary road districts.

SCHEDULE FIVE.

COUNTY ROAD CHANGES AND ADDITIONS.

| County        | Date Filed with Commission | Date of Action by Commission | Was Board's Action Approved? | Mi. Added to Co. System | Mi. Deducted from Co. Sys. |
|---------------|----------------------------|------------------------------|------------------------------|-------------------------|----------------------------|
| Allamakee     | March 15, 1919.            | March 24, 1919               | Yes                          | 6.66                    |                            |
| Benton        | January 7, 1918.           | April 28, 1919               | Yes                          | 5.12                    |                            |
| Benton        | January 7, 1918.           | April 28, 1919               | No                           |                         |                            |
| Boone         | March 17, 1919.            | April 3, 1919                | Yes                          | 2.50                    |                            |
| Bremer        | March 12, 1919.            | March 21, 1919               | Yes                          | 4.50                    |                            |
| Buchanan      | Feb'y. 20, 1918.           | April 28, 1919               | Yes                          | 5.00                    |                            |
| Cedar         | June 21, 1919.             | Aug. 5, 1919                 | Yes                          | 7.50                    | 9.00                       |
| Cerro Gordo   | Feb'y. 22, 1919.           | March 21, 1919               | Yes                          | 3.50                    |                            |
| Cerro Gordo   | May 15, 1918.              | April 3, 1919                | Yes                          | 9.25                    |                            |
| Cherokee      | October 2, 1919.           | Nov. 7, 1919                 | No                           |                         |                            |
| Crawford      | March 20, 1919.            | March 30, 1919               | Yes                          | 2.75                    |                            |
| Davis         | Sept. 20, 1919.            | Oct. 23, 1919                | Yes                          | 6.00                    | 5.50                       |
| Decatur       | August 13, 1919.           | Sept. 9, 1919                | Yes                          | 5.25                    |                            |
| Decatur       | April 24, 1919.            | April 28, 1919               | Yes                          | 2.50                    | 2.00                       |
| Floyd         | Feb'y. 22, 1919.           | March 21, 1919               | Yes                          | 3.75                    |                            |
| Greene        | August 11, 1919.           | Aug. 14, 1919                | Yes                          | 1.75                    |                            |
| Grundy        | July 6, 1918.              | June 23, 1919                | No                           |                         |                            |
| Hancock       | May 30, 1919.              | June 10, 1919                | Yes                          | 0.50                    |                            |
| Hancock       | May 14, 1919.              | May 27, 1919                 | Yes                          | 1.50                    |                            |
| Hardin        | June 5, 1919.              | Sept. 30, 1919               | Yes                          | 2.75                    |                            |
| Hardin        | April 10, 1919.            | April 28, 1919               | Yes                          | 1.00                    | 0.75                       |
| Howard        | June 9, 1919.              | June 23, 1919                | Yes                          | 0.75                    | 0.62                       |
| Ida           | June 4, 1919.              | Nov. 7, 1919                 | No                           |                         |                            |
| Jones         | August 12, 1919.           | Sept. 30, 1919               | No                           |                         |                            |
| Johnson       | Sept. 25, 1919.            | Oct. 24, 1919                | Yes                          | 2.12                    |                            |
| Lucas         | Sept. 17, 1919.            | Sept. 23, 1919               | Yes                          | 2.00                    | 2.50                       |
| Lucas         | July 16, 1919.             | July 18, 1919                | Yes                          | 0.25                    |                            |
| Lucas         | May 17, 1919.              | May 27, 1919                 | Yes                          | 0.75                    |                            |
| Louisa        | December 5, 1918.          | Dec. 19, 1918                | Yes                          | 0.62                    |                            |
| Lyon          | December 27, 1918.         | Jan. 6, 1919                 | Yes                          | 0.50                    | 0.50                       |
| Marion        | January 8, 1919.           | Jan. 16, 1919                | Yes                          | 1.50                    |                            |
| Marshall      | August 9, 1919.            | Aug. 18, 1919                | Yes                          | 1.75                    |                            |
| Mitchell      | March 20, 1919.            | March 21, 1919               | Yes                          | 1.12                    |                            |
| Plymouth      | May 2, 1919.               | May 27, 1919                 | Yes                          | 0.87                    |                            |
| Pocahontas    | May 13, 1919.              | Aug. 18, 1919                | Yes                          | 15.00                   | 6.00                       |
| Pottawattamie | May 16, 1919.              | May 27, 1919                 | No                           |                         |                            |
| Pottawattamie | April 19, 1919.            | May 27, 1919                 | Yes                          | 0.50                    | 0.50                       |
| Scott         | June 16, 1919.             | June 23, 1919                | Yes                          |                         |                            |
| Scott         | Sept. 29, 1919.            | Oct. 3, 1919                 | Yes                          | 2.50                    |                            |
| Sioux         | Feb'y. 11, 1919.           | Feb. 24, 1919                | Yes                          | 0.50                    |                            |
| Sioux         | Feb'y. 26, 1919.           | March 21, 1919               | Yes                          | 8.66                    |                            |
| Sioux         | Feb'y. 26, 1919.           | Aug. 18, 1919                | Yes                          | 7.50                    | 8.50                       |
| Sac           | October 1, 1918.           | Dec. 4, 1918                 | Yes                          | 4.80                    | 3.75                       |
| Union         | March 27, 1919.            | May 27, 1919                 | Yes                          | 0.50                    | 0.50                       |
| Wayne         | Feb'y. 7, 1919.            | Sept. 5, 1919                | Yes                          | 4.50                    |                            |
| Washington    | Dec. 16, 1919.             | Dec. 19, 1919                | Yes                          | 3.25                    |                            |
| Worth         | March 31, 1919.            | April 3, 1919                | Yes                          | 0.75                    |                            |

SCHEDULE SIX.

FEDERAL AID PROJECTS OUTLINED BY RESOLUTION OF BOARD OF SUPERVISORS.

| County         | Project No. | Length in Miles   |                 |        | Total |
|----------------|-------------|-------------------|-----------------|--------|-------|
|                |             | Permanent Grading | Gravel Surf'ing | Paving |       |
| Audubon        | 52          | 26.25             |                 |        | 26.25 |
| Adair          | 95          | 15.50             |                 |        | 15.50 |
| Allamakee      | 126         | 7.85              |                 | 7.35   | 7.35  |
| Benton         | 58          | 17.89             |                 | 8.79   | 17.89 |
| Black Hawk     | 62          | 17.10             |                 | 17.10  | 17.10 |
| Boone          | 65          | 22.50             | 22.50           |        | 22.50 |
| Bremer         | 88          | 16.40             |                 |        | 16.40 |
| *Buchanan      | 5           | 14.80             |                 | 14.80  | 14.80 |
| Buena Vista    | 37          |                   | 12.86           |        | 12.86 |
| Butler         | 85          | 15.62             | 15.62           |        | 15.62 |
| Carroll        | 99          | 8.88              |                 |        | 8.88  |
| Cass           | 44          | 19.60             |                 |        | 19.60 |
| Cerro Gordo    | 61          | 6.00              |                 | 6.00   | 6.00  |
| Cerro Gordo    | 115         | 22.25             |                 | 22.25  | 22.25 |
| Cherokee       | 116         | 14.00             |                 |        | 14.00 |
| Cedar          | 57          | 24.20             |                 |        | 24.20 |
| Chickasaw      | 76          | 13.50             | 13.50           |        | 13.50 |
| Clay           | 73          | 7.24              |                 | 7.24   | 7.24  |
| Clayton        | 74          | 32.20             |                 |        | 32.20 |
| *Clinton       | 118         | 17.75             |                 | 17.75  | 17.75 |
| Dallas         | 101         | 22.25             | 7.25            |        | 22.25 |
| Davis          | 50          | 10.20             |                 |        | 10.20 |
| Decatur        | 122         | 10.00             |                 |        | 10.00 |
| Delaware       | 103         | 13.50             | 13.50           |        | 13.50 |
| *Des Moines    | 124         | 6.50              |                 | 6.50   | 6.50  |
| Dickinson      | 68          | 5.50              |                 | 5.50   | 5.50  |
| *Dubuque       | 17          | 21.69             |                 |        | 21.69 |
| Emmet          | 49          | 3.95              |                 | 3.95   | 3.95  |
| Fayette        | 59          | 36.60             |                 |        | 36.60 |
| Franklin       | 105         | 9.75              | 9.75            |        | 9.75  |
| Fremont        | 77          | 18.50             |                 |        | 18.50 |
| Greene         | 39          | 7.40              |                 | 7.40   | 7.40  |
| Grundy         | 19          | 14.25             |                 |        | 14.25 |
| Guthrie        | 51          | 20.00             |                 |        | 20.00 |
| Hamilton       | 67          | 20.90             |                 |        | 20.90 |
| Hancock        | 94          | 24.90             |                 | 24.90  | 24.90 |
| Harrison       | 82          | 19.50             |                 |        | 19.50 |
| Henry          | 56          | 20.90             |                 |        | 20.90 |
| Howard         | 93          | 11.00             | 11.00           |        | 11.00 |
| Humboldt       | 48          | 1.87              | 0.60            | 1.23   | 1.87  |
| Humboldt       | 117         | 40.25             |                 |        | 40.25 |
| Ida            | 80          | 19.50             |                 |        | 19.50 |
| Iowa           | 90          | 26.50             |                 |        | 26.50 |
| Jasper         | 64          | 31.75             |                 |        | 31.75 |
| Jefferson      | 120         | 6.90              |                 |        | 6.90  |
| Johnson        | 102         | 4.50              |                 | 5.00   | 5.00  |
| Jones          | 86          | 25.20             |                 |        | 25.20 |
| Kossuth        | 66          | 34.23             |                 |        | 34.23 |
| Kossuth        | 111         | 22.31             |                 | 22.31  | 22.31 |
| *Linn (Amend.) | 22          |                   |                 | 5.41   | 5.41  |
| Louisa         | 53          | 24.80             |                 |        | 24.80 |
| Lucas          | 63          | 33.15             |                 |        | 33.15 |
| Lyon           | 110         | 22.00             |                 |        | 22.00 |
| Mahaska        | 70          | 28.25             |                 |        | 28.25 |
| Marion         | 75          | 23.20             |                 |        | 23.20 |
| Marshall       | 23          |                   |                 | 6.00   | 6.00  |
| Mills          | 113         | 8.00              |                 |        | 8.00  |
| Mitchell       | 45          | 15.88             | 15.88           |        | 15.88 |
| Monona         | 69          | 39.40             |                 |        | 39.40 |
| Muscatine      | 40          | 20.50             |                 |        | 20.50 |
| Muscatine      | 87          | 29.10             |                 |        | 29.10 |
| Muscatine      | 87          | 22.59             |                 | 22.59  | 22.59 |
| O'Brien        | 43          | 16.50             |                 |        | 16.50 |
| Page           | 100         | 16.50             |                 |        | 16.50 |
| Palo Alto      | 109         | 11.00             |                 | 11.00  | 11.00 |

SCHEDULE SIX—Continued.

| County             | Project No. | Length in Miles   |                 |        |          |
|--------------------|-------------|-------------------|-----------------|--------|----------|
|                    |             | Permanent Grading | Gravel Surf'ing | Paving | Total    |
| Plymouth           | 38          | 27.85             |                 |        | 27.85    |
| Plymouth           | 112         | 27.50             |                 |        | 27.50    |
| Polk               | 104         | 6.57              |                 | 6.57   | 6.57     |
| Pottawattamie      | 46          | 2.65              |                 |        | 2.65     |
| Poweshiek          | 119         | 24.75             |                 |        | 24.75    |
| Ringgold           | 123         | 12.00             |                 |        | 12.00    |
| Scott              | 54          | 8.46              |                 | 8.46   | 8.46     |
| Scott              | 55          | 21.00             |                 |        | 21.00    |
| Scott              | 114         | 15.00             |                 | 15.00  | 15.00    |
| Sioux              | 84          | 2.94              |                 | 2.94   | 2.94     |
| Story              | 72          | 12.00             | 8.50            |        | 20.50    |
| Tama               | 47          | 30.00             |                 |        | 30.00    |
| Taylor             | 81          | 19.25             |                 |        | 19.25    |
| Union              | 83          | 24.00             |                 |        | 24.00    |
| Van Buren          | 60          | 11.10             |                 |        | 11.10    |
| Washington         | 71          | 22.00             |                 |        | 22.00    |
| Wayne              | 91          | 17.80             |                 |        | 17.80    |
| Winneshiek         | 98          | 27.20             |                 |        | 27.20    |
| Woodbury           | 78          | 2.80              |                 | 2.80   | 2.80     |
| *Woodbury (Amend.) | 2           | 19.45             |                 | 19.45  | 19.45    |
| Totals             | 84          | 1,448.02          | 130.96          | 278.29 | 1,481.29 |

\*Project No. 5, Buchanan County, substitutes pavement for gravel surfacing proposed in original project.

Project No. 18, Clinton County, substitutes pavement for gravel surfacing proposed in original project.

Project No. 124, Des Moines County, includes mileage originally included in Project No. 32.

Project No. 17, Dubuque County, new project is modification of original Project No. 17.

Project No. 22, Linn County, original project amended to include 5.41 additional miles of pavement.

Project No. 2, Woodbury County, original project amended to include 19.45 additional miles of pavement.

SCHEDULE SEVEN.

PRIMARY ROAD PROJECTS OUTLINED BY RESOLUTION OF BOARD OF SUPERVISORS.

| County    | Project No. | Length in Miles   |                 |        |       |
|-----------|-------------|-------------------|-----------------|--------|-------|
|           |             | Permanent Grading | Gravel Surf'ing | Paving | Total |
| Polk      | 1           | 1.50              |                 | 1.50   | 1.50  |
| Winnebago | 2           | 18.87             | 18.87           |        | 18.87 |
| Polk      | 3           | 4.25              |                 |        | 4.25  |
| Hardin    | 4           | 9.00              | 4.50            |        | 9.00  |
| Calhoun   | 5           |                   | 4.00            |        | 4.00  |
| Kossuth   | 6           | 17.42             |                 |        | 17.42 |
| Totals    | 6           | 51.04             | 27.37           | 1.50   | 55.04 |

SCHEDULE EIGHT.

TRAFFIC CENSUS DATA—DAILY AVERAGE BY COUNTIES.

| County        | No. of Stations | Through Traffic    |                             |                                | Local Traffic      |                             |                                | Avg. No. of All Units (Daily) |
|---------------|-----------------|--------------------|-----------------------------|--------------------------------|--------------------|-----------------------------|--------------------------------|-------------------------------|
|               |                 | Approximate Trucks | Average Pass. Motor Vehicle | Daily No. Horse Drawn Vehicles | Approximate Trucks | Average Pass. Motor Vehicle | Daily No. Horse Drawn Vehicles |                               |
| Adair         | 2               | 0                  | 22                          | 0                              | 9                  | 167                         | 36                             | 334                           |
| Audubon       | 1               | 1                  | 51                          | 0                              | 24                 | 286                         | 25                             | 387                           |
| Buena Vista   | 1               | 1                  | 161                         | 0                              | 7                  | 146                         | 16                             | 331                           |
| Black Hawk    | 4               | 228                | 1                           | 25                             | 262                | 60                          | 580                            | 580                           |
| Bremer        | 0               | 22                 | 0                           | 11                             | 160                | 64                          | 257                            | 257                           |
| Butler        | 1               | 1                  | 23                          | 0                              | 10                 | 177                         | 57                             | 268                           |
| Boone         | 2               | 13                 | 2                           | 11                             | 159                | 25                          | 210                            | 210                           |
| Cass          | 1               | 53                 | 0                           | 13                             | 180                | 8                           | 256                            | 256                           |
| Clay          | 2               | 615                | 0                           | 12                             | 240                | 25                          | 804                            | 804                           |
| Clayton       | 4               | 0                  | 11                          | 0                              | 9                  | 104                         | 31                             | 155                           |
| Cerro Gordo   | 4               | 1                  | 65                          | 0                              | 14                 | 276                         | 33                             | 389                           |
| Cedar         | 2               | 7                  | 141                         | 0                              | 4                  | 85                          | 21                             | 258                           |
| Davis         | 1               | 0                  | 11                          | 0                              | 5                  | 118                         | 25                             | 159                           |
| Dickinson     | 2               | 1                  | 526                         | 0                              | 24                 | 688                         | 39                             | 1078                          |
| Emmet         | 1               | 1                  | 21                          | 0                              | 15                 | 295                         | 18                             | 350                           |
| Fayette       | 3               | 0                  | 14                          | 0                              | 16                 | 202                         | 52                             | 284                           |
| Floyd         | 1               | 2                  | 154                         | 0                              | 11                 | 190                         | 57                             | 414                           |
| Fremont       | 2               | 0                  | 14                          | 0                              | 10                 | 140                         | 17                             | 181                           |
| Greene        | 3               | 2                  | 47                          | 2                              | 13                 | 300                         | 17                             | 381                           |
| Guthrie       | 4               | 0                  | 30                          | 0                              | 16                 | 167                         | 27                             | 230                           |
| Hamilton      | 2               | 0                  | 31                          | 0                              | 7                  | 184                         | 19                             | 241                           |
| Hancock       | 1               | 2                  | 115                         | 0                              | 10                 | 274                         | 35                             | 436                           |
| Henry         | 4               | 2                  | 111                         | 0                              | 7                  | 138                         | 42                             | 300                           |
| Iowa          | 2               | 0                  | 54                          | 0                              | 8                  | 153                         | 36                             | 251                           |
| Ida           | 2               | 0                  | 27                          | 0                              | 18                 | 266                         | 42                             | 353                           |
| Jefferson     | 1               | 0                  | 14                          | 0                              | 11                 | 280                         | 65                             | 370                           |
| Jones         | 2               | 1                  | 21                          | 0                              | 12                 | 231                         | 74                             | 339                           |
| Jasper        | 2               | 1                  | 45                          | 0                              | 10                 | 341                         | 22                             | 419                           |
| Kossuth       | 6               | 1                  | 33                          | 0                              | 9                  | 132                         | 32                             | 207                           |
| Lucas         | 4               | 0                  | 8                           | 0                              | 8                  | 186                         | 48                             | 250                           |
| Louis         | 3               | 3                  | 117                         | 0                              | 7                  | 179                         | 51                             | 357                           |
| Lee           | 1               | 2                  | 87                          | 0                              | 18                 | 329                         | 54                             | 490                           |
| Linn          | 2               | 2                  | 114                         | 1                              | 9                  | 200                         | 25                             | 351                           |
| Mitchell      | 1               | 1                  | 63                          | 0                              | 5                  | 142                         | 21                             | 232                           |
| Mahaska       | 4               | 3                  | 149                         | 0                              | 18                 | 296                         | 36                             | 502                           |
| Marion        | 2               | 0                  | 5                           | 0                              | 8                  | 94                          | 25                             | 132                           |
| Monona        | 4               | 0                  | 18                          | 0                              | 3                  | 122                         | 32                             | 175                           |
| Muscatine     | 2               | 4                  | 123                         | 0                              | 16                 | 200                         | 25                             | 368                           |
| O'Brien       | 2               | 0                  | 32                          | 0                              | 7                  | 108                         | 34                             | 181                           |
| Osceola       | 1               | 1                  | 79                          | 0                              | 4                  | 249                         | 66                             | 399                           |
| Pottawattamie | 4               | 8                  | 159                         | 0                              | 57                 | 388                         | 41                             | 653                           |
| Page          | 3               | 0                  | 36                          | 0                              | 21                 | 242                         | 27                             | 326                           |
| Palo Alto     | 1               | 1                  | 47                          | 0                              | 4                  | 119                         | 34                             | 205                           |
| Polk          | 5               | 2                  | 76                          | 0                              | 36                 | 385                         | 34                             | 533                           |
| Sac           | 1               | 0                  | 6                           | 0                              | 7                  | 151                         | 52                             | 216                           |
| Sioux         | 1               | 0                  | 6                           | 0                              | 12                 | 177                         | 24                             | 219                           |
| Shelby        | 2               | 1                  | 30                          | 0                              | 14                 | 207                         | 8                              | 290                           |
| Scott         | 10              | 3                  | 92                          | 0                              | 22                 | 139                         | 18                             | 274                           |
| Story         | 2               | 1                  | 82                          | 0                              | 12                 | 332                         | 51                             | 378                           |
| Tama          | 3               | 1                  | 80                          | 0                              | 17                 | 200                         | 34                             | 332                           |
| Taylor        | 2               | 0                  | 9                           | 0                              | 4                  | 119                         | 23                             | 155                           |
| Union         | 2               | 0                  | 7                           | 0                              | 6                  | 118                         | 22                             | 153                           |
| Van Buren     | 2               | 0                  | 9                           | 0                              | 3                  | 117                         | 19                             | 148                           |
| Worth         | 1               | 9                  | 274                         | 0                              | 5                  | 152                         | 21                             | 461                           |
| Woodbury      | 1               | 2                  | 124                         | 0                              | 42                 | 370                         | 22                             | 560                           |
| Wayne         | 2               | 0                  | 85                          | 0                              | 12                 | 256                         | 52                             | 405                           |
| Washington    | 4               | 3                  | 68                          | 0                              | 12                 | 251                         | 55                             | 389                           |

SCHEDULE NINE.

PROJECT STATEMENTS APPROVED BY BUREAU OF PUBLIC ROADS.

| County        | Project No. | Length in Miles   |                  |        | Estimated Cost | Federal Aid Requested |
|---------------|-------------|-------------------|------------------|--------|----------------|-----------------------|
|               |             | Permanent Grading | Gravel Surfacing | Paving |                |                       |
| Audubon       | 52          | 26.25             |                  |        | \$ 149,842.00  | \$ 74,900.00          |
| Black Hawk    | 25          | 4.08              |                  | 4.08   | 126,066.16     | 21,881.28             |
| Black Hawk    | 62          | 17.10             |                  | 17.10  | 757,697.60     | 342,000.00            |
| Bremer        | 88          | 16.40             |                  |        | 16.40          | 51,636.20             |
| Buena Vista   | 37          |                   | 12.86            |        | 45,267.20      | 22,600.00             |
| Cerro Gordo   | 61          | 6.00              |                  | 6.00   | 242,611.00     | 120,000.00            |
| Cass          | 44          | 19.60             |                  | 19.60  | 75,856.00      | 21,804.00             |
| Chickasaw     | 76          | 13.50             | 13.50            |        | 86,847.75      | 43,400.00             |
| Clark         | 33          | 9.60              |                  | 9.60   | 38,170.00      | 16,546.27             |
| Davis         | 50          | 10.20             |                  | 10.20  | 62,310.60      | 31,150.00             |
| *Des Moines   | 32          | 2.82              |                  | 2.82   | 52,195.00      | 16,584.93             |
| Dubuque       | 17          | 21.69             |                  | 21.69  | 142,428.00     | 71,200.00             |
| *Floyd        | 41          | 11.72             | 11.72            |        | 75,396.20      | 19,136.45             |
| Fremont       | 77          | 18.50             |                  | 18.50  | 147,400.00     | 73,700.00             |
| Greene        | 39          | 7.41              |                  | 7.41   | 293,920.00     | 146,900.00            |
| Guthrie       | 51          | 20.00             |                  | 20.00  | 140,586.60     | 70,200.00             |
| Hancock       | 94          | 24.90             |                  | 24.90  | 953,350.20     | 476,600.00            |
| Henry         | 56          | 20.90             |                  | 20.90  | 91,377.00      | 45,500.00             |
| Howard        | 93          | 11.00             | 11.00            |        | 84,851.25      | 42,400.00             |
| Marion        | 75          | 23.20             |                  | 23.20  | 123,921.60     | 61,900.00             |
| Monona        | 69          | 39.40             |                  | 39.40  | 168,861.00     | 84,400.00             |
| O'Brien       | 43          | 22.59             |                  | 22.59  | 832,436.00     | 416,000.00            |
| *Palo Alto    | 36          | 11.93             | 11.93            |        | 85,360.00      | 22,113.25             |
| Palo Alto     | 109         | 11.00             |                  | 11.00  | 256,816.00     | 128,400.00            |
| Plymouth      | 38          | 27.85             |                  | 27.85  | 71,621.00      | 33,285.80             |
| Polk          | 104         | 6.50              |                  | 6.50   | 337,145.25     | 130,000.00            |
| Pottawattamie | 46          | 8.46              | 8.46             |        | 400,563.62     | 169,000.00            |
| Scott         | 54          | 2.65              |                  | 2.65   | 24,310.00      | 12,155.00             |
| Sioux         | 28          | 24.27             |                  | 24.27  | 65,780.00      | 29,381.20             |
| Sioux         | 84          | 3.00              |                  | 3.00   | 108,872.50     | 54,400.00             |
| Van Buren     | 60          | 11.10             |                  | 11.10  | 54,120.00      | 27,000.00             |
| Wapello       | 42          | 10.80             |                  | 10.80  | 40,370.00      | 16,932.90             |
| Washington    | 71          | 22.00             |                  | 22.00  | 154,550.00     | 77,200.00             |
| Winnebago     | 30          | 4.00              | 7.50             |        | 47,437.50      | 15,425.14             |
| Totals        | 34          | 490.42            | 68.51            | 113.86 | 506.78         | \$ 6,389,973.83       |
|               |             |                   |                  |        |                | \$ 2,959,896.22       |

\*Project No. 32, Des Moines County, will be included in a new and larger paving project.

Project No. 41, Floyd County has been amended and will be constructed as a paving project.

Project No. 36, Palo Alto County, will not be constructed as a graveling project

SCHEDULE TEN.

PRIMARY ROAD PROJECTS APPROVED BY HIGHWAY COMMISSION.

| County    | Project No. | Length in Miles   |                  |        | Estimated Cost | Date Approved |          |
|-----------|-------------|-------------------|------------------|--------|----------------|---------------|----------|
|           |             | Permanent Grading | Gravel Surfacing | Paving |                |               | Total    |
| Calhoun   | 5           |                   | 4.00             |        | 4.00           | \$ 15,290.00  | 11-12-19 |
| Polk      | 12          | 4.25              |                  |        | 4.25           | 15,550.26     | 10-24-19 |
| Winnebago | 12          | 18.87             | 18.87            |        | 18.87          | 100,093.95    | 10-24-19 |
| Totals    | 3           | 23.12             | 22.87            |        | 27.12          | \$ 130,934.21 |          |

SCHEDULE ELEVEN.

PLANS, SPECIFICATIONS AND ESTIMATES SUBMITTED TO BUREAU OF PUBLIC ROADS.

| County        | Project No. | Length in Miles   |                  |        | Estimated Cost | Requested Federal Aid |                 |
|---------------|-------------|-------------------|------------------|--------|----------------|-----------------------|-----------------|
|               |             | Permanent Grading | Gravel Surfacing | Paving |                |                       | Total           |
| Appanoose     | 27          | 10.58             |                  |        | 10.58          | \$ 50,649.01          | \$ 25,000.00    |
| Black Hawk    | 25          | 4.08              |                  | 4.08   | 4.08           | 168,412.04            | 46,881.28       |
| Cerro Gordo   | 61          | 6.00              |                  | 6.00   | 6.00           | 242,611.00            | 120,000.00      |
| Chickasaw     | 35          | 13.17             | 13.17            |        | 13.17          | 85,292.54             | 42,000.00       |
| Calhoun       | 10          |                   | 18.36            |        | 18.36          | 130,754.30            | 65,000.00       |
| Dallas        | 12          | 16.80             |                  |        | 16.80          | 37,288.07             | 18,000.00       |
| Decatur       | 8           | 9.80              |                  |        | 9.80           | 60,320.90             | 30,000.00       |
| Floyd         | 41          | 11.54             |                  | 12.40  | 12.40          | 504,517.03            | 248,000.00      |
| Greene        | 39          | 7.41              |                  | 7.41   | 7.41           | 302,539.82            | 148,200.00      |
| Howard        | 31          | 10.40             | 10.40            |        | 10.40          | 55,517.44             | 27,000.00       |
| Harrison      | 14          | 15.60             |                  |        | 15.60          | 94,487.14             | 47,200.00       |
| Johnson       | 9           | 10.89             |                  | 1.09   | 10.89          | 79,889.54             | 23,859.55       |
| Keokuk        | 34          | 12.21             |                  |        | 12.21          | 58,366.79             | 29,000.00       |
| Linn          | 22          | 18.00             |                  | 2.00   | 18.00          | 189,979.97            | 27,718.86       |
| Monroe        | 20          | 8.25              |                  |        | 8.25           | 48,639.07             | 24,000.00       |
| Montgomery    | 16          | 15.93             |                  |        | 15.93          | 95,469.97             | 45,000.00       |
| Polk          | 104         | 6.57              |                  | 6.57   | 6.57           | 339,418.20            | 131,000.00      |
| Pottawattamie | 46          | 2.65              |                  |        | 2.65           | 26,819.65             | 13,400.00       |
| Sioux         | 28          | 24.40             |                  |        | 24.40          | 77,782.10             | 29,351.20       |
| Sioux         | 84          | 2.94              |                  | 2.94   | 2.94           | 108,185.66            | 54,000.00       |
| Scott         | 54          | 8.46              |                  | 8.46   | 8.46           | 407,266.80            | 169,000.00      |
| Webster       | 13          | 12.15             | 12.15            |        | 12.15          | 132,639.23            | 28,233.08       |
| Wright        | 29          | 14.67             | 14.67            |        | 14.67          | 161,640.32            | 80,800.00       |
| Totals        | 23          | 242.50            | 68.75            | 50.95  | 261.72         | \$ 3,458,487.19       | \$ 1,472,673.89 |

PROJECT AGREEMENTS EXECUTED BY SECRETARY OF AGRICULTURE. SCHEDULE TWELVE.

| County     | Project No. | Length in Miles   |                  |        |        | Total           | Requested     | Federal Aid Estimated Cost |
|------------|-------------|-------------------|------------------|--------|--------|-----------------|---------------|----------------------------|
|            |             | Permanent Grading | Gravel Surfacing | Paving | Total  |                 |               |                            |
| Appanoose  | 27          | 10.58             | -----            | 4.08   | 10.58  | \$ 50,619.01    | \$ 25,000.00  |                            |
| Black Hawk | 25          | 4.08              | -----            | -----  | 4.08   | 168,412.58      | 46,881.28     |                            |
| Chilhowee  | 10          | 18.35             | -----            | -----  | 18.35  | 130,754.30      | 65,000.00     |                            |
| Chickasaw  | 35          | 13.17             | -----            | -----  | 13.17  | 85,292.54       | 42,000.00     |                            |
| Dallas     | 12          | 16.80             | -----            | -----  | 16.80  | 97,288.07       | 18,000.00     |                            |
| Decorah    | 8           | 9.83              | -----            | -----  | 9.83   | 60,330.90       | 30,000.00     |                            |
| Howard     | 31          | 10.40             | -----            | -----  | 10.40  | 55,514.14       | 27,000.00     |                            |
| Harrison   | 14          | 15.60             | -----            | -----  | 15.60  | 94,487.14       | 47,300.00     |                            |
| Jefferson  | 3           | 19.78             | -----            | -----  | 19.78  | 82,332.55       | 18,100.45     |                            |
| Johnson    | 9           | 10.89             | -----            | 1.092  | 10.89  | 79,880.54       | 23,850.55     |                            |
| Kooken     | 34          | 12.21             | -----            | -----  | 12.21  | 58,366.79       | 29,000.00     |                            |
| Linn       | 22          | 17.88             | -----            | 2.00   | 17.88  | 189,079.07      | 57,718.85     |                            |
| Montrose   | 30          | 8.25              | -----            | -----  | 8.25   | 48,639.07       | 24,000.00     |                            |
| Montgomery | 16          | 16.30             | -----            | -----  | 16.30  | 90,469.07       | 45,000.00     |                            |
| Sioux      | 28          | 24.40             | -----            | -----  | 24.40  | 77,782.10       | 29,331.30     |                            |
| Webster    | 13          | 12.15             | -----            | -----  | 12.15  | 132,639.23      | 58,232.08     |                            |
| Totals     | 16          | 202.27            | 64.58            | 7.172  | 220.63 | \$ 1,447,808.20 | \$ 526,443.42 |                            |

SCHEDULE THIRTEEN.

CONTRACTS APPROVED ASIDE FROM FEDERAL AID PROJECTS. SCHEDULE NINE—Continued.

| County     | Contractor             | Quantity    | Item       | Unit Price | Amount of Contract | Date Approved      |
|------------|------------------------|-------------|------------|------------|--------------------|--------------------|
| Black Hawk | Chris Hansen           | 28,900 foot | Tiling     | 25c-40c    | \$ 9,282.00        | September 27, 1919 |
|            | Cox Bros.              | 18,900 c.y. | Earth      | 62c        |                    |                    |
|            |                        | 40 rod      | Fence      | 80c        | \$ 11,750.00       | September 27, 1919 |
| Boone      | Chas. Marsh            | 3,500 c.y.  | Gravel     | \$1.00     | \$ 3,500.00        | September 1, 1919  |
|            | Joe Pestotnik          | 7,891 c.y.  | Gravel     | 2.20       | 17,362.00          | September 1, 1919  |
|            | Stanley & Williams     | 6,000 c.y.  | Gravel     | 1.00       | 6,000.00           | September 1, 1919  |
|            | Wm. Dutton             | 15,000 c.y. | Earth      |            | Force Acct.        | September 1, 1919  |
| Cherokee   | Geo. W. Condon         | 82,500 c.y. | Earth      | 36c        |                    |                    |
|            |                        | 500 c.y.    | Loose Rock | 95c        |                    |                    |
|            |                        | 1,080 foot  | Culvert    | 55c        | \$ 29,969.00       | May 1, 1919        |
| Clinton    | Fuller Bros. Co.       | 46,110 c.y. | Earth      | 45c        |                    |                    |
|            |                        | 3,700 c.y.  | Earth      | 50c        |                    |                    |
|            |                        | 320 rod     | Fence      | 50c        |                    |                    |
|            |                        | 70 rod      | Fence      | 75c        |                    |                    |
|            |                        | 894 foot    | Culvert    | 25c-45c    | 23,130.70          | April 24, 1919     |
| Clinton    | Russell Condon         | 19,600 c.y. | Earth      | 49.5c      |                    |                    |
|            |                        | 9,593 c.y.  | Earth      | 45.5c      | 14,066.81          | June 19, 1919      |
| Clay       | Ira C. Knight          |             | Gravel     | 50c y.m.   |                    | September 8, 1919  |
| Clay       | E. A. Dennis           |             |            |            | 21,000.00          | September 6, 1919  |
| Crawford   | Geo. W. Condon         | 41,668 c.y. | Earth      | 35.5c      | 14,792.14          | April 30, 1919     |
| Crawford   | W. R. Grinnell         | 43,764 c.y. | Earth      | 38.5c      |                    |                    |
|            |                        | 77,007 c.y. | Earth      | 37c        |                    |                    |
|            |                        | 33,377 c.y. | Earth      | 37.5c      | 57,758.10          | April 30, 1919     |
| Crawford   | Grinnell & Jensen      | 4,732 c.y.  | Earth      | 38c        |                    |                    |
|            |                        | 12,230 c.y. | Earth      | 45.5c      | 7,362.81           | August 9, 1919     |
| Crawford   | Ed. Sash               |             | Earth      |            | 10,398.66          | October 11, 1919   |
| Crawford   | W. E. Grinnell         | 7,100 c.y.  | Earth      | 40c        | 2,840.00           | August 23, 1919    |
| Franklin   | Stackhouse & Bradfield | 3,600 c.y.  | Gr. Load   | 25c        |                    |                    |
|            |                        | 8,250 y.m.  | Gr. Haul   | 51.6c      | 5,175.00           | November 24, 1919  |
| Franklin   | G. E. Sargent          | 3,600 c.y.  | Gr. Load   | 25c        |                    |                    |
|            |                        | 3,600 y.m.  | Gr. Haul   | 63.7c      | 10,080.00          | November 24, 1919  |
| Franklin   | J. A. Dunkel           | 7,600 c.y.  | Gr. Load   | 25c        |                    |                    |
|            |                        | 24,998 y.m. | Gr. Haul   | 55.5c      | 15,768.00          | November 24, 1919  |



SCHEDULE THIRTEEN—Continued.

| County    | Contractor          | Quantity                                | Item                        | Unit Price        | Amount of Contract                             | Date Approved                      |
|-----------|---------------------|---|-----------------------------|-------------------|--|------------------------------------|
| Guthrie   | W. J. Bennethum     | 15,500 c.y.<br>4,300 c.y.               | Earth<br>Gravel             | 35c<br>2.10       |  | 19, 1919                           |
| Hardin    | L. C. Wood & Co.    | 550 rod<br>254 foot                     | Fence<br>Culvert            | 1.00<br>0.40      | 15,096.60<br>20,880.00                         | June<br>August                     |
| Kossuth   | L. C. Wood & Co.    | 58,000 c.y.<br>23,039 c.y.              | Earth<br>Earth              | 35c<br>50c        | 11,519.50                                      | October                            |
| Lyon      | Russell Condon      | 39,658 c.y.<br>4,436 c.y.               | Earth<br>Earth              | 54c<br>59c        | 24,082.56                                      | July                               |
| Lyon      | Ira Cox             | 20,813 c.y.                             | Earth                       | 44.9c             | 9,261.78                                       | July                               |
|           | J. J. Stark & Co.   | From pic.<br>First mile.<br>After 1 mi. | Gravel<br>Gravel<br>Gravel  | 79c<br>55c<br>55c |  | 1, 1919                            |
| Marshall  | P. E. Shugart       | Spreading                               | Gravel                      | 4c sq. yd         |  | 5, 1919                            |
| Marshall  | P. E. Shugart       | Stripping                               | Gravel                      | 75c cu. yd        | 24,733.00                                      | November                           |
| Marshall  | T. Ryan & Son       | 39,883 c.y.                             | Earth                       | 33c               | 13,161.39                                      | May                                |
| Marshall  | Wm. Rathlef         | 64,367 c.y.                             | Earth                       | 59.5c             | 38,298.36                                      | October                            |
| Scott     | Littig Const Co.    | 9,850 feet<br>12,862 c.y.               | Tiling<br>Earth             | 46c-25c<br>54c    | 28,400.00<br>1,970.00                          | July<br>July                       |
| Scott     | Littig Const Co.    | 84 feet<br>213 feet<br>7,514 c.y.       | Culvert<br>Culvert<br>Earth | 50c<br>40c<br>69c | 7,147.20                                       | July                               |
| Story     | Chas. Maroney       | 302 feet                                | Pipe                        | 40c               |  |                                    |
| Story     | R. E. Carr          | 3,200 c.y.                              | Macadam                     | \$1.50            |  |                                    |
| Story     | Truck Service Co.   |   | Stone                       |                   | 10,056.15                                      | September                          |
| Winnabago | Wisley & Sons       |   | Gravel                      |                   | 12,412.50                                      | November                           |
| Woodbury  | Bois & Olson        | 71,197 c.y.                             | Gravel                      |                   | 6,300.00                                       | November                           |
| Wright    | National Sewer Pipe | 4,512 c.y.<br>20,000 feet               | Earth<br>Tile               | 34c-85c<br>40c    | 13,695.00<br>24,812.15<br>1,804.80<br>2,053.00 | November<br>May<br>June<br>October |

37 contracts amounting to \$525,459.21 have been approved.  
Note: These totals do not include some force account items or indeterminate amounts.

SCHEDULE FOURTEEN.

SECONDARY ROAD DISTRICTS ESTABLISHED BY RESOLUTION OF BOARD OF SUPERVISORS.

| County     | District No. | Type of Surfacing | Length in Miles | Approximate Acres in District. | Date Established | Date Filed With Commission |
|------------|--------------|-------------------|-----------------|--------------------------------|------------------|----------------------------|
| Black Hawk | 1            | Gravel            | 6               | 10,880                         | May 27, 1919     | July 25, 1919              |
| Boone      | 1            | Gravel            | 7               | 8,920                          | Aug. 15, 1919    | Aug. 18, 1919              |
|            | 2            | Gravel            | 6               | 3,840                          | Aug. 23, 1919    | Aug. 25, 1919              |
| Dallas     | 1            | Gravel            | 2               |                                | Oct. 20, 1919    | Oct. 22, 1919              |
|            | 2            | Gravel            | 4               | 2,560                          | Nov. 6, 1919     | Nov. 11, 1919              |
| Dickinson  | 1            | Gravel            | 8.75            | 5,240                          | Oct. 3, 1919     | Oct. 11, 1919              |
|            | 2            | Gravel            | 5.00            | 3,200                          | Oct. 3, 1919     | Oct. 11, 1919              |
|            | None         | Gravel            | 11.00           | 7,040                          | Oct. 3, 1919     | Oct. 11, 1919              |
|            | None         | Gravel            | 3.75            | 2,240                          | Oct. 3, 1919     | Oct. 11, 1919              |
| Franklin   | 1            | Gravel            | 17.75           | 17,480                         | Oct. 3, 1919     | Nov. 7, 1919               |
|            | 4            | Gravel            | 4.50            | 5,440                          | Oct. 24, 1919    | Nov. 7, 1919               |
|            | 6            | Gravel            | 6.00            | 9,840                          | Oct. 24, 1919    | Nov. 7, 1919               |
| Lyon       | 1            | Gravel            | 8.00            | 15,360                         | Aug. 16, 1919    | Aug. 20, 1919              |
| Sac        | 1            | Gravel            | 7.75            | 5,440                          | Oct. 7, 1919     | Oct. 8, 1919               |
|            | 2            | Gravel            | 9.50            | 6,080                          | Oct. 1, 1919     | Oct. 8, 1919               |
| Story      | 1            | Gravel            | 7.00            | 4,680                          | Aug. 6, 1919     | Aug. 11, 1919              |
|            | 2            | Gravel            | 4.75            | 3,040                          | Oct. 7, 1919     | Oct. 11, 1919              |
|            | 3            | Gravel            | 6.50            | 4,160                          | Oct. 8, 1919     | Oct. 11, 1919              |
|            | 4            | Gravel            | 1.00            | 640                            | Oct. 14, 1919    | Oct. 16, 1919              |
|            | 5            | Gravel            | 4.00            | 2,560                          | Oct. 15, 1919    | Oct. 18, 1919              |
|            | 7            | Gravel            | 4.50            | 2,880                          | Oct. 15, 1919    | Oct. 18, 1919              |
|            | 2            | Gravel            | 9.50            | 6,240                          | Oct. 15, 1919    | Oct. 18, 1919              |
| Totals     | 22           |                   | 144.25          | 127,760                        |                  |                            |

## Chapter VII. Department of Road Surveys and Plans

This department makes the surveys and prepares the plans for all Federal Aid and Primary road projects, and checks and approves all road plans submitted by the county engineers. During 1919, surveys were made on 1093.5 miles of primary roads, plans were prepared for 386.7 miles, and profiles prepared by county engineers for 321 miles of road, were checked and approved. At the beginning of the season, there were two parties on surveys. At the end of the season, thirty parties were engaged in this work.

The mileage of road surveyed during 1919 would reach three and one-half times across the state east and west, or five times across the state north and south. It would reach from Ames to New York City or from Ames to Jacksonville, Florida. The total mileage of road surveyed since the Federal Aid work was started in 1917 (1495 miles) would reach from Ames to Portland, Oregon.

### Organization.

The department is under the direction of an engineer of road surveys and plans. The survey and plan work in each district is under the district engineer, and he is responsible to the engineer of road surveys and plans. In each district there are one or more field survey parties. Each district office is equipped to handle the preparation of road plans. There are one or more men in each district office engaged in the exclusive work of preparing road plans, and the field survey men in each district are employed in the preparation of road plans in the district offices during the winter.

In addition, a central road drafting force is maintained at Ames, where the county road plans are checked and approved, and a portion of the primary road plans are prepared.

The standard organization and equipment for a field survey party was as follows:

#### Organization:

- 1 Party Chief,
- 1 Instrumentman,
- 2 Rodmen.

#### Equipment:

- 1 Car,
- 1 Transit,
- 1 Hand level,
- 1 Level Rod,
- 2 Extra Plumb Bobs,
- 2 100' Steel Tapes,
- 2 50' Metallic Tapes,
- 1 Hand Axe,
- 1 2 pound Axe,
- 1 8 pound Sledge,
- 1 Set Chaining Pins,
- 1 Frost Pin,
- Note Books,
- Stakes.

### Organizing and Equipping Field Parties.

At the beginning of the season, the Commission had two field survey parties organized and equipped. This force was expanded until at the end of the season the Commission had twenty-two such parties in the field. For transportation, each party was provided with a Ford car. It was intended at the beginning of the season to equip these survey cars with special survey bodies, and nine of the cars were so equipped, but on account of a lack of funds, the remainder of the survey parties were equipped with ordinary Ford touring cars, which had been released to the Commission by the Government.

### County Parties Used.

In order to use the engineering force of the whole state and do as much work as possible, the Commission adopted the policy of using county survey parties wherever such parties were available within the counties where surveys were to be made. Twenty-seven county parties were thus employed at different times in the season, although there were not more than ten county parties working at any one time. The plans for some of the projects are also being prepared by the county engineers.

When county engineers or survey parties were employed for Federal Aid or Primary road work, they worked under the Commission's supervision the same as the employees of the Commission, and the cost of the work paid by the Commission.

### Surveys Made (Refer to Schedule 15 and 16).

Prior to December 1, 1918, surveys had been completed on twenty-seven Federal Aid projects, including 402.21 miles of road. A list of these projects will be found in the 1918 report.

During 1919, surveys were completed on fifty-one projects, including 731.35 miles of road. Surveys were started but not completed on twenty-nine projects, including 613.65 miles of road. On these projects 362.25 miles of survey were completed. The total mileage of road surveyed during 1919 was 1093.50 miles.

#### Plans.

Prior to December 1, 1918, plans were completed for sixteen projects, involving 252.55 miles of road. A list of these projects will be found in the 1918 report.

During 1919 plans were completed for eighteen projects involving a total of 196 miles as follows:

| County        | Project Number | Miles |
|---------------|----------------|-------|
| Harrison      | 14             | 18.00 |
| Linn          | 22             | 17.00 |
| Appanoose     | 27             | 11.00 |
| Sioux         | 28             | 24.25 |
| Wright        | 29             | 14.90 |
| Howard        | 31             | 10.50 |
| Keokuk        | 34             | 16.25 |
| Chickasaw     | 35             | 13.07 |
| Pottawattamie | 46             | 3.00  |
| Scott         | 54             | 8.46  |
| Cerro Gordo   | 61             | 6.00  |
| Polk          | 89             | 6.50  |
| Greene        | 39             | 7.00  |
| Wapello       | 42             | 11.00 |
| Floyd         | 41             | 11.70 |
| Humboldt      | 48             | 1.87  |
| Polk          | 104            | 7.22  |
| Winnebago     | 30             | 7.50  |

Total Miles, 196.02

Plans were started but not completed on twenty projects, involving 346.71 miles of road. Plans were completed for 170.6 miles of such projects as follows:

| County      | Project Number | Total Miles | Miles of Plans Completed |
|-------------|----------------|-------------|--------------------------|
| Adams       | 26             | 10.0        | 8.5                      |
| Des Moines  | 32             | 4.8         | 4.5                      |
| Warren      | 11             | 15.5        | 11.5                     |
| Clinton     | 18             | 18.0        | 14.0                     |
| Scott       | 114            | 15.0        | 5.0                      |
| Clarke      | 33             | 9.6         | 6.7                      |
| Davis       | 50             | 9.8         | 7.3                      |
| Palo Alto   | 36             | 11.0        | 10.5                     |
| Cerro Gordo | 115            | 22.04       | 18.3                     |
| Butler      | 85             | 16.0        | 0.5                      |
| Franklin    | P. R.          | 10.5        | 0.2                      |
| O'Brien     | 43             | 23.0        | 20.7                     |
| Plymouth    | 38             | 28.0        | 0.8                      |
| Cass        | 44             | 19.0        | 17.1                     |
| Guthrie     | 51             | 25.0        | 1.2                      |
| Henry       | 56             | 21.1        | 4.6                      |
| Jackson     | 21             | 18.2        | 17.3                     |
| Black Hawk  | 62             | 17.17       | 14.9                     |
| Bremer      | 88             | 17.0        | 3.4                      |
| Kossuth     | 66             | 36.0        | 3.6                      |
| Totals      |                | 346.71      | 170.6                    |

On December first, 1919, surveys had been made for 706.8 miles, for which plans had not been prepared. It is expected that plans for this mileage will be completed during the winter.

#### County Road Profiles.

The law requires that road plans prepared by the county engineers shall be approved by the Commission. During 1919, the Commission approved 321 miles of such profiles. Since 1913, county profiles have been checked and approved for 3444.5 miles of road.

The following data regarding the profiles approved in 1919 is of interest:

|                                  |                   |
|----------------------------------|-------------------|
| Miles of County Profile Approved | 320.9             |
| Average Original Maximum Grade   | 5.43%             |
| Average Final Maximum Grade      | 3.67%             |
| Average Original Rise and Fall   | 47.7 ft.          |
| Average Final Rise and Fall      | 38.4 ft.          |
| Total Earthwork                  | 1,713,927 cu. yd. |
| Average Earthwork per Mile       | 5,341 " "         |

## SCHEDULE FIFTEEN.

## PROJECTS ON WHICH SURVEYS WERE STARTED BUT NOT COMPLETED.

| County             | Project Number | Total Length | Mileage Surveys Completed |
|--------------------|----------------|--------------|---------------------------|
| Kossuth.....       | 66             | 25.50        | 25.50                     |
| Clayton.....       | 74             | 32.20        | 28.00                     |
| Iowa.....          | 90             | 26.50        | 20.00                     |
| Audubon.....       | 52             | 26.50        | 6.00                      |
| Page.....          | 100            | 16.50        | 7.00                      |
| Louisa.....        | 53             | 24.80        | 16.00                     |
| Green.....         | 106            | 41.00        | 30.00                     |
| Monona.....        | 69             | 19.40        | 18.00                     |
| Pottawattamie..... | 92             | 15.00        | 14.50                     |
| Shelby.....        | 79             | 20.00        | 17.00                     |
| Cedar.....         | 57             | 28.00        | 15.00                     |
| Union.....         | 83             | 24.00        | 17.00                     |
| Carroll.....       | 127            | 10.50        | 10.00                     |
| Woodbury.....      | 78             | 2.80         | 1.00                      |
| Mahaska.....       | 76             | 28.25        | 12.00                     |
| Winnesiek.....     | 98             | 27.20        | 18.00                     |
| Lucas.....         | 63             | 22.80        | 16.00                     |
| Mills.....         | 15             | 3.00         | 2.50                      |
| Marion.....        | 75             | 26.00        | 24.00                     |
| Washington.....    | 71             | 22.00        | 6.00                      |
| Story.....         | 72             | 20.25        | 8.00                      |
| Dallas.....        | 101            | 22.25        | 7.00                      |
| Mitchell.....      | 45             | 20.00        | 18.00                     |
| Lyon.....          | 110            | 22.00        | 5.00                      |
| Monona.....        | 69             | 20.00        | 8.00                      |
| Buena Vista.....   | 37             | 9.00         | 3.00                      |
| Humboldt.....      | 117            | 40.25        | 7.00                      |
| Johnson.....       | 102            | 18.3         | 3.00                      |
| Total.....         |                |              | 362.25                    |

## SCHEDULE SIXTEEN.

## PROJECTS ON WHICH SURVEYS WERE COMPLETED IN 1919.

| County             | Project Number | Mileage |
|--------------------|----------------|---------|
| Grundy.....        | 19             | 18.50   |
| Jackson.....       | 21             | 20.00   |
| Adams.....         | 26             | 10.00   |
| Wright.....        | 29             | 14.90   |
| Des Moines.....    | 32             | 4.80    |
| Clark.....         | 33             | 9.60    |
| Greene.....        | 39             | 7.00    |
| Floyd.....         | 41             | 11.70   |
| Wapello.....       | 42             | 11.00   |
| O'Brien.....       | 43             | 23.00   |
| Pottawattamie..... | 46             | 3.00    |
| Davis.....         | 50             | 11.00   |
| Polk.....          | P. R. No. 1    | 2.50    |
| Cerro Gordo.....   | 61             | 6.00    |
| Plymouth.....      | 38             | 27.85   |
| Boone.....         | 65             | 12.00   |

## SCHEDULE SIXTEEN—Continued.

| County          | Project Number | Mileage |
|-----------------|----------------|---------|
| Adair.....      | 95             | 15.50   |
| Henry.....      | 56             | 20.90   |
| Cass.....       | 44             | 19.60   |
| Ida.....        | 80             | 18.75   |
| Dubuque.....    | 17             | 20.00   |
| Benton.....     | 58             | 16.50   |
| Wayne.....      | 91             | 17.00   |
| Hamilton.....   | 67             | 20.80   |
| Butler.....     | 85             | 15.60   |
| Keokuk.....     | 34             | 4.00    |
| Emmet.....      | 49             | 4.00    |
| Tama.....       | 47             | 31.00   |
| Guthrie.....    | 51             | 23.00   |
| Fremont.....    | 77             | 18.00   |
| Van Buren.....  | 60             | 11.10   |
| Jasper.....     | 64             | 31.00   |
| Franklin.....   | 105            | 10.00   |
| Cherokee.....   | 116            | 14.00   |
| Winnebago.....  | 30             | 7.50    |
| Sioux.....      | 84             | 2.50    |
| Humboldt.....   | 48             | 2.50    |
| Polk.....       | 24             | 6.50    |
| Marshall.....   | 23             | 6.00    |
| Black Hawk..... | 62             | 17.00   |
| Palo Alto.....  | 36             | 11.00   |
| Bremer.....     | 88             | 15.40   |
| Johnson.....    | 102            | 5.00    |
| Folk.....       | P. R.          | 10.75   |
| Muscatine.....  | 40             | 20.50   |
| Fayette.....    | 59             | 37.50   |
| Hancock.....    | 94             | 25.00   |
| Scott.....      | 55             | 21.00   |
| Linn.....       | 96             | 12.50   |
| Scott.....      | 114            | 15.00   |
| Howard.....     | 93             | 11.00   |
| Total.....      |                | 731.35  |

## Chapter VIII. Department of Road Construction

This department has charge of all construction work on Federal Aid and Primary Road projects, all construction and maintenance work on state institutional roads, and of the receipt, storage, and distribution of excess war equipment assigned to this state by the federal government.

On December 1, 1919, twenty-one Federal Aid projects containing 304.66 miles of road were under construction. These projects contemplated 4.85 miles of paving, 41.87 miles of gravel surface, and 257.94 miles of permanent grading. Of the above work 4.34 miles of paving, 3.00 miles of graded surface, and 140.00 miles of permanent grading was completed, and 126,991 lineal feet of tile drains placed.

On the state institutional roads, twenty miles were tractor graded, 3.25 miles were built to finished grade, and one mile was graveled.

Government equipment to the value of \$721,709.00 was received. Part of this equipment was assigned to the counties and part was retained for the use of the state. Four buildings, each 52'-6" by 142'-6" were constructed for storing this retained equipment.

### Organization.

This department is under the supervision of a road construction engineer. The district engineer in each district is responsible to the road construction engineer for all construction work in that district. The construction work on each project is under the supervision of a resident engineer. He reports to and is responsible to the district engineer. Inspectors, instrumentmen, rodmen, and others employed on construction work are under the direction of the resident engineer.

### County Engineers Used on Construction Work.

In order to utilize to the fullest extent the engineering forces of the state, the Commission adopted the policy of employing county engineers as resident engineers on Federal Aid work whenever practical. This policy has proved particularly applicable to those projects which consist of building roads to finished grades, and which are located in the smaller counties. Such grading projects do not ordinarily require constant attention. Thus, in supervising the work on such projects the county engineer has some time to devote

to the ordinary county work. In large counties the county engineering work makes such demands on the county engineer's time that he cannot properly attend to the Federal Aid work. Paving projects require constant attention so that it is not ordinarily practical for the county engineer to act as resident engineer on such projects. When a county engineer is employed as resident engineer on Federal Aid or Primary Road work he works under the Commission's supervision, the same as any other employee of the Commission. His salary for time spent in supervising the work on such projects is paid from the project funds.

### Conditions Relative to Letting Contracts.

Contract prices throughout the season have been quite high. On account of the uncertain conditions and the large amount of work to be let, there was very little competition. As a general rule there was a sufficient number of grading contractors and it was possible to let grading work. The prices were about two and one-half to three times those prevailing in 1916. There is a very serious shortage of paving contractors. The pavement contracting forces of the state will have to be very greatly increased before suitable progress can be made on the road program outlined by the Thirty-eighth General Assembly.

### Work Contracted or Placed Under Construction.

Contracts have been let on nineteen Federal Aid projects. On seventeen of these work has actually been started. These projects by counties are as follows:

| County           | Project No. | Mileage | Kind of Work               |
|------------------|-------------|---------|----------------------------|
| Black Hawk.....  | 25          | 4.05    | Grading and paving         |
| Calhoun.....     | 10          | 18.30   | Graveling                  |
| Cerro Gordo..... | 61          | 6.05    | Paving (Only tilling let). |
| Chickasaw.....   | 35          | 13.17   | Grading and graveling      |
| Dallas.....      | 12          | 16.80   | Grading and graveling      |
| Decatur.....     | 8           | 9.83    | Grading                    |
| Delaware.....    | 4           | 12.02   | Grading and graveling      |
| Howard.....      | 31          | 10.40   | Grading and graveling      |
| Jefferson.....   | 3           | 19.78   | Grading                    |
| Johnson.....     | 9           | 10.00   | Grading                    |
| Keokuk.....      | 34          | 12.25   | Grading                    |
| Linn.....        | 22          | 6.50    | Grading                    |
| Linn.....        | 22          | .80     | Paving                     |
| Monroe.....      | 20          | 8.25    | Grading                    |
| Montgomery.....  | 16          | 16.50   | Grading                    |
| Ringgold.....    | 6           | 12.00   | Grading                    |
| Scott.....       | 54          | 8.46    | Grading                    |
| Sioux.....       | 28          | 24.30   | Grading                    |
| Webster.....     | 13          | 6.00    | Grading                    |
| Harrison.....    | 14          | 15.60   | Grading                    |
| Total.....       | 19          | 231.06  |                            |

During this season contracts have been let involving a total of 231.66 miles. Of this amount, 4.85 miles are to be paved, 41.87 miles are to be graveled, and 184.94 miles are to be built to finished grade without the addition of a surfacing material. A full description of each of these projects may be found in Chapter VI of this report.

#### Construction Work Continued from 1918.

In addition to the foregoing, construction has been continued on the fifty-five mile grading project in Woodbury County and the eighteen mile grading project in Marion County. Both of these projects were started in 1918 and both were practically completed in 1919. A detailed description of both Woodbury and Marion County projects may be found in Chapter VII of the 1918 Annual Report.

#### Work Completed.

Work completed on Federal Aid projects was as follows:

|                        |           |
|------------------------|-----------|
| Paving .....           | 4.1 miles |
| Graveling .....        | 3.0 "     |
| Finished grading ..... | 140.0 "   |

This is a very small amount of work compared to the schedule of construction which must be carried on under the new primary road law. However, on account of the war conditions prevailing in 1918, and the passage of the primary road law late in the spring of 1919, the program of construction for 1919 was not well outlined, a large amount of the work was let late in the season, and conditions were the very worst for handling construction work. With reasonable conditions in 1920 it should be possible to complete several times as much work as that finished in 1919.

A statement of the work accomplished on each project follows:

Black Hawk County, Federal Aid Project No. 25. This project was completed all but placing 4000 lineal feet of brick surfacing and completing the earth shoulders. The bad weather in October delayed the work to an extent that prevented the work being finished.

The work done consists of moving 15,765 cubic yards of earth, placing 10,258 lineal feet of tile, constructing 42,819 square yards of concrete base, and laying 34,964 square yards of brick surface.

#### Expenditures:

|               |              |
|---------------|--------------|
| Paving .....  | \$145,540.62 |
| Grading ..... | 10,432.37    |
| Tiling .....  | 2,163.97     |
|               | <hr/>        |
|               | \$158,136.96 |

Calhoun County, Federal Aid Project No. 10. This project includes the graveling of eighteen miles. Work was started late in the fall. The contractor plans on working during the winter months. The gravel is loaded by a steam shovel and delivered to the road by trucks. The work done consists of hauling and placing 1,100 cubic yards of gravel.

Expenditures .....\$5,238.48

Cerro Gordo County, Federal Aid Project No. 61. The contract let on this project includes only the tiling work (18,935 lineal feet). Of this amount 13,550 feet has been placed.

Expenditures .....\$2,048.00

Decatur County, Federal Aid Project No. 8. Work in Decatur County did not commence until very late in the season. Operations so far have been confined to a railroad crossing improvement. A steam shovel has been at work here for three weeks. The work done consists of moving 9,200 cubic yards of earth.

Expenditures .....\$5,814.20

Delaware County, Federal Aid Project No. 4. Work on this project has been only started. The work done consists of moving 1,250 cubic yards of earth.

Expenditures .....Approx. \$700.00

Howard County, Federal Aid Project No. 31. Approximately 29.2 per cent of the grading on this project has been completed. The work done consists of moving 12,940 cubic yards of earth and hauling and placing 4,694 cubic yards of gravel.

#### Expenditures:

|                  |             |
|------------------|-------------|
| Excavation ..... | \$ 6,591.37 |
| Graveling .....  | 5,630.82    |
|                  | <hr/>       |
|                  | \$12,222.19 |

Jefferson County, Federal Aid Project No. 3. The work done consists of moving 115,525 cubic yards of excavation and placing 15,277 lineal feet of tile. The project is about 75 per cent completed.

#### Expenditures:

|                  |             |
|------------------|-------------|
| Excavation ..... | \$47,481.98 |
| Tiling .....     | 4,979.79    |
|                  | <hr/>       |
|                  | \$52,461.77 |

Chickasaw County, Federal Aid Project No. 35. The grading on this project is 76 per cent completed. Tiling has been entirely completed. The work done consists of moving 47,000 cubic yards of earth, placing 40,520 lineal feet of tile, and hauling and placing 1,705 cubic yards of gravel. Graveling was started late in the fall but could not continue long on account of bad weather. The gravel is loaded by a small revolving steam shovel. The hauling is being done by a fleet of the Commission's trucks.

**Expenditures:**

|               |             |
|---------------|-------------|
| Grading ..... | \$25,146.93 |
| Tiling .....  | 8,109.49    |

**Graveling:**

|                                |          |
|--------------------------------|----------|
| Steam Shovel .....             | 7,800.00 |
| Truck Bodies .....             | 1,500.00 |
| Freight and Miscellaneous..... | 652.72   |
| Labor .....                    | 1,403.05 |

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\$46,095.24

Dallas County, Federal Aid Project No. 12. The work done consists of moving 33,954 cubic yards of earth and placing 26,935 lineal feet of tile. The earthwork is about 51 per cent completed and the tile is all placed.

**Expenditures:**

|                  |             |
|------------------|-------------|
| Excavation ..... | \$19,693.32 |
| Tiling .....     | 4,236.81    |

---

\$23,930.12

Johnson County, Federal Aid Project No. 9. Work in this county is being done on a cost plus basis, which has proved satisfactory. The work done consists of moving 48,498 cubic yards of earth. The earthwork is about 64.5 per cent completed.

Expenditures .....\$21,468.31

Keokuk County, Federal Aid Project No. 34. The work done consists of moving 49,800 cubic yards of earth. This work is about 42.2 per cent completed.

Expenditures .....\$26,589.50

Linn County, Federal Aid Project No. 22. The work done consists of moving 19,100 cubic yards of excavation, placing 17,000 lineal feet of tile, and constructing 9,373 square yards of bituminous filled brick pavement. The paving on the Boulevard was completed, thus connecting the City of Marion with the town of Kenwood Park.

**Expenditures:**

|                  |             |
|------------------|-------------|
| Excavation ..... | \$15,903.82 |
| Paving .....     | 38,900.86   |
| Tiling .....     | 4,123.41    |

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\$58,928.09

Marion County, Federal Aid Project No. 7. This project was started in 1918 and was completed in 1919 except for the guard rail and the fill at a bridge which is now being built. During the season of 1918, 109,078 cubic yards of earth excavation was moved. During the season of 1919, 53,880 cubic yards of earth was moved.

Expenditure .....\$66,136.20

Monroe County, Federal Aid Project No. 20. The work done consists of moving 43,245 cubic yards of earth. This work is 31 per cent completed.

**Expenditures:**

|                  |             |
|------------------|-------------|
| Excavation ..... | \$31,208.14 |
| Tiling .....     | 252.13      |

---

\$31,460.27

Montgomery County, Federal Aid Project No. 16. Work in this county is being done by day labor with two rented elevating grader outfits. The work done consists of moving 90,975 cubic yards of earth. This work is 35.5 per cent completed.

**Expenditures:**

|                                |             |
|--------------------------------|-------------|
| Excavation .....               | \$45,933.53 |
| Clearing and grubbing .....    | 2,812.36    |
| Back filling in sand cuts..... | 2,232.67    |

---

\$50,978.56

Ringgold County, Federal Aid Project No. 6. Owing to a very late start in the fall, only 11,500 cubic yards of earth excavation has been moved on this project.

Expenditures .....\$6,277.40

Scott County, Federal Aid Project No. 54. Work on this project was closed down early on account of labor trouble. The work done consists of moving 11,500 cubic yards of earth and placing 3,500 lineal feet of tile. This is about 33.7 per cent of the total.

**Expenditures:**

|                  |            |
|------------------|------------|
| Excavation ..... | \$6,479.00 |
| Tiling .....     | 955.00     |

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\$7,434.00

Sioux County, Federal Aid Project No. 28. No work was done on this contract.

Webster County, Federal Aid Project No. 13. Work in this county has just commenced. The work done consists of moving 4,560 cubic yards of earth.

Expenditures .....\$2,530.00

Woodbury County, Federal Aid Project No. 2. This fifty-five mile project was started in 1918. The work has been practically completed this year. The total amount of this contract was 379,111 cubic yards. In 1918, 110,000 cubic yards was excavated. In 1919, 259,000 cubic yards was excavated, leaving a total of 10,000 cubic yards of excavation to complete the work.

Expenditures .....\$119,070.00

Harrison County, Federal Aid Project No. 14. No work was done on this project.

**Government Equipment Received (Refer to Schedule 17).**

When the war ended the government had on hand vast quantities of motor trucks, tractors, pumps, graders, concrete mixers, and other equipment suitable for use in road work. In February, 1919, Congress passed a law authorizing the War Department to distribute to the State Highway Departments such of this equipment as was not needed for the use of the army. Under this law Iowa has received two hundred twenty-eight motor trucks, twenty-nine Ford cars, thirteen tractors, two concrete mixers, three road graders, one hundred thirty tons of spare parts for trucks, and a quantity of miscellaneous equipment, tools, and supplies. The total value of the equipment so received is approximately \$721,709.00. A complete list of equipment received up to December 1, 1919, will be found in Schedule Seventeen. The cost of transporting such equipment to the State is paid by the Executive Council from the general state fund.

**Assignment of Government Equipment (Refer to Schedule 18 and 19).**

Under the law the Commission is authorized to make such apportionment of the government equipment among the counties as will secure to the state the greatest benefit therefrom. It is contemplated that about six hundred trucks will be received. It is proposed to distribute about four hundred of these trucks to the counties and to retain about two hundred under the direction of the Commission. It is believed that in this way the greatest service will be secured. Each community will receive a sufficient number of trucks to handle its ordinary highway work, and the state will have a sufficient number of trucks to handle the hauling on a few large projects each year. The four hundred trucks to be allotted to the counties will, as nearly

as possible, be allotted on the basis of the relation which the area of each county bears to the area of the whole state.

To date one hundred twenty-six trucks, valued at \$300,800.00, and two tractors, valued at \$4,000.00, have been allotted to the various counties. Each county, excepting Carroll and Wayne, has at least one truck. A used two-ton Nash Quad truck was assigned to Carroll County. This truck was accepted by the county at Camp Dodge and was driven to Carroll. Later the truck was found to be in bad condition and the county did not wish to retain it. It was accordingly repaired, placed in good condition, and transferred to another county. No truck has been assigned to Wayne County as this county indicated early in the season that they did not wish a government truck. Later this county requested a truck, and an assignment will be made to them as soon as possible. Eight trucks, valued at \$16,000.00, have been assigned to the State Board of Control for use on roads at State Institutions.

The title and right of possession of all this equipment remains vested in the Highway Commission. It is assigned to the counties for their use in highway work with that understanding, and with the further understanding that the county will maintain the equipment in the best condition practicable, the cost of the repairs and maintenance to be paid by the county. The counties have no authority to sell or otherwise dispose of this equipment. When any piece of such equipment becomes unserviceable, the county shall notify the Commission of that fact. It is expected that through the collection and dismantling of unserviceable equipment by the state, serviceable parts will be reclaimed for use in repairing similar equipment and placing it in serviceable condition. Schedule Eighteen shows the assignment of equipment as made up to December 1st, and Schedule Nineteen shows the details of such assignments.

**Storage for Government Equipment.**

The receipt, inspection, distribution, and storage of government equipment necessitated the securing of yards and storage space. A convenient yard was secured by leasing a piece of ground located on the south side of Lincoln Way and just west of the Des Moines Branch of the Chicago & Northwestern Railway in the City of Ames. This yard is located very conveniently with respect to the switch tracks of both the Chicago & Northwestern Railway and the Fort Dodge, Des Moines & Southern Railway. There were no buildings or sheds on this ground, neither was it possible to secure build-



ings or sheds in Ames of sufficient size to shelter this equipment. Accordingly, four buildings or sheds, each 52'-6" by 142'-6" in size, were constructed. These will provide about half of the space required. The buildings have hollow tile walls, rubberoid roofs and cinder floors. They are one story in height. One end of one building is equipped as a repair shop. The cost of these buildings was about \$43,000.00, or ten per cent of the value of the equipment that can be stored therein.

## SCHEDULE SEVENTEEN.

## GOVERNMENT EQUIPMENT RECEIVED TO DECEMBER 1ST, 1919.

| Description Motor Vehicles                | Number | Value         |
|---|--------|---------------|
| Used Ford Touring Cars.....               | 29     | \$ 8,700      |
| Used International Two-Ton Trucks.....    | 2      | 3,200         |
| New Federal 3½-Ton Trucks.....            | 20     | 70,000        |
| New Heavy Aviation Three-Ton Trucks.....  | 28     | 98,000        |
| New Nash Quad Two-Ton Trucks.....         | 106    | 318,000       |
| Used Denby One-Ton Trucks.....            | 1      | 700           |
| Used Denby Two-Ton Trucks.....            | 8      | 9,600         |
| Used Nash Quad Two-Ton Trucks.....        | 25     | 37,500        |
| New Light Aviation One-Ton Trucks.....    | 26     | 52,000        |
| Used Kelly-Springfield 3½-Ton Trucks..... | 12     | 18,000        |
| New Titan Tractors 15-30.....             | 2      | 3,800         |
| New Gray Tractors 18-36.....              | 10     | 20,000        |
| New Cleveland Tractor Five-Ton.....       | 1      | 2,000         |
| New Nash Quad Spare Parts.....            | 130T   | \$ 65,000     |
| New Centrifugal Pumps, 4 inch.....        | 2      | 500           |
| Road Graders, 12 foot.....                | 3      | 1,500         |
| New Hatchets.....                         | 2      | 30            |
| Used Concrete Buggies, 6 foot.....        | 150    | 112.50        |
| Used Two-Way Hopper.....                  | 1      | 25            |
| New Lanterns.....                         | 102    | 102           |
| Used 18 cu. ft. Concrete Mixers.....      | 2      | 5,000         |
| New Angle Iron Fence Posts.....           | 2,500  | 1,250         |
| New Portable Forges.....                  | 25     | 500           |
| Used Sprinkling Wagons.....               | 6      | 1,800         |
| New 480-Gallon Tanks, knocked down.....   | 5      | 100           |
| New 165-gallon Tanks.....                 | 25     | 500           |
| New Plunger Pump.....                     | 1      | 600           |
| New Orange Bucket.....                    | 1      | 1,500         |
| Used Dump Wagons.....                     | 4      | 200           |
| Tool Steel Pieces.....                    | 350    | 1,000         |
| Used Field Desks.....                     | 3      | 30            |
| Shovels.....                              | 80     | 60            |
| Dumpy Levels.....                         | 4      | 400           |
| Total.....                                |        | \$ 721,709.50 |

## SCHEDULE EIGHTEEN.

## GENERAL ASSIGNMENT OF GOVERNMENT EQUIPMENT.

| Description                               | Assigned to |            |                           |           | Reserved by Highway Commission |               |
|---|-------------|------------|---------------------------|-----------|--------------------------------|---------------|
|   | Counties    |            | State Institutional Roads |           | No.                            | Value         |
|   | No.         | Value      | No.                       | Value     |                                |               |
| Used Ford Touring Cars.....               |             |            |                           |           | 29                             | \$ 8,700      |
| Used International Two-Ton Trucks.....    | 2           | \$ 3,200   |                           |           |                                |               |
| New Federal 3½-Ton Trucks.....            | 4           | 14,000     |                           |           | 16                             | 56,000        |
| New Heavy Aviation Three-Ton Trucks.....  | 9           | 31,500     |                           |           | 19                             | 66,500        |
| New Nash Quad Two-Ton Trucks.....         | 55          | 165,000    |                           |           | 51                             | 153,000       |
| Used Denby One-Ton Trucks.....            |             |            |                           |           | 1                              | 700           |
| Used Denby Two-Ton Trucks.....            | 8           | 9,600      |                           |           |                                |               |
| Used Nash Two-Ton Trucks.....             | 25          | 37,500     |                           |           |                                |               |
| New Light Aviation One-Ton Trucks.....    | 11          | 22,000     | 8                         | \$ 16,000 | 7                              | 14,000        |
| Used Kelly-Springfield 3½-Ton Trucks..... | 12          | 18,000     |                           |           |                                |               |
| New Titan Tractors 15-30.....             |             |            |                           |           | 2                              | 3,800         |
| New Gray Tractors 18-36.....              | 2           | 4,000      |                           |           | 8                              | 16,000        |
| New Cleveland Tractor Five-Ton.....       |             |            |                           |           | 1                              | 2,000         |
| Miscellaneous                             |             |            |                           |           |                                |               |
| Nash Quad Spare Parts.....                |             |            |                           |           | 130T                           | 65,000        |
| New Centrifugal Pumps, 4 inch.....        |             |            |                           |           | 2                              | 500           |
| Road Graders, 12 foot.....                |             |            |                           |           | 3                              | 1,500         |
| Used Concrete Buggies, 6 foot.....        |             |            |                           |           | 2                              | 30            |
| New Hatchets.....                         |             |            |                           |           | 150                            | 112.50        |
| Used Two-Way Hopper.....                  |             |            |                           |           | 1                              | 25            |
| New Lanterns.....                         |             |            |                           |           | 102                            | 102           |
| Used 18-foot Concrete Mixers.....         |             |            |                           |           | 2                              | 5,000         |
| New Angle Iron Fence Posts.....           |             |            |                           |           | 2500                           | 1,250         |
| New Portable Forges.....                  |             |            |                           |           | 25                             | 500           |
| Used Sprinkling Wagons.....               |             |            |                           |           | 6                              | 1,800         |
| New 480-gallon Tanks, knocked down.....   |             |            |                           |           | 5                              | 100           |
| New 165-gallon Tanks.....                 |             |            |                           |           | 25                             | 500           |
| New Plunger Pump.....                     |             |            |                           |           | 1                              | 600           |
| New Orange Bucket.....                    |             |            |                           |           | 1                              | 1,500         |
| Used Dump Wagon.....                      |             |            |                           |           | 4                              | 200           |
| Tool Steel Pieces.....                    |             |            |                           |           | 350                            | 1,000         |
| Used Field Desks.....                     |             |            |                           |           | 3                              | 30            |
| New Shovels.....                          |             |            |                           |           | 80                             | 60            |
| Dumpy Levels.....                         |             |            |                           |           | 4                              | 400           |
| Total.....                                |             | \$ 304,800 |                           | \$ 16,000 |                                | \$ 400,709.50 |
| Grand Total.....                          |             |            |                           |           |                                | \$ 721,709.50 |

## SCHEDULE NINETEEN.

DETAIL OF ASSIGNMENT OF GOVERNMENT EQUIPMENT TO  
COUNTIES, DECEMBER 1, 1919.

| Location    | Description                            | Value    |          |
|-------------|--|----------|----------|
|             |  | Detail   | Total    |
| Adair       | 1 New Light Aviation One-Ton Truck     | \$ 2,000 |          |
| Adair       | 1 Used Nash Quad Two-Ton Truck         | 1,500    | \$ 3,500 |
| Adams       | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Allamakee   | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Appanoose   | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Audubon     | 1 Used Nash Quad Two-Ton Truck         | 1,500    |          |
| Audubon     | 1 New Light Aviation One-Ton Truck     | 2,000    | 3,500    |
| Benton      | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Black Hawk  | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Boone       | 1 New Federal 3/4-Ton Truck            | 3,500    |          |
| Boone       | 1 Used Kelly-Springfield Truck         | 1,500    | 5,000    |
| Bremner     | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Buchanan    | 1 New Nash Quad Two-Ton Truck          | 3,000    |          |
| Buchanan    | 1 Kelly-Springfield 3/4 Ton Used Truck | 1,500    | 4,500    |
| Buena Vista | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Butler      | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Calhoun     | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Carroll     |  |          |          |
| Cass        | 1 New Light Aviation One-Ton Truck     | 2,000    |          |
| Cass        | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 3,500    |
| Cerro Gordo | 1 Heavy Aviation, New Three-Ton Truck  | 3,500    |          |
| Cerro Gordo | 1 Used International Two-Ton Truck     | 1,600    | 5,100    |
| Cherokee    | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Cedar       | 1 New Nash Quad Two-Ton Truck          | 3,000    |          |
| Cedar       | 1 Used Kelly-Springfield 3/4 Ton Truck | 1,500    | 4,500    |
| Chickasaw   | 1 New Nash Quad Two-Ton Truck          | 3,000    |          |
| Chickasaw   | 1 Used Kelly-Springfield 3/4-Ton Truck | 1,500    |          |
| Chickasaw   | 1 New Gray Tractor, 18-36              | 2,400    | 6,500    |
| Clarke      | 1 Heavy Aviation New Three-Ton Truck   | 3,500    | 3,500    |
| Clay        | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Clayton     | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Clinton     | 1 New Federal 3/4 Ton Truck            | 3,500    |          |
| Clinton     | 1 Kelly-Springfield 3/4-Ton Used Truck | 1,500    | 5,000    |
| Crawford    | 1 Used Denby Two-Ton Truck             | 1,200    | 1,200    |
| Dallas      | 1 New Heavy Aviation Three-Ton Truck   | 3,500    |          |
| Dallas      | 1 Used Kelly-Springfield 3/4 Ton Truck | 1,500    | 5,000    |
| Davis       | 1 Used Denby Two-Ton Truck             | 1,200    | 1,200    |
| Decatur     | 1 Used Denby Two-Ton Truck             | 1,200    | 1,200    |
| Delaware    | 1 New Nash Quad Two Ton Truck          | 3,000    | 3,000    |
| Des Moines  | 1 New Nash Quad Two Ton Truck          | 3,000    |          |
| Des Moines  | 1 Used Kelly-Springfield 3/4-Ton Truck | 1,500    | 4,500    |
| Dickinson   | 1 New Nash Quad Two Ton Truck          | 3,000    | 3,000    |
| Dubuque     | 1 New Nash Quad Two Ton Truck          | 3,000    |          |
| Dubuque     | 1 Used Kelly-Springfield 3/4-Ton Truck | 1,500    | 4,500    |
| Emmet       | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Fayette     | 1 New Heavy Aviation Three-Ton Truck   | 3,500    | 3,500    |
| Floyd       | 1 New Heavy Aviation Three-Ton Truck   | 3,500    |          |
| Floyd       | 1 Used Kelly-Springfield 3/4-Ton Truck | 1,500    | 5,000    |
| Franklin    | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Fremont     | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Greene      | 1 New Light Aviation One-Ton Truck     | 2,000    |          |
| Greene      | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 3,500    |
| Grundy      | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Guthrie     | 1 Used Denby Two-Ton Truck             | 1,200    | 1,200    |
| Hamilton    | 1 New Nash Quad Two Ton-Truck          | 3,000    | 3,000    |
| Hancock     | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Hardin      | 1 New Nash Quad Two Ton-Truck          | 3,000    | 3,000    |
| Harrison    | 1 New Nash Quad Two Ton-Truck          | 3,000    |          |
| Harrison    | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 4,500    |
| Henry       | 1 New Nash Quad Two Ton-Truck          | 3,000    | 3,000    |
| Howard      | 1 New Nash Quad Two Ton-Truck          | 3,000    |          |
| Howard      | 1 New Gray Tractor, 18-36              | 2,000    | 5,000    |
| Humboldt    | 1 New Nash Quad Two Ton-Truck          | 3,000    | 3,000    |
| Ida         | 1 New Light Aviation One-Ton Truck     | 2,000    |          |
| Ida         | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 3,500    |
| Iowa        | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |
| Jackson     | 1 New Nash Quad Two-Ton Truck          | 2,000    | 3,000    |
| Jasper      | 1 Used Nash Quad Two-Ton Truck         | 1,500    | 1,500    |
| Jefferson   | 1 New Nash Quad Two-Ton Truck          | 3,000    | 3,000    |

## SCHEDULE NINETEEN—Continued.

| Location     | Description                            | Value  |        |
|--------------|--|--------|--------|
|              |  | Detail | Total  |
| Johnson      | 1 New Nash Quad Two-Ton Truck          | 3,000  |        |
| Johnson      | 1 Kelly-Springfield 3/4-Ton Used Truck | 1,500  | 4,500  |
| Jones        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Keokuk       | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Kossuth      | 2 New Light Aviation One-Ton Trucks    | 4,000  | 4,000  |
| Lee          | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Linn         | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Louisa       | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Lucas        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Lyon         | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Madison      | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Mahaska      | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Marion       | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Marshall     | 1 New Heavy Aviation Three-Ton Truck   | 3,500  |        |
| Marshall     | 1 Kelly-Springfield 3/4 Ton Used Truck | 1,500  | 5,000  |
| Mills        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Mitchell     | 1 New Nash Quad Two-Ton Truck          | 3,000  |        |
| Mitchell     | 1 Used Kelly-Springfield 3/4-Ton Truck | 1,500  | 4,500  |
| Monona       | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Monroe       | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Montgomery   | 1 New Heavy Aviation Three-Ton Truck   | 3,500  | 3,500  |
| Muscatine    | 1 New Heavy Aviation Three-Ton Truck   | 3,500  |        |
| Muscatine    | 1 Used International Two-Ton Truck     | 1,600  | 5,100  |
| O'Brien      | 1 Used Denby Two-Ton Truck             | 1,200  | 1,200  |
| Osceola      | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Page         | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Palo Alto    | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Plymouth     | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Pocahontas   | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Polk         | 4 New Nash Quad Two-Ton Trucks         | 12,000 | 12,000 |
| Potawattamie | 1 New Nash Quad Two-Ton Truck          | 3,000  |        |
| Potawattamie | 2 New Light Aviation One-Ton Trucks    | 4,000  | 7,000  |
| Poweshiek    | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Ringgold     | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Sac          | 1 New Light Aviation One-Ton Truck     | 2,000  |        |
| Sac          | 1 Used Denby Two-Ton Truck             | 1,200  | 3,200  |
| Scott        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Shelby       | 1 New Light Aviation One-Ton Truck     | 2,000  |        |
| Shelby       | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 3,500  |
| Sioux        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Story        | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Tama         | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Taylor       | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Union        | 1 Used Nash Quad Two-Ton Truck         | 1,500  | 1,500  |
| Van Buren    | 1 New Heavy Aviation Three-Ton Truck   | 3,500  | 3,500  |
| Wapello      | 1 Used Denby Two-Ton Truck             | 1,200  | 1,200  |
| Warren       | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Washington   | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Wayne        |  |        |        |
| Webster      | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Winnebago    | 1 New Federal 3/4-Ton Truck            | 3,500  | 3,500  |
| Winnebago    | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Woodbury     | 1 New Nash Quad Two-Ton Truck          | 3,000  |        |
| Woodbury     | 1 Used Denby Two-Ton Truck             | 1,200  | 4,200  |
| Worth        | 1 New Nash Quad Two-Ton Truck          | 3,000  | 3,000  |
| Wright       | 1 New Federal 3/4-Ton Truck            | 3,500  | 2,500  |

Total equipment assigned to counties to December 1, 1919.

|          |              |
|----------|--------------|
| Trucks   | 126          |
| Tractors | 2            |
| Value    | \$300,800.00 |
| Value    | 4,000.00     |

## IOWA STATE HIGHWAY COMMISSION

## SCHEDULE NINETEEN,

DETAIL OF ASSIGNMENT OF GOVERNMENT EQUIPMENT TO  
STATE INSTITUTIONAL ROADS.

| Location          | Description                           | Value    |           |
|-------------------|---------------------------------------|----------|-----------|
|                   |                                       | Detail   | Total     |
| Cherokee.....     | 1 New Light Aviation One-Ton Truck..  | \$ 2,000 |           |
| Eldora.....       | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Anamosa.....      | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Glenwood.....     | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Woodward.....     | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Independence..... | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Ft. Madison.....  | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Clarinda.....     | 1 New Light Aviation One-Ton Truck..  | 2,000    |           |
| Total.....        | 8 New Light Aviation One-Ton Trucks.. |          | \$ 16,000 |

## SCHEDULE NINETEEN,

## GOVERNMENT EQUIPMENT RETAINED BY COMMISSION.

| Location                | Description                            | Value    |               |
|-------------------------|--|----------|---------------|
|                         |  | Detail   | Total         |
| Commission Headquarters | 29 Used Ford Touring Cars.....         | \$ 8,700 |               |
| Commission Headquarters | 16 New Federal 3/4-Ton Trucks.....     | 55,000   |               |
| Commission Headquarters | 19 New Heavy Aviation 3-Ton Trucks..   | 66,500   |               |
| Commission Headquarters | 51 New Nash Quad Two-Ton Trucks.....   | 153,500  |               |
| Commission Headquarters | 1 Used Denby One-Ton Truck.....        | 700      |               |
| Commission Headquarters | 7 New Light Aviation One-Ton Trucks..  | 14,000   |               |
| Commission Headquarters | 2 New Titan Tractors 15-30.....        | 3,800    |               |
| Commission Headquarters | 8 New Gray Tractors, 18-36.....        | 16,600   |               |
| Commission Headquarters | 1 New Cleveland Tractor, 5-T.....      | 2,000    |               |
| Commission Headquarters | 130 Tons New Nash Quad Spare Parts..   | 35,600   |               |
| Commission Headquarters | 2 New 4-inch Centrifugal Pumps.....    | 500      |               |
| Commission Headquarters | 3 12-foot Road Graders.....            | 1,500    |               |
| Commission Headquarters | 2 6-foot Concrete Buggies.....         | 30       |               |
| Commission Headquarters | 150 New Hatchets.....                  | 112.50   |               |
| Commission Headquarters | 1 New Two-Way Hopper.....              | 25       |               |
| Commission Headquarters | 102 New Lanterns.....                  | 102      |               |
| Commission Headquarters | 2 Used 15-foot Concrete Mixers.....    | 5,000    |               |
| Commission Headquarters | 2,500 New Angle Iron Fence Posts.....  | 1,250    |               |
| Commission Headquarters | 25 New Portable Forges.....            | 500      |               |
| Commission Headquarters | 6 Used Sprinkling Wagons.....          | 1,300    |               |
| Commission Headquarters | 5 new 450-Gallon Tanks, knocked down.. | 100      |               |
| Commission Headquarters | 25 New 165-Gallon Tanks.....           | 500      |               |
| Commission Headquarters | 1 New Plunger Pump.....                | 600      |               |
| Commission Headquarters | 1 New Orange Bucket.....               | 1,500    |               |
| Commission Headquarters | 4 Used Dump Wagons.....                | 200      |               |
| Commission Headquarters | 350 Pieces Tool Steel.....             | 1,000    |               |
| Commission Headquarters | 3 Used Field Desks.....                | 30       |               |
| Commission Headquarters | 80 New Shovels.....                    | 60       |               |
| Commission Headquarters | 4 Dumpy Levels.....                    | 400      |               |
| Total.....              |  |          | \$ 400,909.50 |

## Chapter IX. Department of Road Maintenance

## Organization.

The maintenance work of the Commission was, until June, 1919, handled directly by the Road Engineer. The road law, enacted by the 38th General Assembly, placed upon the Commission after July 1, 1920, the responsibility for the maintenance of the Primary Road System. In anticipation of this increased responsibility and believing that our first care should be to provide the public with usable roads, it was deemed necessary to remove the maintenance activities of the Commission from the other branches of road work and place them under a separate department. When the road department was reorganized in June, a department of Road Maintenance was formed. While the maintenance department was created June 1st and a maintenance engineer was appointed at that time, the actual work of the department was not undertaken until September 1st.

## Summary.

The principal road maintenance activities of the Commission during the past year consisted of the investigation and adjustment of ninety-four road complaints; the collection of data for and the preparation of a map showing the condition of the Primary Road System; the preparation of a manual outlining the plans for maintaining the Primary Road System in 1920; the numbering of the primary roads and the preparation of a map showing such numbering system; the issuance of instructions to county and township road officers warning against the practice of dragging material into the flangeways of railroad crossings; and the investigation of the maintenance work and organizations of Minnesota and Wisconsin.

## Complaints.

During 1919, one hundred and fourteen road complaints were filled with the Commission. Eighty-four of these complaints were in regard to township roads and thirty concerned county roads. Of these eighty-four township road complaints received, sixty-six were investigated and adjusted. Of the thirty county road complaints received, twenty-nine were investigated and adjusted. This makes a total of ninety-five complaints investigated and adjusted. Nineteen complaints remain unadjusted. Some of these nineteen were found to have been made without proper justification and others were

filed late in the year and are now pending investigation. Schedule XX shows the number of complaints filed and adjusted in the different counties. Since April, 1913, there have been filed with the Commission 818 road complaints as follows:

|             |     |            |
|-------------|-----|------------|
| 1913 .....  | 28  | complaints |
| 1914 .....  | 83  | "          |
| 1915 .....  | 254 | "          |
| 1916 .....  | 151 | "          |
| 1917 .....  | 126 | "          |
| 1918 .....  | 62  | "          |
| 1919 .....  | 114 | "          |
| Total ..... | 818 | complaints |

#### Primary Road Condition Map.

A map of the Primary Road System has been prepared and is appended to this report. This map shows the condition of the Primary Road System December 1, 1919. The classifications shown are—1st, paving; 2nd, gravel; 3rd, built to permanent grade; and 4th, not built. No attempt is made to differentiate between different types of paving. All types are included under the one heading, "paving." There is a small mileage of limestone macadam construction on the Primary System. These roads are shown under the "gravel" class. "Roads to permanent grade" includes all roads built to an established and approved grade line. The classification, "not built" shows roads upon which maintenance work only has been done. The mileage of the Primary Road System in each of the above classes is approximately as follows: "Paving," 25.1 miles; "gravel," 624.0 miles; "built to permanent grade," 835.8 miles, and "not built," 4947.2 miles.

#### Maintenance Manual.

A maintenance manual has been published and will soon be sent to all County Supervisors, Engineers and Auditors. This manual explains in detail the plan for 1920 primary road maintenance and accounting. Standard forms for reporting and accounting have been included in the manual. While the actual program of maintenance on the Primary Road System will not be assumed by the state till July 1, 1920, this manual will be issued early so that the counties can outline their maintenance work in accordance therewith at the beginning of the season.

#### Primary Road Numbering Plan.

The roads comprising the Primary Road System have been assigned numbers. Each cross-state highway has been given a dis-

tinctive number. Highways that do not run clear across the state have been given a continuous number for as great a distance as possible. Wherever possible, the numbers of the highways have been made to correspond to the numbered highways in adjoining states. A map showing the Primary Roads and their numbers will be published soon. Each highway will be properly marked with its number on a standard design. These markers will be placed conspicuously on telephone and telegraph poles, culvert headwalls and marker posts so that they will be visible and distinctive at all intersections and turns. It is hoped thus to enable one to travel without confusion from any part of the state to any other part of the state by the shortest and best Primary Road.

#### Inspection of Maintenance in Other States.

During the year, two inspection trips were made in adjoining states for the purpose of maintenance study. The first inspection was made in Minnesota. Here a special study was made of gravel maintenance by the patrol system. The methods of reporting and accounting were noted and about three hundred miles of road were examined. Patrolmen and local officials were consulted and methods of maintenance investigated.

A later trip was made through Wisconsin where much the same study was made. About four hundred miles of road were examined and maintenance methods studied. A special study was made of the maintenance of the concrete roads in Milwaukee County. The marking of the State Truck Highway System in Wisconsin is very complete. This phase of the maintenance work was given special consideration and cost data was secured.

Many valuable suggestions and experiences were obtained from the maintenance engineers and organizations in both states. Iowa can, without question, adopt many of the systems and methods used in Minnesota and Wisconsin and thus save the expense and delay of experiment and trial.

#### Dragging at Railroad Crossings.

Neglect of dragmen to clear their drags before crossing railroad tracks has caused the flangeways to become packed full of clay and loose stones, thus making the probability of derailment very serious. Early in the year the attention of all county and township road officers was called to this matter with a request that they insist that all dragmen use care in keeping the dragged material out of the flangeways at railroad crossings.

## Chapter X. Work of District Engineers

### Summary.

The district engineering work was reorganized June 1st. There are now nine districts, each in the charge of a district engineer. One of the district offices is located at Ames, the others are located at Mason City, Sioux City, Atlantic, Ottumwa, Cedar Rapids, Waterloo, Storm Lake and Chariton.

During the year the district engineers spent 1510 days in the various counties assisting in highway work. They spent 128 days attending bridge lettings for the construction of 2234 bridges costing \$3,216,130. Forty-three days were spent attending road lettings for 257 miles of road work (other than Federal Aid) costing \$699,754. Profiles for 240 miles of road were examined and approved. At least one project has been definitely outlined on the Primary Road System of every county in the state. Under the direction of the district engineers, reconnaissance estimates have been prepared and surveys made on most of these projects. The district engineers have attended twenty-one lettings on Federal Aid Projects for 207 miles amounting to \$1,315,000 and have had general supervision of the construction work on the 265 miles of Federal Aid roads under construction. Six hundred and five days were spent on Federal Aid and Primary road work. It is of interest to note that forty per cent of the district engineers' time was spent on Federal Aid work in 1919, while only twenty per cent was required for this work in 1918. The number of days spent in the field are classified as follows:

|  | 1917         | 1918         | 1919         |
|--|--------------|--------------|--------------|
| Examination of bridge sites.....                           | 85           | 58           | 95           |
| Attending bridge lettings.....                             | 101          | 118          | 128          |
| Attending material lettings.....                           | 67           | 69           | 82           |
| Inspection and supervision bridge work.....                | 202          | 180          | 163          |
| Examination of emergency work.....                         | 13           | 2            | 2            |
| Approval of profiles.....                                  | 125          | 60           | 61           |
| Attending road lettings.....                               | 38           | 30           | 43           |
| Inspection and supervision road work.....                  | 83           | 67           | 103          |
| Inspection of proposed changes in county road system.....  | 51           | 46           | 18           |
| Inspection of proposed changes in primary road system..... |              |              | 35           |
| Investigation of complaints.....                           | 63           | 45           | 56           |
| Explanation of report blanks.....                          | 56           | 66           | 70           |
| Railroad crossing work.....                                | 35           | 24           | 31           |
| Special administrative assignments.....                    |              |              | 18           |
| Federal Aid road work, preliminary engineering.....        | 139          | 243          | 500          |
| Federal Aid road work, construction engineering.....       |              |              | 105          |
| Unclassified.....  | 111          | 214          |              |
| <b>Total</b> .....   | <b>1,169</b> | <b>1,222</b> | <b>1,510</b> |

### Reorganization of Districts.

The Primary Road Law, enacted by the 38th General Assembly, so increased the administrative and engineering work of the Commission that it was found necessary June 1, 1919, to increase the number of district engineers from six to nine. The state was, therefore, redivided into nine districts. In 1916, none of the time of district engineers was spent on Federal Aid and Primary road work, while in 1919, forty per cent of the district engineers' time was spent on such work. During the same period (1916 to 1919) the total amount of time spent on district work increased just fifty per cent. In other words, the total increase in the time spent in the field by the district engineers is practically the same as the increase in the time spent by these men on Federal Aid work. The Federal Aid and Primary road work was only just started in 1919. As this work gets under way, it will require more and more of the district engineers' time. At the same time, the general supervisory work of the Commission over the county and township road work will require at least as much time as in 1916.

The counties in each district, the district engineer and the headquarters address for each district follows:

#### FIRST DISTRICT

Engineer, W. F. Beard, Headquarters, Ames.

|         |          |          |           |
|---------|----------|----------|-----------|
| Boone   | Greene   | Marshall | Poweshiek |
| Carroll | Hamilton | Polk     | Story     |
| Dallas  | Jasper   |          |           |

#### SECOND DISTRICT

Engineer, R. R. Zack, Headquarters, Mason City.

|             |          |          |           |
|-------------|----------|----------|-----------|
| Butler      | Floyd    | Hardin   | Winnebago |
| Cerro Gordo | Franklin | Howard   | Worth     |
| Chickasaw   | Hancock  | Mitchell | Wright    |

#### THIRD DISTRICT

Engineer, E. W. Dunn, Headquarters, Sioux City.

|          |         |          |          |
|----------|---------|----------|----------|
| Cherokee | Lyon    | Osceola  | Sioux    |
| Crawford | Monona  | Plymouth | Woodbury |
| Ida      | O'Brien |          |          |

## FOURTH DISTRICT

Engineer, L. M. Martin, Headquarters, Atlantic.

|         |          |            |               |
|---------|----------|------------|---------------|
| Adams   | Fremont  | Mills      | Pottawattamie |
| Audubon | Guthrie  | Montgomery | Shelby        |
| Cass    | Harrison | Page       | Taylor        |

## FIFTH DISTRICT

Engineer, J. S. Morrison, Headquarters, Ottumwa.

|            |           |           |            |
|------------|-----------|-----------|------------|
| Davis      | Jefferson | Louisa    | Van Buren  |
| Des Moines | Keokuk    | Mahaska   | Wapello    |
| Henry      | Lee       | Muscatine | Washington |

## SIXTH DISTRICT

Engineer, W. H. M. Lee, Headquarters, Cedar Rapids.

|         |         |       |       |
|---------|---------|-------|-------|
| Benton  | Iowa    | Jones | Scott |
| Cedar   | Jackson | Linn  | Tama  |
| Clinton | Johnson |       |       |

## SEVENTH DISTRICT

Engineer, J. W. Mercer, Headquarters, Waterloo.

|           |          |         |            |
|-----------|----------|---------|------------|
| Allamakee | Buchanan | Dubuque | Grundy     |
| Blackhawk | Clayton  | Fayette | Winneshiek |
| Bremer    | Delaware |         |            |

## EIGHTH DISTRICT

Engineer, J. F. Reynolds, Headquarters, Storm Lake.

|             |           |            |         |
|-------------|-----------|------------|---------|
| Buena Vista | Dickinson | Kossuth    | Sac     |
| Calhoun     | Emmet     | Palo Alto  | Webster |
| Clay        | Humboldt  | Pocahontas |         |

## NINTH DISTRICT

Engineer, W. O. Price, Headquarters, Chariton.

|           |         |          |        |
|-----------|---------|----------|--------|
| Adair     | Decatur | Marion   | Union  |
| Appanoose | Lucas   | Monroe   | Warren |
| Clarke    | Madison | Ringgold | Wayne  |

## Changes in Personnel.

W. O. Price, county engineer, Marion County, was appointed district engineer for district No. 9, June 1, 1919. Major Geo. K. McCullough, former county engineer of Buena Vista County, was appointed district engineer for District No. 8, July 1, 1919. He resigned September 20th to take up private business and J. F. Reynolds was appointed to fill the vacancy. On July 1st, J. W. Mercer, county engineer of Tama County, was appointed district engineer for District No. 7. W. H. Root, district engineer of District No. 2, was transferred to the Maintenance Department September 1st and R. R. Zack, chief of field party on Federal Aid surveys, was appointed to this district.

## Chapter XI. Roads at State Institutions

### Organization.

The responsibility for construction and maintaining public highways upon and adjacent to lands owned by the state at state institutions, rests with the Board of Control of State Institutions. About fifty miles of roads are located at the various institutions. The Chief Engineer of the Commission acts as Supervisor of these state roads under the Board of Control. He receives no additional compensation for this work.

### Summary of Work During 1919.

During 1919 the work on institutional roads consisted largely of tractor grading and patrol maintenance. A small amount of permanent grading and of graveling was done. The following is a summary of the work done:

|                                 |    |       |
|---------------------------------|----|-------|
| Tractor graded.....             | 20 | miles |
| Maintained under patrolmen..... | 21 | "     |
| Built to permanent grade.....   | 3¼ | "     |
| Graveled .....                  | 1  | mile  |

The total expenditure for work at all institutions was \$28,680.03.

### Patrol Maintenance.

Four patrolmen are employed on institutional road work. One is employed at each of the following institutions:

|  |    |       |
|--|----|-------|
| State Hospital at Cherokee.....              | 3½ | miles |
| State Hospital at Independence.....          | 6½ | "     |
| State College at Ames.....                   | 5½ | "     |
| State Colony for Epileptics at Woodward..... | 5¼ | "     |

These men put in their entire time on the state road work. They were paid during the past year seventy cents per hour for man and team.

While maintenance of roads by the patrol system is more expensive than by other methods, and especially so where the mileage is very small as at state institutions, yet the important point is that the roads are maintained in much better shape and thus a greater service is rendered. It is contemplated that patrol maintenance will be continued at the above institutions and that patrolmen will be employed at other institutions where the mileage of roads is sufficient to keep a patrolman busy.

### Tractor Grading.

Early in the season a 15-30 tractor and a ten-foot blade grader were purchased at the following prices:

|                           |           |
|---------------------------|-----------|
| No. 8 Adams Grader.....   | \$ 850.00 |
| 15-30 Lawson Tractor..... | 1600.00   |
| Total .....               | \$2450.00 |

An experienced grader operator was secured and the outfit was sent to grade the roads at eight of the institutions. Very creditable work was done at a reasonable cost. The outfit operated almost continuously from July 1st to November 1st, with but little cost for repairs. Twenty miles of road were graded at an average cost of \$145.00 per mile. This cost includes an allowance for depreciation on the equipment based on wearing said equipment out in four years.

### Additional Roads.

During the past season additional land has been bought at Anamosa and Fort Madison, thereby adding several miles of road to the state institutional road system. Survey of this additional mileage will be made on request of the Board of Control.

### Work Proposed at Clarinda and Glenwood.

Plans have been prepared for the improvement of approximately one and one-quarter miles of road at Clarinda State Hospital and a survey for 1¼ miles was made at the Glenwood School for Feeble Minded. It is contemplated that improvements consisting of permanent grading will be made at both these places during the coming season.

### Iowa State College—Ames.

The roads at this institution have all been permanently graded and surfaced with gravel or cinders and with the exception of Lincoln Way between the College and the City of Ames are kept in excellent condition by a patrolman who is hired by the month and spends his entire time on the state roads.

The improvement of the Ontario Hill on Lincoln Way was completed by the city of Ames, the state contributing funds for the improvement of that portion bordering state lands.

## Expenditures:

|  |           |
|--|-----------|
| Grading and cindering North Lincoln Way..... | \$1610.80 |
| Patrolman .....                              | 1815.52   |
| Permanent grading and cindering.....         | 570.37    |
| Equipment and repairs.....                   | 84.23     |
| Miscellaneous .....                          | 68.17     |
| Engineering .....                            | 70.00     |
| Total .....                                  | \$4219.09 |

## State Hospital—Cherokee.

The Thirty-eighth General Assembly appropriated \$37,000.00 to be used in paving the south boundary road from the end of the present city paving to the west boundary of the State Farm.

Plans and specifications were prepared and two different attempts were made to let this contract, but in each case the price bid exceeded the appropriation and the work was put off until 1920, at which time it is contemplated the work will be done.

During this season the graveling which was started in 1918 has been completed, except for one quarter of a mile on north road. The entire system of  $3\frac{1}{2}$  miles was tractor bladed.

## Expenditures:

|                          |           |
|--------------------------|-----------|
| Graveling roads.....     | \$2332.57 |
| Patrolman's salary ..... | 717.81    |
| Miscellaneous .....      | 12.40     |
| Tractor grading .....    | 300.00    |
| Engineering .....        | 217.14    |
| Total .....              | \$3579.92 |

## College of Epileptics—Woodward.

At this institution there are five and three-quarters miles of permanently graded roads, all of which have been graveled with the exception of 1,000 feet. About half of this gravel is two course construction, the balance is one course.

During the season the patrolman has graveled about one-half mile of road at add times in addition to hauling a considerable amount of gravel for maintenance of roads previously surfaced. These roads have been kept in excellent condition during the entire season.

## Expenditures:

|                   |           |
|-------------------|-----------|
| Patrolman .....   | \$1402.47 |
| Graveling .....   | 704.59    |
| Equipment .....   | 37.40     |
| Engineering ..... | 45.68     |
| Total .....       | \$2190.14 |

## School for Deaf—Council Bluffs.

The Thirty-seventh General Assembly appropriated \$6,000.00 to be used in paving the road from the city limits to the institution gateway, but owing to war-time prices the work was not done. The Thirty-eighth General Assembly increased this appropriation to \$22,000.00, enough to carry the work past the gateway to the east boundary of the state land, a total distance of 4,000 feet.

In July a contract for paving this road was awarded to the Wickham Construction Company, of Council Bluffs, but owing to the difficult material situation the work has been put off until the spring of 1920.

## Expenditures:

|                                      |         |
|--------------------------------------|---------|
| Advertising for bids for paving..... | \$23.12 |
| Stakes .....                         | 10.00   |
| Inspection .....                     | 7.00    |
| Total .....                          | \$40.12 |

## Iowa Soldier's Orphans Home—Davenport.

In 1918 the Board of Control appropriated \$6,798.00 to be used in grading one and one-half miles of road through the State Farm. The contractor to whom the work was awarded failed to execute a contract and the work was postponed until 1919, when a contract was entered into with E. S. Gay. The contract in 1918 was let on a basis of sixty-three cents a cubic yard and the new contract entered into in 1919 was let at fifty-five cents per cubic yard, thereby effecting a considerable saving to the state. This grading work has been completed and the road will be surfaced with cinders during the winter.

## Expenditures:

|                                      |           |
|--------------------------------------|-----------|
| Permanent grading .....              | \$4227.80 |
| Culverts (metal) .....               | 56.10     |
| Engineering and superintendence..... | 587.30    |
| Total .....                          | \$4871.20 |



**State Hospital—Mount Pleasant.**

Under the direction of Ralph Huelings, steward of the institution, the east boundary road was graded on a day labor basis using institutional men and teams. This completes the grading of all the roads at this institution, all of which have been done on the day labor basis with satisfactory results. The entire system of 2½ miles was tractor bladed.

|                         |          |
|-------------------------|----------|
| Permanent grading ..... | \$567.98 |
| Dragging .....          | 22.68    |
| Tractor grading .....   | 140.87   |
|                         | <hr/>    |
| Total .....             | \$731.53 |

**Custodial Farm—Clive.**

At Clive an appropriation for \$6,431.00 was made for grading and building culverts on one and one-quarter miles of road from the east boundary of the farm west to the farm buildings.

A contract for the grading was awarded to Temple & Keats. The work was finished early in the season. Four culverts were constructed on the basis of the state furnishing the material and paying cost plus ten per cent for the labor.

**Expenditures:**

|                                       |           |
|---------------------------------------|-----------|
| Bridges and culverts—(day labor)..... | \$1976.83 |
| Grading (contract) .....              | 3209.42   |
| Repairs and bridge filling.....       | 218.57    |
| Engineering .....                     | 674.96    |
| Miscellaneous .....                   | 30.58     |
|                                       | <hr/>     |
| Total .....                           | \$6110.36 |

**Industrial School—Eldora.**

During the past year the roads at this institution have received the same careful attention as in past years, all the work being done by the boys of the school under the supervision of Mr. Illiff, the local supervisor.

A survey of the roads was made in anticipation of the county adopting a paving program, but plans were not prepared.

**Expenditures:**

|                                     |          |
|-------------------------------------|----------|
| Surfacing (cinders and gravel)..... | \$443.50 |
| Engineering (survey) .....          | 92.50    |
|                                     | <hr/>    |
| Total .....                         | \$536.00 |

**State Penitentiary—Fort Madison.**

In 1917 a small grading project was started, the work being done by prisoners from the institution.

A contract was entered into with the Warden whereby the work was let to them at the engineer's estimate. This work was completed in 1919.

One and one-half miles of road were tractor graded.

**Expenditures:**

|                                    |           |
|------------------------------------|-----------|
| Labor on bridges and culverts..... | \$ 529.12 |
| Permanent grading .....            | 709.67    |
| Tractor grading .....              | 232.45    |
|                                    | <hr/>     |
| Total .....                        | \$1471.24 |

**School for Feeble Minded—Glenwood.**

A survey of one and one-quarter miles of road was made from which plans are to be made for next year's construction.

Three miles of road were tractor graded, but the total cost is not shown on account of the bills not being paid until after December 1st.

**Expenditures:**

|                       |          |
|-----------------------|----------|
| Tractor grading ..... | \$145.00 |
| Engineering .....     | 32.26    |
|                       | <hr/>    |
| Total .....           | \$177.26 |

**State Hospital—Clarinda.**

Surveys and plans have been prepared for the improvement of one and one-quarter miles of road. Three miles were tractor graded, but the cost is not shown here on account of the bills not being paid until after December 1st.

**Expenditures:**

|                   |         |
|-------------------|---------|
| Engineering ..... | \$36.75 |
|-------------------|---------|

**Women's Reformatory—Rockwell City.**

At this institution no work was done except by the tractor blader. One mile of road was tractor graded.

**Expenditures:**

|  |          |
|--|----------|
| Tractor grading .....  | \$87.15  |
| Girl's Reformatory—Mitchelville.   |          |
| A new crossing was built near the main entrance and a short stretch of road surfaced with cinders. |          |
| Expenditure .....  | \$140.25 |

**State Sanatorium—Oakdale.**

One and one-half miles of road were graded by tractor grader.

**Expenditures:**

|                       |                 |
|-----------------------|-----------------|
| Dragging .....        | \$ 23.00        |
| Tractor grading ..... | 139.14          |
| <b>Total .....</b>    | <b>\$162.14</b> |

**State Hospital—Independence.**

There are 6½ miles of road at this institution of which five miles were tractor graded. The roads at this institution are now cared for by a patrolman whose full time is devoted to this work.

**Expenditures:**

|                       |                  |
|-----------------------|------------------|
| Dragging .....        | \$ 6.72          |
| Tractor grading ..... | 722.01           |
| Patrolman .....       | 394.50           |
| <b>Total .....</b>    | <b>\$1123.23</b> |

**State Hospital—Knoxville.**

About 1500 feet of concrete pavement was built in 1918 under the plans and specifications prepared by the City Engineer of Knoxville. The appropriation made for this work was not quite large enough to pay the entire cost and additional funds were required to meet the engineering cost.

|                   |          |
|-------------------|----------|
| Expenditure ..... | \$326.53 |
|-------------------|----------|

**Institutions General.**

The following expenditures were made for institutions general:

|                                |                  |
|--------------------------------|------------------|
| Repairs .....                  | \$ 57.04         |
| Supplies .....                 | 72.15            |
| Engineering .....              | 210.41           |
| 15-30 Lawson Tractor.....      | 1600.00          |
| 10 ft. Adams Blade Grader..... | 850.00           |
| <b>Total .....</b>             | <b>\$2789.60</b> |

**Chapter XII. Drainage Department**

The work of this department consists principally of studying the flow of Iowa's streams to determine reasonable rates of flood run off to be used in the design of highway bridges and culverts. Other lines of work have been undertaken at times, such as assisting the Executive Council in the drainage of lake beds and in controlling the elevation of the water in Spirit and Okoboji Lakes.

**Stream Gauging Work.**

Two main lines of investigation have been undertaken as follows:

First—A co-operative agreement has been reached by which the stream gauging work formerly carried on by the State Geological Survey, the State Highway Commission and the United States Geological Survey has been consolidated under the direction of Mr. E. D. Burchard, Assistant Engineer, U. S. Geological Survey, who devotes his entire time to this work in Iowa.

Twenty-five regular gauging stations, as shown by the following list, are maintained on the most important streams, where water stages are measured once or twice a day:

**Mississippi Drainage.**

| River        | Town         | County     |
|--------------|--------------|------------|
| Upper Iowa   | Decorah      | Winneshiek |
| Turkey River | Garber       | Clayton    |
| Maquoketa    | Maquoketa    | Jackson    |
| Shell Rock   | Clarksville  | Butler     |
| Cedar        | Janesville   | Bremer     |
| Cedar        | Cedar Rapids | Linn       |
| Iowa River   | Marshalltown | Marshall   |
| Iowa River   | Iowa City    | Johnson    |
| Iowa River   | Wapello      | Louisa     |
| Squaw Creek  | Ames         | Story      |
| Skunk River  | Coppock      | Henry      |
| Skunk River  | Augusta      | Lee        |
| Raccoon      | Van Meter    | Dallas     |
| Des Moines   | Kalo         | Webster    |
| Des Moines   | Des Moines   | Polk       |
| Des Moines   | Ottumwa      | Wapello    |
| Des Moines   | Keosauqua    | Van Buren  |
| Des Moines   | Tracy        | Marion     |

## Missouri Drainage.

| River                | Town            | County     |
|----------------------|-----------------|------------|
| Little Sioux         | Correctionville | Woodbury   |
| Boyer                | Logan           | Harrison   |
| West Br. Nishnabotna | White Cloud     | Hastings   |
| East Br. Nishnabotna | Red Oak         | Montgomery |
| West. Br. Nodaway    | Villisca        | Montgomery |
| Nodaway              | Clarinda        | Page       |
| Grand                | Davis City      | Decatur    |

At these stations one hundred and sixty-four actual measurements of the amount of water flowing have been made during the year. The daily flow at these stations has been computed and is now available to anyone who is interested in these matters. Several large floods have been measured at or very near their crest, and the information so obtained is being used by the Commission in the design of new bridges.

Second—Severe local floods which do not reach the regular gauging stations are investigated and where natural conditions are favorable, estimates of the size of the floods are prepared and filed for use of the bridge department.

**Drainage and Sale of Lake Beds.**

The drainage department has assisted the Executive Council in the drainage and sale of lake beds as follows:

**Keokuk Lake (Muscatine County).**

A detailed survey of the lake bed was finished by the Central States Engineering Company, the land was appraised, and property owners abutting on the lake bed were notified of their ninety-day option to fill out their forties all as required by law. Land not taken under the options will be sold at auction.

**Odessa Lake (Louisa County).**

A detailed survey of the lake bed was finished by the Central States Engineering Company. This land was not drained by the pumping plant at Port Louisa. The district's plans for a second pumping plant near the mouth of the Iowa River have been checked by this department. It is expected that this plant will give adequate drainage to the state lands and that they will promptly be sold as required by law.

**Swan Lake (Emmet County).**

A conflict as to the ownership of land bordering on East Swan Lake made necessary a re-survey of this property before it could be sold as required by law. This survey has been nearly completed by Mr. F. A. McDonald. Upon completion of this survey, the lake bed will be promptly sold as required by law.

**Elbow Lake (Palo Alto County).**

A representative of the department attended the auction at which state lands in the bed of Elbow Lake were all disposed of to private landowners.

**Goose Lake (Greene County).**

The Thirty-eighth General Assembly ordered the drainage of Goose Lake in Greene County. Two propositions relative to straightening the boundaries between the state's land in the lake bed and the land of private parties on the lake shore have been investigated. A fair basis for straightening these lines was arrived at in each case, and suitable recommendations were made to the Executive Council.

**Fixing Elevation for Surface of Lakes.**

Assistance has been given the Executive Council in reference to fixing the elevation for the surface of certain lakes as follows:

**Spirit Lake.**

A report was prepared showing the changes in level of Spirit Lake which have occurred in the past, and an estimate of floods which are to be expected in the future. Recommendations were made for the establishment of a normal spillway level. Estimates were prepared showing the size and cost of controlling works which will never allow the lake level to rise more than a foot and a half above such normal level, and which will promptly discharge surplus water after a heavy storm.

**East and West Okoboji Lakes.**

A petition addressed to the Executive Council relative to levels of East and West Okoboji was referred to this department with a request that conditions be examined and recommendations made as to possible regulation. The necessary field work has been completed and a report is being prepared.

## Chapter XIII. Department of Materials and Tests

### Organization.

Previous to November 15, 1919, all tests of materials were made for the Commission by the Engineering Experiment Station of the Iowa State College. The Department of Materials and Tests officially assumed the testing work of the Commission on November 15, 1919.

The functions of this department are: (a) to inspect, test, and approve the materials used in all work done under the direction of the Highway Commission, (b) to make surveys of the natural deposits of construction materials in the state, (c) to assist in the development of such natural resources, (d) to acquire information concerning available resources of raw material, and (e) to conduct experimental work and technical investigations. Samples of material sent to the Commission by the various counties are tested.

### Tests of Materials.

The resumption of construction work after the war-time restrictions of 1918, the construction of two Federal Aid paving projects, and the realization on the part of road officials of the importance of definite information as to the quality of the materials entering into the construction of roads and bridges, has resulted in a great increase in the volume of the testing work done by the Highway Commission. In 1918 a total of 67 samples of all the various kinds of road and bridge materials were tested. In 1919 the total was 341.

The following schedule shows the number of samples of various kinds of materials tested by the Experiment Station of the Iowa State College and by the Highway Commission:

| Kind of Material       | Tested by Iowa State College | Tested by the Highway Commission |
|------------------------|------------------------------|----------------------------------|
| Bituminous.....        | 32                           | 4                                |
| Paving Brick.....      | 33                           | -----                            |
| Bridge Paint.....      | 60                           | -----                            |
| Building Blocks.....   | 1                            | 1                                |
| Cement.....            | 40                           | 6                                |
| Culvert Metal.....     | 1                            | -----                            |
| Drain Tile.....        | 5                            | 1                                |
| Gravel.....            | 24                           | 14                               |
| Sand.....              | 12                           | 2                                |
| Stone.....             | 25                           | 10                               |
| Reinforcing Steel..... | 13                           | 1                                |
| Road Oil.....          | 56                           | 0                                |
| <b>Total.....</b>      | <b>302</b>                   | <b>39</b>                        |

### Material Resource Survey.

During the year the Highway Commission began a survey of the sources of material available in the state, suitable for the construction of the higher types of road surfaces. About one-half of all the plants in the state which are producing such material on a commercial basis were visited by an engineer from the Department of Materials and Tests. Samples were selected and sent to the laboratory for testing. A number of undeveloped sources of material were also visited and samples tested. Seven such trips were made. On these seven trips deposits of material were investigated as follows:

|   |    |
|---|----|
| Commercially operated gravel plants.....  | 10 |
| Undeveloped gravel pits and bars.....     | 16 |
| Commercially operated stone quarries..... | 4  |
| Undeveloped stone deposits.....           | 1  |

The survey, when completed, will furnish for the designing or construction engineer, data as to the distribution, amount, and quality of material available for the construction of any project under consideration.

### Pipe Culvert Investigations.

During the past summer, an engineer especially employed for the purpose, made a personal investigation of pipe culverts in Montgomery, Pottawattamie, Woodbury, Guthrie, Adair, Adams, Taylor, Page, Fremont, Mills, and Muscatine Counties. One hundred sixty-seven culverts ranging in size from twenty-four to forty-eight inches were examined in detail. Two and one-half months were spent in this work. The information secured in this work is being arranged and analyzed to assist the bridge department in preparing specifications.

At the request of the Commission, the Engineering Experiment Station of the Iowa State College made strength tests upon culvert pipe submitted by the counties manufacturing culvert pipe and by most of the commercial plants operating in Iowa.

The Engineering Experiment Station is also carrying on a very important investigation of the loads upon pipe culverts in service, the results of which will be accessible to the Highway Commission.

### Publications.

A "Manual for Concrete Inspectors" has been prepared and published. This book contains chapters on "Current Practice in Concrete Operations," "Tests and Inspection of Materials," "Inspection of Workmanship," and "Special Conditions in Concreting."

## Chapter XIV. Financial Report

### Increases in Expenditures.

Legislation of the Thirty-seventh and Thirty-eighth General Assemblies accepting the Federal Aid tendered by the government and placing the construction and maintenance of the Primary Road System under the immediate supervision of the Commission, has very materially increased the work of the Commission with a consequent increase in expenditures.

The expenditures for the fiscal year ending June 30, 1919, increased \$58,409.03 over those of the previous year. The details of this increase are as follows:

|   |                   |
|---|-------------------|
| Surveys and plans for Federal Aid Work.....                     | \$24861.56        |
| Commissioners .....   | 107.81            |
| Administrative Department .....                                 | 2013.42           |
| Road Department (Including Testing and Experimental Work) ..... | 8184.38           |
| Bridge Department .....   | 6311.94           |
| Drainage Department .....                                       | 2128.79           |
| District Engineers .....  | 3693.94           |
| Equipment and Supplies .....                                    | 9107.19           |
| <b>Total Increase .....</b>                                     | <b>\$56409.03</b> |

The increases in the cost of the Road Department, the Bridge Department, Equipment and Supplies, and Surveys and plans for Federal Aid work constitute 86.1 per cent of the total increases in the Commission's expenditures. The increase in each of these items or departments is largely due to Federal Aid work. The increased equipment and supplies purchased were largely for use on surveys and plans for Federal Aid Projects. The increase in the Bridge Department was largely because of the preparation of plans and the making of surveys for bridges and culverts on Federal Aid Projects. The increase in the Road Department was partly due to assistance rendered certain counties in supervising construction work on county road projects of special importance, and partly due to supervising construction work on Federal Aid Projects. These items of expense should properly be chargeable to the Federal Aid Engineering Fund, but apparently the law creating such fund is not comprehensive enough to cover such items.

The other items of increased expense (13.9 per cent of the total) are due to the general advance in prices, which everyone has had

called forcibly to his attention when purchasing shoes, clothing, corn, produce, or almost any other article or commodity.

It is of interest to note in passing that the total salaries and expense of the commissioners was \$2992.63 and that these items exclusive of Federal Aid work advanced \$107.81 during the year. The cost of the administrative department, which includes the chief engineer, the auditor, and the general office force, advanced only \$2,013.42. On June 30, 1919 (the date when this financial report closes), work under the new Primary Road Law (passed by the 38th G. A.) was just beginning to get under way. This law vastly increased the work of the Commission and a corresponding increase in expenditures is to be expected.

### Audit and Payment of Bills.

Under an act of the Thirty-sixth General Assembly all bills for salaries and expenses of the State Highway Commission are audited by the State Board of Audit. All bills are examined and approved by the Commission and then forwarded to the State Board of Audit at Des Moines. All funds credited to the State Highway Commission are disbursed by the Treasurer of State on warrants drawn by the Auditor of State.

The act of the Thirty-seventh General Assembly dealing with Federal Aid provides that the State Highway Commission shall on the first of each month prepare an itemized voucher for all expenses incurred in the preparation of plans and specifications for Federal Aid Projects and shall present such voucher to the Auditor of State who shall draw a warrant on the Federal Aid Engineering Fund transferring the amount of such voucher to the maintenance fund of the State Highway Commission.

This provisions requires that a detailed and exact record be kept of all time and expense devoted to the preparation of plans and specifications for Federal Aid Projects.

In the attached schedules the Federal Aid Engineering expense is shown in columns parallel to the columns showing total amount paid by the State Highway Commission.

### Purchase of Supplies.

Practically all supplies are purchased through the purchasing department of the Iowa State College or through the State Executive Council, and in such quantities as to secure the best prices obtainable. Office rooms, heat, light and janitor services are furnished by the Iowa State College.

## Primary Road Fund.

The laws enacted by the Thirty-seventh and the Thirty-eighth General Assemblies provide that the State Highway Commission shall keep detailed records as to the expenditures of the primary road fund, and shall open an account with each county, crediting said account with the funds allotted to the county and debiting said account for expenditures from the funds allotted to such county.

The Treasurer of State is the custodian of the Primary Road Fund and said fund can be disbursed only on warrants issued by the Auditor of State. All bills for the construction of projects on the Primary Road System must be approved by the board of supervisors of the county in which the work is performed, then presented to the State Highway Commission for final audit. Twenty-five per cent of the cost of hard surfacing is payable from the proceeds of special assessments. The bills for this portion of the work after being approved by the Commission are returned to the county auditor for payment. All other bills are payable from the Primary Road Fund. If there is a balance in said fund, such bills after being approved by the Commission, are forwarded to the State Auditor for payment. If the county is proceeding under a bond issue or an issue of road certificates and there is no balance in the Primary Road Fund, the bills after being approved by the Commission are returned to the county auditor for payment.

## SCHEDULE TWENTY-THREE.

## SUMMARY OF EXPENDITURES—JULY 1, 1918, TO JUNE 30, 1919.

| Name                 | Total Amount Paid |              |              | Federal Aid Eng. Expense |              |              |
|----------------------|-------------------|--------------|--------------|--------------------------|--------------|--------------|
|                      | Salary            | Expense      | Total        | Salary                   | Expense      | Total        |
| Commissioners        | \$ 1,730.00       | \$ 1,262.63  | \$ 2,992.63  | \$ 425.00                | \$ 332.55    | \$ 757.55    |
| Administrative Dept. | 16,219.17         | 1,267.87     | 17,487.04    | 1,678.70                 | 377.27       | 2,055.97     |
| Road Dept.—General   | 5,420.00          | 444.53       | 5,864.53     | 1,382.85                 | 245.85       | 1,628.70     |
| Road Dept.—Plans     | 16,893.21         | 480.51       | 17,373.72    | 12,275.75                | 387.73       | 12,663.48    |
| Road Dept.—Field     | 23,408.64         | 6,053.38     | 29,462.02    | 14,660.90                | 4,275.47     | 18,936.37    |
| Road Dept.—Traffic   |                   |              |              |                          |              |              |
| Enum                 | 971.43            | 54.16        | 1,025.59     | 935.03                   | 43.74        | 978.77       |
| Road Dept.—Tracing   | 10,292.47         |              | 10,292.47    | 2,989.68                 |              | 2,989.68     |
| Bridge Dept.         | 25,382.76         | 1,209.14     | 26,591.90    | 571.80                   | 77.08        | 648.88       |
| Drainage Dept.       | 3,950.04          | 1,108.35     | 5,058.39     | 75.00                    | 69.49        | 144.49       |
| W. F. Beard—Dist.    |                   |              |              |                          |              |              |
| Eng.                 | 2,300.00          | 943.13       | 3,243.13     | 153.51                   | 81.38        | 234.69       |
| W. H. Root—Dist.     |                   |              |              |                          |              |              |
| Eng.                 | 2,600.00          | 1,058.70     | 3,658.70     | 316.08                   | 162.86       | 478.94       |
| E. W. Dunn—Dist.     |                   |              |              |                          |              |              |
| Eng.                 | 2,300.00          | 1,028.28     | 3,328.28     | 475.40                   | 204.15       | 679.55       |
| L. M. Martin—Dist.   |                   |              |              |                          |              |              |
| Eng.                 | 2,600.00          | 1,191.14     | 3,791.14     | 528.37                   | 370.11       | 898.48       |
| J. S. Morrison—Dist. |                   |              |              |                          |              |              |
| Eng.                 | 2,600.00          | 987.81       | 3,587.81     | 606.33                   | 220.19       | 826.52       |
| H. L. Phelps—Dist.   |                   |              |              |                          |              |              |
| Eng.                 | 687.73            | 192.10       | 859.83       | 76.60                    | 26.14        | 102.74       |
| W. M. Lee—Dist.      |                   |              |              |                          |              |              |
| Eng.                 | 1,485.00          | 705.14       | 2,190.14     | 164.12                   | 90.06        | 254.18       |
| W. O. Price—Dist.    |                   |              |              |                          |              |              |
| Eng.                 | 97.50             |              | 97.50        |                          |              |              |
| Equip. & Sup.—All    |                   |              |              |                          |              |              |
| Depts.               |                   | 32,992.70    | 32,992.70    |                          | 3,656.48     | 3,656.48     |
| Totals               | \$118,917.95      | \$ 50,979.57 | \$162,897.52 | \$ 37,314.92             | \$ 10,620.55 | \$ 47,935.47 |

## SCHEDULE TWENTY-FOUR.

## COMMISSIONERS—JULY 1, 1918, TO JULY 1, 1919.

|                   |             |             |             |           |           |           |
|-------------------|-------------|-------------|-------------|-----------|-----------|-----------|
| H. C. Beard       | \$ 480.00   | \$ 316.55   | \$ 796.55   | \$ 50.00  | \$ 21.81  | \$ 71.81  |
| J. W. Holden      | 1,030.00    | 491.89      | 1,521.89    | 330.00    | 157.98    | 487.98    |
| S. W. Beyer       |             | 218.86      | 218.86      |           | 65.59     | 65.59     |
| Anson Marston     |             | 126.06      | 126.06      |           | 62.59     | 62.59     |
| William Collinson | 220.00      | 109.27      | 329.27      | 45.00     | 24.58     | 69.58     |
| Totals            | \$ 1,730.00 | \$ 1,262.63 | \$ 2,992.63 | \$ 425.00 | \$ 332.55 | \$ 757.55 |

Note: Commissioner Holden was the only commissioner that served throughout the whole year. Commissioners Beard and Beyer served from July 1, 1918 until about January 1, 1919, when they were succeeded by Commissioners Collinson and Marston.

## SCHEDULE TWENTY-FIVE.

ADMINISTRATIVE DEPARTMENT—JULY 1, 1918, TO JULY 1, 1919.

| Name                    | Total Amount Paid |             |              | Federal Aid Eng. Expense |           |             |
|-------------------------|-------------------|-------------|--------------|--------------------------|-----------|-------------|
|                         | Salary            | Expense     | Total        | Salary                   | Expense   | Total       |
| T. H. MacDonald         | \$ 4,125.00       | \$ 780.19   | \$ 4,905.19  | \$ 626.25                | \$ 357.35 | \$ 983.60   |
| F. W. Parrott           | 2,700.00          | 287.14      | 2,987.14     | 268.87                   | 19.92     | 288.79      |
| J. W. Eichinger         | 2,300.00          | 167.96      | 2,467.96     |                          |           |             |
| May Vanderlinden        | 1,080.00          |             | 1,080.00     | 3.60                     |           | 3.60        |
| Yelda Rowland           | 1,080.00          |             | 1,080.00     | 54.45                    |           | 54.45       |
| Edith Voorhees          | 800.00            |             | 800.00       | 15.60                    |           | 15.60       |
| Thora Tallman           | 210.00            | 27.05       | 237.05       | 1.35                     |           | 1.35        |
| Ruth Haggin             | 911.13            |             | 911.13       | 289.15                   |           | 289.15      |
| Luella Devereaux        | 844.35            |             | 844.35       | 36.88                    |           | 36.88       |
| Maud Spence             | 259.98            |             | 259.98       |                          |           |             |
| Elizabeth Richardson    | 204.00            | 2.80        | 206.80       | 4.50                     |           | 4.50        |
| M. E. Davis             | 232.25            |             | 232.25       | 232.25                   |           | 232.25      |
| Anna S. Lynch           | 274.75            |             | 274.75       |                          |           |             |
| Beryl Bogue             | 471.00            | 2.73        | 473.73       | 145.80                   |           | 145.80      |
| A. S. Miller            | 150.00            |             | 150.00       |                          |           |             |
| M. L. Hutton            | 95.00             |             | 95.00        |                          |           |             |
| Extra Help—Mailing      | 196.70            |             | 196.70       |                          |           |             |
| Bulletin                |                   |             |              |                          |           |             |
| Extra Help—Steno.       | 109.81            |             | 109.81       |                          |           |             |
| Extra Help—An. Rep.     | 124.20            |             | 124.20       |                          |           |             |
| Extra Help—Road         | 15.00             |             | 15.00        |                          |           |             |
| School and Mo. Meetings |                   |             |              |                          |           |             |
| Extra Help—Misc         | 36.00             |             | 36.00        |                          |           |             |
| Totals                  | \$ 16,219.17      | \$ 1,267.87 | \$ 17,487.04 | \$ 1,678.70              | \$ 377.27 | \$ 2,055.97 |

## SCHEDULE TWENTY-SIX.

ROAD DEP'T—GENERAL—JULY 1, 1918, TO JULY 1, 1919.

| Name              | Total Amount Paid |           |             | Federal Aid Eng. Expense |           |             |
|-------------------|-------------------|-----------|-------------|--------------------------|-----------|-------------|
|                   | Salary            | Expense   | Total       | Salary                   | Expense   | Total       |
| F. R. White       | \$ 3,600.00       | \$ 350.56 | \$ 3,950.56 | \$ 891.00                | \$ 151.88 | \$ 1,042.88 |
| O. Coykendall     | 500.00            | 93.97     | 593.97      | 400.00                   | 93.97     | 493.97      |
| Anne Vanderlinden | 1,320.00          |           | 1,320.00    | 91.85                    |           | 91.85       |
| Totals            | \$ 5,420.00       | \$ 444.53 | \$ 5,864.53 | \$ 1,382.85              | \$ 245.85 | \$ 1,628.70 |

## SCHEDULE TWENTY-SEVEN.

ROAD DEP'T—PLANS—JULY 1, 1918, TO JULY 1, 1919.

| Name            | Total Amount Paid |           |              | Federal Aid Eng. Expense |           |              |
|-----------------|-------------------|-----------|--------------|--------------------------|-----------|--------------|
|                 | Salary            | Expense   | Total        | Salary                   | Expense   | Total        |
| W. E. Jones     | \$ 2,500.00       | \$ 216.80 | \$ 2,716.80  | \$ 1,720.39              | \$ 177.84 | \$ 1,897.73  |
| H. S. Leicht    | 1,863.07          | 78.60     | 1,941.67     | 1,491.57                 | 78.60     | 1,570.17     |
| A. S. Miller    | 56.45             | 11.41     | 67.86        |                          |           |              |
| W. M. MacGibbon | 695.13            | 26.20     | 721.33       |                          |           |              |
| W. A. Reeves    | 133.33            |           | 133.33       |                          |           |              |
| J. W. Brandt    | 1,723.65          |           | 1,723.65     | 1,510.31                 |           | 1,510.31     |
| M. H. Bryant    | 1,600.00          |           | 1,600.00     | 1,423.97                 |           | 1,423.97     |
| D. M. Finley    | 625.00            | 131.79    | 756.79       | 565.00                   | 131.79    | 696.79       |
| Oscar Trueblood | 1,320.00          |           | 1,320.00     | 907.47                   |           | 907.47       |
| T. J. Medicleo  | 351.60            |           | 351.60       | 321.00                   |           | 321.00       |
| H. P. Hertz     | 270.00            |           | 270.00       | 258.75                   |           | 258.75       |
| H. E. Crosby    | 260.25            |           | 260.25       |                          |           |              |
| H. G. Singer    | 151.00            |           | 151.00       | 150.08                   |           | 150.08       |
| U. Hozzi        | 631.30            |           | 631.30       | 534.90                   |           | 534.90       |
| B. E. Brevik    | 898.92            |           | 898.92       | 599.03                   |           | 599.03       |
| E. H. Irwin     | 875.00            |           | 875.00       | 650.61                   |           | 650.61       |
| J. R. Sage      | 148.06            |           | 148.06       | 133.27                   |           | 133.27       |
| F. C. Schneider | 1,125.00          |           | 1,125.00     | 1,058.12                 |           | 1,058.12     |
| L. W. Mahone    | 245.70            |           | 245.70       | 103.73                   |           | 103.73       |
| I. E. Goodrich  | 625.00            |           | 625.00       | 519.38                   |           | 519.38       |
| E. A. Zack      | 451.33            | 15.71     | 467.04       | 306.17                   |           | 306.17       |
| M. G. Spangler  | 270.00            |           | 270.00       |                          |           |              |
| R. W. Crum      | 46.00             |           | 46.00        |                          |           |              |
| G. B. Barrett   | 26.67             |           | 26.67        | 22.00                    |           | 22.00        |
| Totals          | \$ 16,893.21      | \$ 480.51 | \$ 17,373.72 | \$ 12,275.75             | \$ 387.73 | \$ 12,663.48 |

## SCHEDULE TWENTY-EIGHT.

ROAD DEP'T—FIELD—JULY 1, 1918, TO JULY 1, 1919.

| Name             | Total Amount Paid |           |             | Federal Aid Eng. Expense |         |          |
|------------------|-------------------|-----------|-------------|--------------------------|---------|----------|
|                  | Salary            | Expense   | Total       | Salary                   | Expense | Total    |
| F. H. Mann       | \$ 2,700.00       | \$ 607.29 | \$ 3,307.29 |                          |         |          |
| P. J. Preston    | 1,855.00          |           | 1,855.00    | 517.50                   |         | 517.50   |
| Bert Myers       | 783.36            | 72.75     | 856.11      | 95.95                    | 23.77   | 119.72   |
| R. W. Crum       | 159.20            | 55.08     | 214.28      |                          |         |          |
| G. S. Foster     | 1,716.72          | 353.91    | 2,070.63    | 712.67                   | 100.51  | 813.18   |
| O. R. Livingston | 315.15            | 56.79     | 371.94      | 139.50                   |         | 139.50   |
| LeRoy Brown      | 1,210.90          | 150.00    | 1,360.90    | 580.25                   |         | 580.25   |
| A. A. Baustian   | 1,375.00          | 473.42    | 1,848.42    | 424.68                   | 86.23   | 510.91   |
| A. F. Miller     | 229.80            | 51.06     | 280.86      |                          |         |          |
| J. D. Kaser      | 87.10             | 129.08    | 216.18      |                          |         |          |
| O. M. Briley     | 353.63            | 7.55      | 361.18      |                          |         |          |
| S. A. Schackle   | 222.60            | 112.97    | 335.57      | 222.60                   | 112.97  | 335.57   |
| H. H. Howie      | 563.70            | 304.88    | 868.58      | 487.50                   | 287.61  | 775.11   |
| E. L. Kaser      | 1,725.00          | 346.96    | 2,071.96    | 1,563.00                 | 346.96  | 1,909.96 |
| Wm. Behrns       | 225.00            | 147.54    | 372.54      | 225.00                   | 147.54  | 372.54   |
| R. R. Zack       | 1,330.65          | 222.98    | 1,553.63    | 1,228.50                 | 212.72  | 1,441.22 |
| M. B. Phelps     | 211.60            | 119.49    | 331.09      | 211.20                   | 119.51  | 330.71   |
| G. H. Craig      | 838.30            | 281.02    | 1,119.32    | 840.12                   | 281.02  | 1,121.14 |
| Robt. McCormack  | 300.00            | 56.10     | 356.10      | 240.00                   | 56.10   | 296.10   |
| Shun Koo         |                   |           |             | 9.94                     |         | 9.94     |
| Edward Cleary    | 133.05            | 58.20     | 191.25      | 106.13                   | 58.20   | 164.33   |
| O. L. Huffman    | 237.10            |           | 237.10      | 237.10                   |         | 237.10   |
| J. D. McCarthy   | 244.36            | 77.53     | 321.89      | 225.00                   | 77.53   | 302.53   |
| K. F. Trottnow   | 404.33            | 121.63    | 525.96      | 385.00                   | 121.63  | 506.63   |
| L. A. Davidson   | 950.00            | 413.69    | 1,363.69    | 950.00                   | 413.69  | 1,363.69 |
| C. L. Eckel      | 197.33            | 43.66     | 240.99      | 197.33                   | 43.66   | 240.99   |
| Waldo McDowell   | 133.05            | 44.70     | 177.76      | 133.05                   | 44.60   | 177.65   |

SCHEDULE TWENTY-EIGHT—Continued.

| Name                    | Total Amount Paid |             |              | Federal Aid Eng. Expense |             |              |
|-------------------------|-------------------|-------------|--------------|--------------------------|-------------|--------------|
|                         | Salary            | Expense     | Total        | Salary                   | Expense     | Total        |
| D. B Walker.....        | 170.67            | 54.41       | 225.08       | 170.67                   | 63.53       | 234.20       |
| J. D. Snover.....       | 143.63            | 36.32       | 179.95       | 143.63                   | 36.32       | 179.95       |
| W. A. Peterson.....     | 162.50            | 56.11       | 218.61       | 162.00                   | 56.11       | 218.11       |
| C. R. Andrews.....      | 600.00            | 302.87      | 902.87       | 600.00                   | 302.87      | 902.87       |
| W. M. Sherman.....      | 175.00            | 52.40       | 227.40       | 174.94                   | 52.40       | 227.34       |
| W. J. Smith.....        | 747.58            | 222.70      | 970.28       | 765.00                   | 222.70      | 927.70       |
| H. Uhlig.....           | 31.45             | 10.30       | 41.75        | 30.75                    | 10.30       | 41.05        |
| M. E. Johnson.....      | 1,499.97          | 377.50      | 1,877.47     | 1,443.07                 | 377.50      | 1,820.57     |
| G. W. Woods.....        | 158.65            | 41.44       | 200.09       | 158.65                   | 41.44       | 200.09       |
| J. M. Ward.....         | 544.50            | 297.74      | 842.24       | 547.00                   | 297.24      | 844.24       |
| F. K. Preston.....      | 190.00            | 40.83       | 230.83       | 189.94                   | 40.83       | 230.77       |
| Andrew Wallukaft.....   | 167.50            | 65.88       | 233.38       | 165.00                   | 65.88       | 230.88       |
| Extra Help—Surveys..... | 815.22            |             | 815.22       | 438.23                   |             | 438.23       |
| Extra Help—Trans.....   |                   | 186.60      | 186.60       |                          | 174.10      | 174.10       |
| Totals .....            | \$ 23,408.64      | \$ 6,053.38 | \$ 29,462.02 | \$ 14,660.90             | \$ 4,275.47 | \$ 18,936.37 |

SCHEDULE TWENTY-NINE.

ROAD DEPT—TRAFFIC CENSUS—JULY 1, 1918, TO JULY 1, 1919.

| Name                  | Total Amount Paid |          |             | Federal Aid Eng. Expense |          |           |
|-----------------------|-------------------|----------|-------------|--------------------------|----------|-----------|
|                       | Salary            | Expense  | Total       | Salary                   | Expense  | Total     |
| J. M. Ward.....       | \$ 48.90          | \$ 9.47  | \$ 58.37    | \$ 48.90                 | \$ 9.47  | \$ 58.37  |
| C. J. Bergen.....     | 36.40             |          | 36.40       |                          |          |           |
| C. W. Fowler.....     | 62.50             | 25.49    | 87.99       | 62.50                    | 15.07    | 77.57     |
| R. A. Farley.....     | 24.20             | 6.30     | 30.50       | 24.20                    | 6.30     | 30.50     |
| C. R. Andrews.....    | 60.50             |          | 60.50       | 60.50                    |          | 60.50     |
| L. M. Romano.....     | 9.00              | 6.30     | 15.30       | 9.00                     | 6.30     | 15.30     |
| C. Sheets.....        | 15.00             | 6.60     | 21.60       | 15.00                    | 6.60     | 21.60     |
| C. R. King.....       | 43.33             |          | 43.33       | 43.33                    |          | 43.33     |
| Neal Dunning.....     | 41.16             |          | 41.16       | 41.16                    |          | 41.16     |
| G. E. Schilling.....  | 46.66             |          | 46.66       | 46.66                    |          | 46.66     |
| John Barton.....      | 44.33             |          | 44.33       | 44.33                    |          | 44.33     |
| H. E. Pammell.....    | 46.66             |          | 46.66       | 46.66                    |          | 46.66     |
| H. J. Richardson..... | 44.33             |          | 44.33       | 44.33                    |          | 44.33     |
| E. M. Brown.....      | 50.00             |          | 50.00       | 50.00                    |          | 50.00     |
| C. T. Hall.....       | 47.50             |          | 47.50       | 47.50                    |          | 47.50     |
| J. N. Garwood.....    | 43.33             |          | 43.33       | 43.33                    |          | 43.33     |
| R. P. Moscrip.....    | 41.16             |          | 41.16       | 41.16                    |          | 41.16     |
| D. A. Morris.....     | 50.00             |          | 50.00       | 50.00                    |          | 50.00     |
| Bruce Russell.....    | 47.50             |          | 47.50       | 47.50                    |          | 47.50     |
| F. W. Watson.....     | 26.66             |          | 26.66       | 26.66                    |          | 26.66     |
| Warren Buser.....     | 25.33             |          | 25.33       | 25.33                    |          | 25.33     |
| F. V. Cure.....       | 26.66             |          | 26.66       | 26.66                    |          | 26.66     |
| Edgar Jacobsen.....   | 25.33             |          | 25.33       | 25.33                    |          | 25.33     |
| L. R. McCarty.....    | 33.33             |          | 33.33       | 33.33                    |          | 33.33     |
| D. F. McCarthy.....   | 31.66             |          | 31.66       | 31.66                    |          | 31.66     |
| Totals .....          | \$ 971.43         | \$ 54.16 | \$ 1,025.59 | \$ 935.03                | \$ 43.74 | \$ 978.77 |

SCHEDULE THIRTY.

WOMEN'S DRAFTING DEPARTMENT—JULY 1, 1918, TO JULY 1, 1919.

| Name                         | Total Amount Paid |         |              | Federal Aid Eng. Expense |         |             |
|------------------------------|-------------------|---------|--------------|--------------------------|---------|-------------|
|                              | Salary            | Expense | Total        | Salary                   | Expense | Total       |
| W. T. Ide, Supt. ....        | \$ 156.80         |         | \$ 156.80    | \$ 101.25                |         | \$ 101.25   |
| Alda Wilson, Supt. ....      | 1,500.00          |         | 1,500.00     | 112.50                   |         | 112.50      |
| Jennie Coventry, Trac        | 1,035.00          |         | 1,035.00     | 343.93                   |         | 343.93      |
| Doris Ambrose, Trac.         | 900.00            |         | 900.00       | 120.10                   |         | 120.10      |
| Carita McCarroll, Tracer     | 815.00            |         | 815.00       | 455.66                   |         | 455.66      |
| Jessie Brooks, Tracer        | 572.50            |         | 572.50       | 154.18                   |         | 154.18      |
| Hazel Brandt, Tracer         | 880.00            |         | 880.00       | 465.07                   |         | 465.07      |
| Marie Haskamp, Tracer        | 155.67            |         | 155.67       | 15.91                    |         | 15.91       |
| Frances McCall, Trac.        | 845.00            |         | 845.00       | 201.95                   |         | 201.95      |
| Dorothy Twitchell, Tracer    | 845.00            |         | 845.00       | 263.02                   |         | 263.02      |
| Belle Courtney, Trac         | 845.00            |         | 845.00       | 190.72                   |         | 190.72      |
| Florence Clark, Trac.        | 280.00            |         | 280.00       | 77.18                    |         | 77.18       |
| Florence Porterfield, Tracer | 62.50             |         | 62.50        | 60.00                    |         | 60.00       |
| Mildred Illiff, Tracer       | 35.00             |         | 35.00        | 35.00                    |         | 35.00       |
| Belle Hamilton, Trac.        | 35.00             |         | 35.00        | 35.00                    |         | 35.00       |
| Violet Roberson, Tra.        | 845.00            |         | 845.00       | 238.06                   |         | 238.06      |
| Margaret Lysinger, Tracer    | 35.00             |         | 35.00        | 35.00                    |         | 35.00       |
| Dorothy Mussen, Tra.         | 265.00            |         | 265.00       | 62.93                    |         | 62.93       |
| Carlotta Howard, Tracer      | 130.00            |         | 130.00       | 22.22                    |         | 22.22       |
| Celia Thomas, Tracer         | 55.00             |         | 55.00        |                          |         |             |
| Totals .....                 | \$ 10,292.47      |         | \$ 10,292.47 | \$ 2,989.68              |         | \$ 2,989.68 |

SCHEDULE THIRTY-ONE.

BRIDGE DEPARTMENT—JULY 1, 1918, TO JULY 1, 1919.

| Name                             | Total Amount Paid |           |             | Federal Aid Eng. Expense |         |          |
|----------------------------------|-------------------|-----------|-------------|--------------------------|---------|----------|
|                                  | Salary            | Expense   | Total       | Salary                   | Expense | Total    |
| J. H. Ames, Br. Eng.             | \$ 3,000.00       | \$ 230.00 | \$ 3,230.93 | \$ 10.00                 | \$ 4.51 | \$ 14.51 |
| E. F. Kelley, Asst. E. Eng.      | 2,500.00          | 105.85    | 2,605.85    |                          |         |          |
| E. W. Blumenschein, Eng.         | 2,500.00          | 84.65     | 2,584.65    |                          |         |          |
| J. A. Paulsen, Con. Eng.         | 2,300.00          | 426.52    | 2,726.52    |                          |         |          |
| S. J. Bell, Designer             | 2,200.00          | 49.18     | 2,249.18    |                          |         |          |
| H. J. Bowman, R. R. X Eng.       | 2,040.00          | 216.52    | 2,256.52    | 397.80                   | 72.57   | 470.37   |
| J. E. Kirkham, Consulting        | 500.00            |           | 500.00      |                          |         |          |
| W. N. Adams, Draft               | 2,000.00          | 1.00      | 2,000.00    |                          |         |          |
| H. B. Collins, Draft             | 1,500.00          |           | 1,500.00    |                          |         |          |
| R. E. Braun, Draft               | 1,440.00          |           | 1,440.00    |                          |         |          |
| A. S. Paterson, Draftsman        | 213.22            |           | 213.22      |                          |         |          |
| Helge Haugen, Draft              | 83.87             |           | 83.87       |                          |         |          |
| Hans Hanson, Clerk               | 1,600.00          | 2.05      | 1,602.05    | 164.00                   |         | 164.00   |
| Mrs. J. A. Paulsen, Stenographer | 1,260.00          |           | 1,260.00    |                          |         |          |
| Mrs. M. F. Stigers, Clerk        | 689.00            |           | 689.00      |                          |         |          |
| C. H. Cook, Draft                | 461.25            |           | 461.25      |                          |         |          |
| H. E. Crosby, Draft              | 390.00            |           | 390.00      |                          |         |          |
| J. C. Nichols, Draft             | 100.00            |           | 100.00      |                          |         |          |
| P. S. Holbrook, Draft            | 33.87             |           | 33.87       |                          |         |          |



SCHEDULE THIRTY-ONE. Continued.

| Name                         | Total Amount Paid |             |              | Federal Aid Eng. Expense |          |           |
|------------------------------|-------------------|-------------|--------------|--------------------------|----------|-----------|
|                              | Salary            | Expense     | Total        | Salary                   | Expense  | Total     |
| L. W. Mahone,<br>Draftsman   | 55.80             |             | 55.80        |                          |          |           |
| L. C. Clark, Draft           | 48.00             | 63.79       | 111.79       |                          |          |           |
| H. C. Crosby, Draft          | 63.75             |             | 63.75        |                          |          |           |
| G. C. Marbeck, Draft         |                   | 13.79       | 13.79        |                          |          |           |
| John Baty, Draft             | 10.00             | 6.30        | 16.30        |                          |          |           |
| Sam Hall, Draft              | 10.00             | 7.13        | 17.13        |                          |          |           |
| M. G. Spangler,<br>Draftsman | 79.00             |             | 79.00        |                          |          |           |
| Reed Brown, Draft            | 5.00              | 1.43        | 6.43         |                          |          |           |
| <b>Totals</b>                | \$ 25,382.76      | \$ 1,209.14 | \$ 26,591.90 | \$ 571.80                | \$ 77.08 | \$ 648.88 |

SCHEDULE THIRTY-TWO.

DRAINAGE DEPARTMENT—JULY 1, 1918, TO JULY 1, 1919.

| Name                              | Total Amount Paid |             |             | Federal Aid Eng. Expense |          |           |
|-----------------------------------|-------------------|-------------|-------------|--------------------------|----------|-----------|
|                                   | Salary            | Expense     | Total       | Salary                   | Expense  | Total     |
| R. W. Clyde, Dr. Eng              | \$ 2,200.00       | \$ 285.52   | \$ 2,485.52 |                          |          |           |
| D. P. Weeks, Eng                  | 470.80            | 295.53      | 766.33      |                          |          |           |
| E. D. Burchard,<br>Asst. Eng      | 429.99            | 209.69      | 639.68      |                          |          |           |
| F. J. Olbrich, Rod-<br>man        | 205.75            | 159.21      | 364.96      | 75.00                    | 69.49    | 144.49    |
| Louis Van Beek,<br>Rodman         | 203.50            | 158.40      | 361.90      |                          |          |           |
| W. L. Severe, G. R.               | 60.00             |             | 60.00       |                          |          |           |
| E. H. Worrell, G. R.              | 72.00             |             | 72.00       |                          |          |           |
| G. S. Dunn, G. R.                 | 60.00             |             | 60.00       |                          |          |           |
| Floyd Kelley, G. R.               | 60.00             |             | 60.00       |                          |          |           |
| E. J. Purlow, G. R.               | 8.00              |             | 8.00        |                          |          |           |
| C. N. Hammock,<br>Gauge Reader    | 60.00             |             | 60.00       |                          |          |           |
| Leonard England,<br>Gauge Reader  | 60.00             |             | 60.00       |                          |          |           |
| C. F. Peckhpough,<br>Gauge Reader | 60.00             |             | 60.00       |                          |          |           |
| <b>Totals</b>                     | \$ 3,950.04       | \$ 1,108.35 | \$ 5,058.39 | \$ 75.00                 | \$ 69.49 | \$ 144.49 |

SCHEDULE THIRTY-THREE.

DISTRICT ENGINEERS—JULY 1, 1918, TO JULY 1, 1919.

| Name           | Total Amount Paid |             |              | Federal Aid Eng. Expense |             |             |
|----------------|-------------------|-------------|--------------|--------------------------|-------------|-------------|
|                | Salary            | Expense     | Total        | Salary                   | Expense     | Total       |
| W. F. Beard    | \$ 2,300.00       | \$ 943.13   | \$ 3,243.13  | \$ 153.31                | \$ 81.38    | \$ 234.69   |
| W. H. Root     | 2,800.00          | 1,058.70    | 3,858.70     | 315.08                   | 162.86      | 477.94      |
| E. W. Dunn     | 2,300.00          | 1,028.23    | 3,328.23     | 475.40                   | 204.15      | 679.55      |
| L. M. Martin   | 2,600.00          | 1,191.14    | 3,791.14     | 523.37                   | 370.11      | 893.48      |
| J. S. Morrison | 2,600.00          | 967.81      | 3,567.81     | 605.33                   | 220.19      | 825.52      |
| H. L. Phelps   | 667.73            | 192.10      | 859.83       | 76.90                    | 26.14       | 102.74      |
| W. M. Lee      | 1,485.00          | 705.14      | 2,190.14     | 164.12                   | 90.06       | 254.18      |
| W. O. Price    | 97.50             |             | 97.50        |                          |             |             |
| <b>Totals</b>  | \$ 14,650.23      | \$ 6,106.80 | \$ 20,756.53 | \$ 2,320.21              | \$ 1,154.89 | \$ 3,475.10 |

SCHEDULE THIRTY-FOUR.

EQUIPMENT AND SUPPLIES—JULY 1, 1918, TO JULY 1, 1919.

| Name                               | Total Amount Paid |              |           | Federal Aid Eng. Expense |             |             |
|------------------------------------|-------------------|--------------|-----------|--------------------------|-------------|-------------|
|                                    | Salary            | Expense      | Total     | Salary                   | Expense     | Total       |
| Freight & Drayage                  | \$ 333.74         |              | \$ 333.74 |                          |             |             |
| Express                            | 208.01            |              | 208.01    |                          |             |             |
| Telegraph                          | 230.84            |              | 230.84    |                          |             |             |
| Postage                            | 3,000.00          |              | 3,000.00  |                          |             |             |
| Telephones                         | 786.08            |              | 786.08    |                          |             |             |
| Photos, Slides and<br>Cuts         | 667.20            |              | 667.20    |                          |             |             |
| Ptg. and Paper—<br>Bull. and Spec. | 3,100.89          |              | 3,100.89  |                          |             |             |
| Ptg.—Blanks, etc.                  | 1,476.45          |              | 1,476.45  |                          |             |             |
| Sta. and Office Sup.               | 3,524.78          |              | 3,524.78  |                          |             |             |
| Furniture & Fixtures               | 2,134.40          |              | 2,134.40  |                          |             |             |
| Maps                               | 792.94            |              | 792.94    |                          |             |             |
| Road Dept.                         | 5,210.54          |              | 5,210.54  |                          |             |             |
| Bridge Dept.                       | 12.50             |              | 12.50     |                          |             |             |
| Drafting Dept.                     | 1,712.75          |              | 1,712.75  |                          |             |             |
| Drainage Dept.                     | 1.90              |              | 1.90      |                          |             |             |
| State Fair Exhibit                 | 192.76            |              | 192.76    |                          |             |             |
| Motor Vehicle Trans.               |                   |              |           |                          |             |             |
| Misc.                              | 213.60            |              | 213.60    |                          |             |             |
| Car No. 1—<br>Cost and Equip       | 210.85            |              | 210.85    |                          |             |             |
| Repairs                            | 295.03            |              | 295.03    |                          |             |             |
| Supplies                           | 251.18            |              | 251.18    |                          | 20.80       | 20.80       |
| Car No. 2—<br>Cost and Equip       | 129.45            |              | 129.45    |                          |             |             |
| Repairs                            | 187.98            |              | 187.98    |                          | 19.81       | 19.81       |
| Supplies                           | 214.83            |              | 214.83    |                          | 10.29       | 10.29       |
| Car No. 3—<br>Cost and Equip       | 495.60            |              | 495.60    |                          |             |             |
| Repairs                            | 97.41             |              | 97.41     |                          |             |             |
| Supplies                           | 153.76            |              | 153.76    |                          | 1.76        | 1.76        |
| Car No. 4—<br>Cost and Equip       | 1,175.00          |              | 1,175.00  |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           | .30               |              | .30       |                          |             |             |
| Car No. 5—<br>Cost and Equip       | 1,548.60          |              | 1,548.60  |                          |             |             |
| Repairs                            | 14.37             |              | 14.37     |                          |             |             |
| Supplies                           | 77.95             |              | 77.95     |                          |             |             |
| Car No. 6—<br>Cost and Equip       | 742.80            |              | 742.80    |                          |             |             |
| Repairs                            | .50               |              | .50       |                          |             |             |
| Supplies                           | 33.21             |              | 33.21     |                          | 2.50        | 2.50        |
| Car No. 7—<br>Cost and Equip       | 760.90            |              | 760.90    |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           |                   |              |           |                          |             |             |
| Car No. 8—<br>Cost and Equip       | 750.90            |              | 750.90    |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           |                   |              |           |                          |             |             |
| Car No. 9—<br>Cost and Equip       | 750.90            |              | 750.90    |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           |                   |              |           |                          |             |             |
| Car No. 10—<br>Cost and Equip      | 750.90            |              | 750.90    |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           |                   |              |           |                          |             |             |
| Car No. 11—<br>Cost and Equip      | 750.90            |              | 750.90    |                          |             |             |
| Repairs                            |                   |              |           |                          |             |             |
| Supplies                           |                   |              |           |                          |             |             |
| Balance charged to<br>Fed. Aid     |                   |              |           |                          | 2,561.25    | 2,561.25    |
| <b>Totals</b>                      | \$ 32,992.70      | \$ 32,992.70 |           |                          | \$ 8,656.48 | \$ 8,656.48 |

SCHEDULE THIRTY-FIVE.

COMPARISON OF EXPENDITURES FOR FIVE YEARS.

|  | 1914-15             | 1915-16             | 1916-17             | Note 1<br>1917-18   | Note 1<br>1918-19    |
|--|---------------------|---------------------|---------------------|---------------------|----------------------|
| Commissioners                                      | \$ 3,407.65         | \$ 2,592.22         | \$ 2,839.63         | \$ 2,127.27         | \$ 2,235.06          |
| Administrative Dept.                               | 14,834.87           | 12,137.98           | 12,479.78           | 13,417.65           | 15,431.07            |
| Road Department                                    | 10,308.53           | 11,186.35           | 11,139.89           | 16,444.05           |                      |
| Road Dept.—General                                 |                     |                     |                     |                     | 4,235.83             |
| Road Dept.—Plans                                   |                     |                     |                     |                     | 4,710.24             |
| Road Dept.—Field                                   |                     |                     |                     |                     | 10,525.65            |
| Women's Drafting Dept.                             |                     |                     |                     |                     | 7,302.79             |
| Road Dept.—Traffic Enum.                           |                     |                     |                     |                     | 46.82                |
| Bridge Department                                  | 16,064.47           | 7,944.33            | 9,139.02            | 19,631.08           | 25,943.02            |
| Drafting Department                                |                     | 10,309.20           | 12,633.25           | Note 2              |                      |
| Drainage Department                                |                     |                     | 882.31              | 2,785.11            | 4,913.90             |
| District Engineers                                 | 13,053.59           | 13,711.09           | 14,386.51           | 13,587.49           | 17,281.43            |
| Remodeling and Repairing Office and Drafting Dept. | 4,622.42            |                     |                     |                     |                      |
| T. & E. W. Department                              |                     | 5,300.07            | 3,886.58            | 2,192.90            |                      |
| Bridge Patent Litigation                           |                     | 1,855.90            |                     | Note 3              | Note 3               |
| State Institutional Roads                          |                     | 3,226.54            | 2,032.37            | Note 4              | Note 4               |
| R. R. Crossing—Survey & Plans                      |                     | 2,031.30            | 2,076.58            | Note 5              | Note 5               |
| Lake Bed Survey                                    |                     | 5,535.00            | 4,814.19            |                     |                      |
| Equipment and Supplies                             | 18,643.65           | 14,990.36           | 13,476.73           | 20,229.03           | 19,998.06            |
| Motor Vehicle Transportation                       |                     |                     |                     |                     | 9,338.16             |
| <b>Totals</b>                                      | <b>\$ 80,935.18</b> | <b>\$ 90,821.34</b> | <b>\$ 89,786.84</b> | <b>\$ 90,414.58</b> | <b>\$ 121,962.05</b> |

Note 1—Excluding cost of Federal Aid Plans which is charged to Federal Aid Engineering Fund.  
 Note 2—Divided between Road and Bridge Department.  
 Note 3—Included under Administrative Department.  
 Note 4—Included under Road Department.  
 Note 5—Included under Bridge Department.

SCHEDULE THIRTY-SIX.

APPROPRIATION STATE HIGHWAY COMMISSION—JULY 1, 1918, TO JUNE 30, 1919.

STATEMENT, JUNE 30, 1919.

|   | Debits       |
|---|--------------|
| Unexpended appropriation on July 1, 1918  | \$ 59,826.46 |
| Tax Collected July 1918                   | 17,327.10    |
| Tax Collected August 1918                 | 9,620.37     |
| Tax Collected September 1918              | 4,790.69     |
| Tax Collected October 1918                | 580.98       |
| Tax Collected November 1918               | 1,341.69     |
| Tax Collected December 1918               | 7,837.91     |
| Tax Collected January 1919                | 11,423.58    |
| Tax Collected February 1919               | 10,131.54    |
| Tax Collected March 1919                  | 9,714.02     |
| Tax Collected April 1919                  | 35,000.00    |
| Tax Collected May 1919                    | 40,000.00    |
| Tax Collected June 1919                   | 15,461.36    |
| Refund—Butler Paper Co.                   | 57.28        |
| Refund—War Ordnance Department            | 935.00       |
| Refund—Blueprinting                       | 10.00        |
| Refund—H. C. Beard                        | 52.75        |
| Refund—Miscellaneous                      | 12.86        |
| Refund—Federal Aid Engineer for June 1918 | 3,277.79     |
| Refund—Federal Aid Engineer, Expense      | 47,935.47    |

\$ 275,236.94

SCHEDULE THIRTY-SIX. Continued.

Credits

|                                    |               |
|------------------------------------|---------------|
| Warrants issued in July, 1918      | \$ 13,582.22  |
| Warrants issued in August, 1918    | 12,263.15     |
| Warrants issued in September, 1918 | 16,901.56     |
| Warrants issued in October, 1918   | 10,943.67     |
| Warrants issued in November, 1918  | 11,122.62     |
| Warrants issued in December, 1918  | 11,227.09     |
| Warrants issued in January, 1919   | 35,533.15     |
| Warrants issued in February, 1919  | 17,251.26     |
| Warrants issued in March, 1919     | 13,092.51     |
| Warrants issued in April, 1919     | 14,287.41     |
| Warrants issued in May, 1919       | 14,896.42     |
| Warrants issued in June, 1919      | 13,687.98     |
| Balance June 30, 1919              | 20,742.63     |
|                                    | 69,806.27     |
|                                    | \$ 275,236.94 |

SCHEDULE THIRTY-SEVEN.

STATEMENT SHOWING DISTRIBUTION OF FEDERAL AID ENGINEERING EXPENSE—JULY 1, 1918, TO JUNE 30, 1919.

COST BY MONTHS

|                 |              |
|-----------------|--------------|
| July, 1918      | \$ 4,895.33  |
| August, 1918    | 4,720.26     |
| September, 1918 | 2,748.97     |
| October, 1918   | 2,570.06     |
| November, 1918  | 3,066.72     |
| December, 1918  | 2,818.14     |
| January, 1919   | 3,097.45     |
| February, 1919  | 3,294.87     |
| March, 1919     | 3,082.08     |
| April, 1919     | 4,378.73     |
| May, 1919       | 5,688.75     |
| June, 1919      | 7,574.11     |
|                 | \$ 47,935.47 |

FEDERAL AID ENGINEERING FUND

| Debits  |              |
|---|--------------|
| Balance June 30, 1918                             | \$ 11,926.09 |
| Appropriation August 1, 1918                      | 30,000.00    |
| Appropriation April 1, 1919                       | 36,009.00    |
|   | \$ 77,926.09 |
| Credits   |              |
| Engineering Expense July 1, 1918 to June 30, 1919 | \$ 47,935.47 |
| Balance June 30, 1919                             | 29,990.62    |
|   | \$ 77,926.09 |

SUMMARY CLASSIFICATION

|                |              |
|----------------|--------------|
| Reconnaissance | \$ 4,216.14  |
| Traffic Census | 2,451.17     |
| Survey         | 15,638.51    |
| Profile        | 21,842.49    |
| Specifications | 491.67       |
| Conferences    | 1,440.18     |
| Records        | 1,855.31     |
|                | \$ 47,935.47 |

SCHEDULE THIRTY-SEVEN.—Continued.

Table with columns: County, Reconnaissance, Traffic Census, Survey, Profile, Specifications, Conferences, Records, Records. Lists counties from Adair to O'Brien with corresponding numerical data.

SCHEDULE THIRTY-SEVEN—Continued

Table with columns: County, Reconnaissance, Traffic Census, Survey, Profile, Specifications, Conferences, Records, Total. Lists counties from Oseeola to General with corresponding numerical data.

SCHEDULE THIRTY-EIGHT.

STATEMENT OF PRIMARY ROAD FUND—JULY 1, 1919.

FEDERAL FUNDS ALLOTTED TO IOWA

Table listing federal funds allotted to Iowa from July 21, 1916, to July 1, 1919, with total amount \$5,058,014.40.

STATE FUNDS APPROPRIATED

Table listing state funds appropriated from August 1, 1917, to April 1, 1919, with total amount \$1,161,789.65.

Total Federal and State Funds made available... \$ 6,219,804.05

FEDERAL FUNDS EXPENDED

Project No. 1, Cerro Gordo Co. \$22,453.75

STATE FUNDS EXPENDED

Project No. 1, Cerro Gordo Co. \$22,453.75; Project No. 2, Woodbury Co. 23,111.94; Project No. 7, Marion County. 41,088.33

Total Federal and State Funds Expended... \$91,654.02; Net Federal and State Funds Available July 1, 1919 \$114,107.77

\$6,105,606.28

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## PART II

### Summary of Annual Reports of County Engineers

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## PART II

### Summary of Annual Reports of County Engineers

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#### Introduction:

This summary is prepared from the annual reports of the county engineers of the ninety-nine counties of Iowa and is prepared and submitted in accordance with the provisions of Section 1527-s2, SS 1915.

The county engineers' reports include detailed statements of all county expenditures for road and bridge work. Efforts were made through the county engineers to secure detailed reports of township expenditures. Out of 1606 townships, reports were secured from 1431 up to date when this report was tabulated.

Statements of expenditures are based on warrants issued by the county auditors for the period covered by this report. The county engineers are dependent upon the following sources for information contained in their reports:

(a) Total expenditures from County Bridge, County Motor Vehicle Road, and County Road Cash Funds; County Auditor's Warrant Register; detailed classification of these expenditures must be made by the county engineer.

(b) Financial statement of the receipts and disbursements in above named funds, County Treasurer's Cash Book.

(c) Statement of county's indebtedness, records of county auditor and county treasurer combined.

(d) Statement of classified expenditures from all township funds, and classified statement of receipts and disbursements in said funds, annual reports of township clerks.

This report includes a general summary of the activities of the ninety-nine counties, paragraph summaries of the road and bridge expenditures of the individual counties, and twenty-nine summary tables showing in detail the expenditures for road and bridge work from all funds and the present financial condition of the several counties.

SUMMARY OF FINANCIAL STATEMENT FOR ENTIRE STATE.

Annual Reports of County Engineers. January 1, 1919, to January 1, 1920.

Total Expenditure:

From January 1, 1919, to January 1, 1920, the counties and townships spent \$16,154,078.45 for road and bridge work on the 104,082 miles of road in the county and township road systems. The above named sum includes expenditures from the primary road fund to the amount of \$440,008.53. This total expenditure for both road and bridge work is an average of \$155.21 per mile on the total mileage above named. The total expenditure is \$2,058,325.84 or 14.7 per cent more than the total expenditure reported for 1918. The expenditures are classified as follows:

|  |                      |
|--|----------------------|
| Bridge work on both county and township roads. | \$ 6,854,722.43      |
| Road work on county and primary roads.         | 5,257,484.30         |
| Road work on township roads.                   | 4,041,871.72         |
| <b>Total</b>                                   | <b>16,154,078.45</b> |

The expenditure for bridge work alone averaged \$65.86 per mile on county and township roads together.

The expenditure for road work proper on the 160,863.72 miles in the county and primary road systems averaged \$311.77 per mile and for road work on the township road system, \$46.34 per mile.

The following schedule compares expenditures for the past several years, according to purpose for which spent and according to fund from which derived:

TOTAL EXPENDITURE FOR ROAD AND BRIDGE WORK.

|  | 1915                   | 1916                   | 1917                   | 1918                   | 1919                    |
|--|------------------------|------------------------|------------------------|------------------------|-------------------------|
| Bridge work on both county and township roads. | \$ 6,629,252.24        | \$ 7,172,246.02        | \$ 7,466,796.69        | \$ 6,808,818.16        | \$ 6,854,722.43         |
| Road work on Co. Roads                         | 3,396,364.97           | 3,276,025.71           | 4,140,340.56           | 3,856,051.88           | 5,257,484.30            |
| Road work on township roads.                   | 2,676,736.03           | 3,072,022.92           | 3,558,338.51           | 3,430,882.57           | 4,041,871.72            |
| <b>Totals</b>                                  | <b>\$12,702,353.22</b> | <b>\$13,520,294.65</b> | <b>\$15,165,475.76</b> | <b>\$14,095,752.61</b> | <b>\$ 16,154,078.45</b> |

TOTAL EXPENDITURE FROM SEVERAL FUNDS.

|                         | 1915                   | 1916                   | 1917                   | 1918                   | 1919                    |
|-------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
| County bridge fund      | \$ 6,629,252.24        | \$ 6,130,409.81        | \$ 6,549,024.03        | \$ 5,808,300.46        | \$ 5,827,432.14         |
| County road cash fund   | 3,396,364.95           | 3,236,318.71           | 3,710,383.02           | 3,514,575.57           | 4,418,288.10            |
| Motor vehicle road fund |                        | 998,292.37             | 1,223,746.06           | 1,215,981.72           | 1,330,384.10            |
| Township road fund      | 2,260,339.65           | 2,508,459.13           | 2,886,652.93           | 2,669,987.83           | 3,190,666.61            |
| Township drag fund      | 416,396.38             | 563,563.79             | 671,685.58             | 726,281.67             | 818,084.94              |
| Primary road fund.      |                        |                        | 18,100.62              | 75,853.12              | 440,008.53              |
| All other sources.      |                        | 83,250.84              | 105,883.52             | 84,822.24              | 129,214.03              |
| <b>Totals</b>           | <b>\$12,702,353.22</b> | <b>\$13,520,294.65</b> | <b>\$15,165,475.76</b> | <b>\$14,095,752.61</b> | <b>\$ 16,154,078.45</b> |

Cash Balances January 1, 1920.

On January 1, 1920, there were cash balances on hand in the county and township road and bridge funds amounting to \$2,039,553.95 as follows:

|   |                       |
|---|-----------------------|
| County bridge fund.                     | \$ 364,070.94         |
| County road cash fund.                  | 76,729.37             |
| County motor vehicle road fund.         | 630,277.99            |
| <b>Total county balance.</b>            | <b>1,071,078.30</b>   |
| Township road, drag and drainage funds. | 968,475.65            |
| <b>Total</b>                            | <b>\$2,039,553.95</b> |

Indebtedness.

There were outstanding funding bonds, for road and bridge work, amounting to \$11,364,704.66 as follows:

|                                 |                        |
|---------------------------------|------------------------|
| Bridge bonds outstanding.       | \$ 8,822,876.74        |
| Road bonds outstanding.         | 2,541,827.92           |
| <b>Total bonds outstanding.</b> | <b>\$11,364,704.66</b> |
| Bridge bonds                    | \$1,581,675.89         |
| Road bonds                      | 709,744.55             |
| <b>Total</b>                    | <b>\$2,291,420.44</b>  |

Bonds were retired during the year as follows:

|              |                     |
|--------------|---------------------|
| Bridge bonds | \$263,620.00        |
| Road bonds   | 170,847.82          |
| <b>Total</b> | <b>\$434,467.82</b> |

It will be noted that the amount of bonds retired did not nearly equal the amount of bonds issued. It may be remarked here that it is the practice in many counties to issue funding bonds to take up outstanding warrants and to extend the payment of such bonds over a term of from ten to twenty years. In several counties the bonded indebtedness has very nearly reached the statutory limitation.

Reports indicate that 77 counties have funding bonds outstanding for road and bridge expenditures, 49 counties being bonded for road work and 75 for bridge work. Of the total bonded indebtedness, 60.5 per cent is for bridge work and 39.5 per cent for road work.

The total indebtedness of the ninety-nine counties as reported January 1, 1920, and as compared with previous years is as follows:

#### TOTAL INDEBTEDNESS FOR ROAD AND BRIDGE WORK.

##### COUNTY BRIDGE FUND.

|                                     | Jan'y. 1, 1917         | Jan'y. 1, 1918         | Jan'y. 1, 1919          | Jan'y. 1, 1920          |
|-------------------------------------|------------------------|------------------------|-------------------------|-------------------------|
| Outstanding bills.....              | \$ 216,253.16          | \$ 152,426.34          | \$ 157,910.05           | \$ 128,968.05           |
| Outstanding warrants.....           | 2,556,460.00           | 2,414,748.15           | 2,081,701.72            | 1,994,273.45            |
| Outstanding bonds.....              | 3,872,817.27           | 6,308,041.95           | 7,954,280.13            | 9,101,876.74            |
| <b>Total Bridge Indebtedness...</b> | <b>\$ 6,645,530.43</b> | <b>\$ 8,875,215.84</b> | <b>\$ 10,193,891.90</b> | <b>\$ 11,225,118.24</b> |

##### COUNTY ROAD FUND.

|                                    | Jan'y. 1, 1917         | Jan'y. 1, 1918          | Jan'y. 1, 1919          | Jan'y. 1, 1920          |
|------------------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| Outstanding bills.....             | \$ 125,475.25          | \$ 86,709.12            | \$ 114,530.96           | \$ 81,914.96            |
| Outstanding warrants.....          | 809,506.17             | 1,174,430.27            | 837,137.99              | 1,307,540.14            |
| Outstanding bonds.....             | 454,457.08             | 1,064,645.79            | 2,054,020.95            | 2,665,551.08            |
| <b>Total Road Indebtedness....</b> | <b>\$ 1,389,438.45</b> | <b>\$ 2,315,785.18</b>  | <b>\$ 3,005,689.90</b>  | <b>\$ 4,115,006.15</b>  |
| <b>Total Indebtedness.....</b>     | <b>\$ 8,034,968.88</b> | <b>\$ 11,191,001.02</b> | <b>\$ 13,199,581.80</b> | <b>\$ 15,340,124.39</b> |

#### EQUIPMENT AND TOOLS ON HAND.

Reports of county engineers show that the several counties owned equipment and tools for road and bridge work valued on January 1, 1920, at \$797,987.01. A summary of the principal items of equipment reported is as follows:

| Items                              | Number | Estimated Value      |
|------------------------------------|--------|----------------------|
| Tractors.....                      | 127    | \$ 217,682.00        |
| Trucks.....                        | 52     | 80,229.73            |
| Concrete Mixers.....               | 146    | 25,467.23            |
| Pile Drivers.....                  | 94     | 11,022.70            |
| Blade Graders.....                 | 804    | 185,560.02           |
| Wheeled Scrapers.....              | 1,230  | 27,761.63            |
| Slip Scrapers.....                 | 1,355  | 8,860.67             |
| Road Drags.....                    | 3,837  | 53,248.79            |
| Fresnos.....                       | 112    | 1,539.27             |
| Road Planers.....                  | 101    | 22,637.50            |
| Plows.....                         | 502    | 6,136.50             |
| Gas Engines.....                   | 19     | 1,979.50             |
| Small Tools and Miscellaneous..... |        | 154,790.87           |
| <b>Total.....</b>                  |        | <b>\$ 797,987.01</b> |

A detailed statement of the inventory of equipment in each county is given in Summary Table No. 29, Parts 1 and 2.

This does not include equipment owned by townships which consists principally of blade graders, tractors, drags, wheeled scrapers, slip scrapers, plows and small tools.





COMPARISON OF EXPENDITURES FOR PERMANENT AND TEMPORARY BRIDGE CONSTRUCTION.

|  | 1915    |                 |        | 1916    |                 |        | 1917   |                 |        |
|--|---------|-----------------|--------|---------|-----------------|--------|--------|-----------------|--------|
|  | No.     | Expenditures    | %      | No.     | Expenditures    | %      | No.    | Expenditures    | %      |
| Permanent Bridges and Culverts.....          | 7,131   | \$ 4,079,000.00 | 78.9   | 11,116  | \$ 4,026,309.01 | 76.7   | 7,166  | \$ 4,485,781.23 | 80.77  |
| Temporary Bridges and Culverts.....          | 34,233* | 1,091,000.00    | 21.1   | 33,500* | 1,222,023.37    | 23.3   | 8,572  | 603,490.24      | 10.88  |
| **Culvert Materials Furnished Townships..... |         |                 |        |         |                 |        |        | 463,553.59      | 3.35   |
| Totals .....                                 | 41,364  | 5,170,000.00    | 100.00 | 44,616  | \$ 5,248,332.38 | 100.00 | 15,738 | \$ 5,552,825.06 | 100.00 |

\*--Includes temporary culverts for townships.

|  | 1918   |                 |        | 1919  |                 |        | Five Year Period |                  |        |
|--|--------|-----------------|--------|-------|-----------------|--------|------------------|------------------|--------|
|  | No.    | Expenditures    | %      | No.   | Expenditures    | %      | No.              | Expenditures     | %      |
| Permanent Bridges and Culverts.....          | 5,698  | \$ 3,578,451.05 | 78.00  | 5,009 | \$ 3,827,081.17 | 80.14  | 36,120           | \$ 19,990,622.46 | 78.93  |
| Temporary Bridges and Culverts.....          | 4,539  | 598,426.88      | 13.05  | 4,343 | 577,741.33      | 12.11  | 85,187           | 4,062,681.82     | 16.16  |
| **Culvert Materials Furnished Townships..... |        | 410,171.73      | 8.95   |       | 370,651.19      | 7.75   |                  | 1,244,376.51     | 4.91   |
| Totals .....                                 | 10,237 | \$ 4,587,049.66 | 100.00 | 9,352 | 4,775,473.69    | 100.00 | 121,307          | 25,333,680.79    | 100.00 |

\*\*--Included under temporary bridges and culverts for 1915 and 1919.

COMPARISON OF CLASSIFIED BRIDGE CONSTRUCTION.

| No.          | Type                                       | 1915            |                 | 1916            |                 | 1917            |                 |
|--------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|              |  | No.             | Cost            | No.             | Cost            | No.             | Cost            |
| 1            | Concrete box culvert.....                  | 4,886           | \$ 1,675,889.00 | 5,136           | \$ 1,883,066.05 | 4,330           | \$ 1,682,831.14 |
| 2            | Circular concrete culvert.....             | 708             | 68,155.00       | 880             | 105,754.11      | 782             | 96,223.43       |
| 3            | Concrete arch culverts.....                | 123             | 23,309.00       | 147             | 16,238.93       | 61              | 7,382.53        |
| 4            | Concrete pipe culverts.....                | 2,531           | 129,835.00      | 2,768           | 89,014.24       | 1,816*          | 209,154.28      |
| 5            | Corrugated pipe culverts.....              | 27,768          | 537,464.00      | 30,480          | 721,334.58      | 5,330*          | 540,498.95      |
| 6            | Masonry arch culverts.....                 | 3               | 803.00          | 56              | 7,066.71        | 2               | 777.90          |
| 7            | Boiler pipe culverts.....                  | 1,859           | 98,018.00       | 1,566           | 77,925.11       | 524*            | 45,001.31       |
| 8            | Cast Iron pipe culverts.....               | 255             | 21,085.00       | 478             | 41,088.49       | 188*            | 17,532.12       |
| 9            | Masonry box culverts.....                  | 23              | 5,421.00        | 30              | 5,562.63        | 24              | 14,257.28       |
| 10           | Headwalls on culverts.....                 | 594             | 62,384.00       | 1,085           | 82,250.46       | 208             | 23,340.37       |
| 11           | Concrete slab bridges.....                 | 138             | 173,034.00      | 128             | 165,555.72      | 115             | 239,271.61      |
| 12           | Concrete arch bridges.....                 | 15              | 199,554.00      | 42              | 73,907.88       | 8               | 79,803.47       |
| 13           | Concrete abutments.....                    | 68              | 60,904.00       | 90              | 91,888.26       | 37              | 54,576.00       |
| 14           | Concrete thru girders.....                 | 16              | 35,668.00       | 23              | 45,142.53       | 22              | 50,986.33       |
| 15           | Retaining walls.....                       | 55              | 167,273.00      | 79              | 187,566.90      | 64              | 179,046.34      |
| 16           | Concrete deck girders.....                 | 41              | 14,085.00       | 24              | 12,838.62       | 13              | 7,423.09        |
| 17           | Masonry abutments.....                     | 6               | 2,940.00        | 4               | 3,433.81        | 8               | 5,501.76        |
| 18           | I-beam spans on piling abutments.....      | 110             | 53,533.00       | 129             | 65,171.45       | 69              | 49,172.49       |
| 19           | I-beam spans on concrete abutments.....    | 404             | 444,479.00      | 411             | 553,942.34      | 456             | 684,115.55      |
| 20           | Steel girders-concrete abutments.....      | 7               | 21,200.00       | 4               | 13,446.76       | 1               | 1,580.14        |
| 21           | Pony trusses on piling-wood floor.....     | 39              | 46,002.00       | 68              | 86,339.73       | 35              | 41,955.07       |
| 22           | Pony truss with concrete abutments.....    | 23              | 566,449.00      | 185             | 545,555.91      | 201             | 727,498.19      |
| 23           | High steel trusses-concrete abutments..... | 24              | 82,300.00       | 23              | 133,981.99      | 27              | 168,313.27      |
| 24           | Deck trusses-concrete abutments.....       | 0               | 0.00            | 1               | 4,422.50        | 6               | 43,352.84       |
| 25           | Wood pile bridges.....                     | 834             | 210,305.00      | 773             | 180,462.27      | 811*            | 274,484.28      |
| 26           | Miscellaneous bridges and culverts.....    | 644             | 186,788.00      | 564             | 54,834.40       | 600*            | 27,745.18       |
| Totals ..... | 441,464                                    | \$ 4,886,886.00 | 45,180          | \$ 5,248,332.38 | 15,738          | \$ 5,552,825.06 |                 |

\*Total number does not include pipe culverts furnished to townships.  
 Note--See report, as above, for 1918, 1919 and total of five year period on next page.

COMPARISON OF CLASSIFIED BRIDGE CONSTRUCTION.

| No. | Type                                       | 1918   |                 | 1919  |                 | Total for Five Years |                  |
|-----|--|--------|-----------------|-------|-----------------|----------------------|------------------|
|     |  | No.    | Cost            | No.   | Cost            | No.                  | Cost             |
| 1   | Concrete box culverts.....                 | 3,312  | \$ 1,741,751.63 | 3,029 | \$ 2,048,718.48 | 20,693               | \$ 9,332,256.39  |
| 2   | Circular concrete culverts.....            | 617    | 84,908.78       | 683   | 127,042.86      | 3,620                | 482,979.18       |
| 3   | Concrete arch culverts.....                | 69     | 7,201.96        | 7     | 3,339.62        | 407                  | 57,463.04        |
| 4   | Concrete pipe culverts.....                | 1,211  | 168,572.25      | 676   | 185,305.53      | 9,002                | 782,481.30       |
| 5   | Corrugated pipe culverts.....              | 2,360  | 81,069.74       | 28    | 4,297.47        | 65,972               | 1,884,674.74     |
| 6   | Masonry arch culverts.....                 | 4      | 1,830.49        |       |                 | 65                   | 10,408.10        |
| 7   | Roller pipe culverts.....                  | 363    | 23,692.13       | 22    | 4,218.68        | 4,334                | 948,255.23       |
| 8   | Cast Iron pipe culverts.....               | 78     | 6,737.39        | 10    | 2,065.94        | 1,009                | 88,538.94        |
| 9   | Masonry box culverts.....                  | 13     | 5,448.98        | 6     | 4,203.52        | 96                   | 34,863.41        |
| 10  | Headwalls on culverts.....                 | 188    | 27,633.17       | 108   | 15,937.20       | 2,193                | 211,845.20       |
| 11  | Concrete slab bridges.....                 | 164    | 260,548.84      | 125   | 280,805.16      | 670                  | 1,100,215.33     |
| 12  | Concrete arch bridges.....                 | 10     | 90,904.29       | 8     | 47,186.61       | 53                   | 491,356.25       |
| 13  | Concrete abutments.....                    | 33     | 51,151.36       | 28    | 39,026.72       | 256                  | 287,546.43       |
| 14  | Concrete thru girder.....                  | 15     | 33,340.83       | 8     | 21,716.54       | 84                   | 186,754.28       |
| 15  | Concrete deck girder.....                  | 55     | 226,727.35      | 41    | 156,536.27      | 394                  | 917,139.86       |
| 16  | Retaining walls.....                       | 19     | 6,421.17        | 24    | 6,408.62        | 117                  | 16,175.90        |
| 17  | Masonry abutments.....                     | 16     | 5,204.91        | 1     | 1,845.54        | 38                   | 18,923.02        |
| 18  | I-beam spans on piling abutments.....      | 40     | 33,644.66       | 38    | 35,646.57       | 386                  | 227,168.17       |
| 19  | Steel girders-concrete abutments.....      | 253    | 890,078.16      | 147   | 342,037.19      | 1,671                | 2,404,632.24     |
| 20  | Steel girders-concrete abutments.....      | 3      | 4,693.29        | 4     | 12,143.36       | 19                   | 53,063.56        |
| 21  | Pony trusses on piling-wood floor.....     | 26     | 55,648.41       | 30    | 55,424.93       | 198                  | 285,370.14       |
| 22  | Pony trusses with concrete abutments.....  | 135    | 442,932.94      | 84    | 404,593.00      | 819                  | 2,687,029.04     |
| 23  | High steel trusses-concrete abutments..... | 18     | 64,475.66       | 19    | 138,154.57      | 110                  | 577,634.49       |
| 24  | Deck trusses-concrete abutments.....       | 0      | 000.00          | 1     | 197.90          | 8                    | 47,973.24        |
| 25  | Wood pile bridges.....                     | 897    | 355,142.68      | 928   | 328,963.12      | 4,243                | 1,849,347.96     |
| 26  | Concrete cantilever.....                   | 1      | 749.81          |       |                 | 1                    | 749.81           |
| 27  | Miscellaneous bridges and culverts.....    | 331    | 17,762.05       | 583   | 51,410.90       | 2,672                | 338,540.63       |
|     | Totals.....                                | 10,237 | \$ 4,170,877.53 | 6,538 | \$ 4,288,516.70 | 119,657              | \$ 24,153,438.07 |

Note—See 1915, 1916 and 1917 on previous page.

CULVERT MATERIAL PURCHASED FOR TOWNSHIPS.

Operating under the law which provides that counties may furnish township with the materials for temporary culverts, the 1612 townships were furnished material in 1918 at a total cost to the counties of \$410,171.73. In 1917 such material was furnished at a cost of \$463,533.59.

A summary of the cost of material of various classes furnished in 1917, 1918 and 1919 is as follows:

|                             | 1917          | 1918          | 1919          |
|-----------------------------|---------------|---------------|---------------|
| Corrugated pipe.....        | \$ 360,912.72 | \$ 320,010.96 | \$ 240,429.40 |
| Concrete pipe.....          | 47,262.25     | 47,558.33     | 64,411.00     |
| Roller pipe.....            | 26,204.49     | 7,654.12      | 12,720.77     |
| Cast Iron pipe.....         | 1,883.40      | 2,433.97      | 3,481.98      |
| Lumber.....                 | 23,411.94     | 27,589.07     | 41,229.52     |
| Miscellaneous Material..... | 3,878.76      | 4,925.28      | 8,378.57      |
| Totals.....                 | \$ 463,533.59 | \$ 410,171.73 | \$ 370,651.19 |

SUMMARY OF ROAD WORK AND EXPENDITURES FOR ENTIRE STATE.

January 1, 1919, to January 1, 1920.

County Road Expenditures.

During the period covered by this report, the total expenditure for road work on the county system and on that part of the county system embraced in the primary system was \$5,257,484.30. This sum includes all expenditures for construction, maintenance, repairs, and miscellaneous work on the county system, all expenditures for road equipment and unused material, new right of way, gravel pits, railway crossing improvements, drainage assessments, and all other expenditures by the county for road purposes. It also includes all expenditures from the primary road fund during 1919. Inasmuch as the law creating the primary road fund and finally establishing a primary road system did not become effective until April, 1919, and inasmuch as said law permitted the expenditure of county funds on the primary system during 1919, it was impossible to show separately the expenditures on the county road system and the primary road system. The above named sum does not include the expenditures from the county motor vehicle road fund for permanent culverts amounting to \$605,881.44, nor the expenditures from the county

road cash fund of \$342,830.33 of which \$329,335.46 was spent for filling bridges and culverts. These expenditures are listed under the bridge work.

Of the above county and primary road expenditures of \$5,257,484.30, \$2,174,334.65 or 41.3% was spent for permanent work; \$349,939.04 or 6.7% was spent for temporary work; \$2,000,423.75 or 38.0% was spent for repairs and maintenance; \$446,843.92 or 8.5% was spent for equipment and unused material, and \$285,942.94 or 5.5% was spent for miscellaneous work.

A statement of the total number of miles improved and comparative charts showing the mileage surfaced and permanently graded to date follows this summary.

"Permanent Work" includes constructing roads to the permanent grade lines established by the county engineer and to the standard sections; constructing roads to temporary grade lines and standard sections, that is widening cuts and fills to standard widths and working toward a permanent grade line; tile drainage; and surfacing roads with gravel, macadam, sand-clay or some form of paving.

It will be noted that the percentage of county and primary road expenditures which went for permanent work in 1919 increased 39.7% from that of 1918. Likewise the repairs and maintenance increased 45.3%.

During 1919 repairs and maintenance cost \$123.25 per mile, against \$85.04 per mile for this work in 1918.

"Temporary Work" includes "oiling roads," and "Tractor grading." No tractor grading is included in this classification unless the cost is in excess of sixty dollars per mile. Such work costing less than \$60.00 per mile is classified as repair work.

"Filling bridges and culverts" which was classified with the road work in 1915, has been classified under bridge work in the 1916, 1917, 1918 and 1919 reports.

During 1919 there were 444.81 miles of road built to permanent grades at a cost of \$1,126,601.45, or an average of \$2,532.77 per mile. There were 35.47 miles built to temporary grade at a cost of \$77,970.17 or an average of \$2,198.29 per mile; 1370.50 miles of road were constructed to natural grade at a cost of \$291,214.34, or an average cost of \$212.48 per mile; 333.15 miles were surfaced at a cost of \$749,836.67.

Of the total expenditure for repairs and maintenance amounting to \$2,000,423.75, \$678,385.10, or 33.9%, was spent for dragging which includes the dragging done by patrolmen; \$499,543.05 or 24.99% was spent for repairs and maintenance by patrolmen; \$822-

495.60 or 41.04% was spent for repairs not done by patrolmen; 16,230.76 miles, or 96.0%, of the county road system were regularly dragged an average number of 35.63 times at an average cost of \$1.09 per one mile round trip. The average cost per mile for dragging was \$41.80. The county engineers' reports show that 10,938.68 miles, or 64.9%, of the county and primary road system were under patrol. Six counties, Allamakee, Cass, Page, Taylor, Union and Woodbury have no regular patrol system and six counties, Adams, Calhoun, Grundy, Humboldt, Madison and Pottawattamie do not give complete reports on their system. There were 695 patrol districts, or an average of 8.0 per county having an average length of 15.74 miles. The patrolmen are paid an average salary of \$151.57 per month. Their work consists of dragging, repairs and general maintenance. Deducting the cost of dragging by patrolmen which is included under dragging, the total average cost of repairs and general maintenance by patrolmen was \$45.67 per mile.

The total expenditures for repairs and maintenance in 1919 averaged \$123.25 per mile. In 1918 this expenditure averaged \$85.05 per mile. The total county road expenditure in 1918 averaged \$238.24 per mile. In 1919 the total expenditure averaged \$311.76 per mile.

Since April, 1913, 9,527.38 miles or 56.8% of the county road system and that part of the county system included in the primary system has been built to natural grade; 1842.12 miles or 11.0% have been built to permanent grade, but not surfaced, and 1261.23 miles or 7.5% have been surfaced. The greater part of this surfacing is single course gravel averaging about 100 cubic yards per mile.

Detailed comparisons of the road work and expenditures on the various county road systems are shown in tables No. 9 to 14, inclusive. Table No. 22 shows the number and value of gravel pits owned by the counties.

#### Township Road Expenditures.

Reports from 1431 of the 1606 townships were received in time to be included in this report. Complete reports of township expenditures from 46 counties and partial reports from 53 counties are included in this report. In all 175 townships are not included in this report.

The 1431 townships reporting show a total road expenditure of \$4,041,871.72 as compared with a total expenditure of \$3,430,882.57 reported by 1412 townships in 1918. The average expenditure per township for those reporting in 1919 is \$2,824.51 as compared with

an average of \$2,429.80 per township for the townships reported in 1918. The township expenditures for 1919 are distributed as follows:

| Totals.                             |                       |
|-------------------------------------|-----------------------|
| Permanent work .....                | \$ 459,917.84         |
| Temporary work .....                | 815,743.57            |
| Repairs .....                       | 1,121,223.77          |
| Maintenance .....                   | 838,357.66            |
| Equipment and unused material ..... | 378,571.92            |
| Special cases .....                 | 428,056.96            |
| <b>Total .....</b>                  | <b>\$4,041,871.72</b> |
| Percentages.                        |                       |
| Permanent work .....                | 11.4%                 |
| Temporary work .....                | 20.2%                 |
| Repairs .....                       | 27.7%                 |
| Maintenance .....                   | 20.8%                 |
| Equipment and unused material ..... | 9.3%                  |
| Special cases .....                 | 10.6%                 |
| <b>Total .....</b>                  | <b>100.0%</b>         |

The above percentages show that 79.3% of the township money went for repairs, maintenance, temporary and miscellaneous work. This is as it should be. It is surprising to note that any of the township money went for permanent work. There are approximately 87,897 miles of township road, and the estimated number of miles in the 1431 townships reporting in 1919 is 78,319, so that the average expenditure per mile is \$51.61.

The township expenditures reported are shown in detail in summary tables Nos. 15, 16, 17, 18 and 19.

#### COMPARISON OF CLASSIFIED ROAD EXPENDITURES.

| AMOUNTS                             |                       |                       |                       |                       |                        |
|-------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
|                                     | 1915                  | 1916                  | 1917                  | 1918                  | 1919                   |
| Permanent work .....                | \$1,159,764.00        | \$1,309,884.00        | \$2,028,625.08        | \$1,567,064.46        | \$ 2,174,334.65        |
| Repairs and maintenance .....       | 1,143,382.00          | 932,142.00            | 1,088,050.58          | 1,376,480.17          | 2,000,423.75           |
| Temporary work—                     |                       |                       |                       |                       |                        |
| (a) Tractor grading .....           | 359,205.00            | 513,600.00            | 426,552.17            | 373,699.80            | 320,552.80             |
| (b) Oiling roads .....              |                       | 28,003.00             | 51,063.96             | 21,385.92             | 29,386.15              |
| Filling bridges and culverts .....  | 249,061.00            |                       |                       |                       |                        |
| Machinery and unused material ..... | 227,920.00            | 242,962.00            | 264,192.98            | 298,840.00            | 446,843.00             |
| Miscellaneous .....                 | 257,078.00            | 249,435.00            | 281,855.79            | 218,551.53            | 285,942.94             |
| <b>Total .....</b>                  | <b>\$3,396,365.00</b> | <b>\$3,276,026.00</b> | <b>\$4,140,340.56</b> | <b>\$3,866,051.88</b> | <b>\$ 5,257,484.30</b> |

#### PERCENTAGES

|                                     | 1915  | 1916  | 1917  | 1918  | 1919  |
|-------------------------------------|-------|-------|-------|-------|-------|
| Permanent work .....                | 34.1% | 40.0% | 49.0% | 40.6% | 41.3% |
| Repairs and maintenance .....       | 33.7% | 28.5% | 26.3% | 35.7% | 38.1% |
| Temporary work—                     |       |       |       |       |       |
| (a) Tractor grading .....           | 10.6% | 15.7% | 10.3% | 9.7%  | 6.1%  |
| (b) Oiling roads .....              |       | 0.8%  | 1.2%  | 0.5%  | 0.6%  |
| Filling bridges and culverts .....  | 7.3%  |       |       |       |       |
| Machinery and unused material ..... | 6.7%  | 7.4%  | 6.4%  | 7.8%  | 8.5%  |
| Miscellaneous .....                 | 7.6%  | 7.6%  | 6.8%  | 5.7%  | 5.4%  |

#### A COMPARISON OF ROAD CONSTRUCTION DURING 1915, 1916, 1917, 1918 AND 1919.

##### NUMBER OF MILES CONSTRUCTED

| Classification                         | 1915           | 1916            | 1917            | 1918            | 1919            | Total Five Year Period |
|--|----------------|-----------------|-----------------|-----------------|-----------------|------------------------|
| Built to permanent grade .....         | 402.7          | 625.2           | 858.44          | 471.06          | 372.83          | 3,208.23               |
| Built to temporary grade .....         | 355.9          | 107.83          | 218.11          | 22.71           | 141.64          | 1,257.19               |
| Tractor grading .....                  | 2,358.8        | 3,080.9         | 2,467.58        | 2,127.60        | 1,407.89        | 13,252.77              |
| Surfaced .....                         | 182.0          | 277.0           | 424.58          | 347.70          | 356.91          | 1,663.79               |
| <b>Total mileage constructed .....</b> | <b>3,359.4</b> | <b>4,690.93</b> | <b>3,963.71</b> | <b>2,969.07</b> | <b>2,279.27</b> | <b>*19,381.98</b>      |

##### PERCENTAGE OF COUNTY ROAD SYSTEM CONSTRUCTED

| Classification                            | 1915        | 1916        | 1917        | 1918        | 1919        | Total Five Year Period |
|---|-------------|-------------|-------------|-------------|-------------|------------------------|
| Built to permanent grade .....            | 2.9         | 3.9         | 5.3         | 2.9         | 2.2         | 19.0                   |
| Built to temporary grade .....            | 2.2         | 0.6         | 1.3         | 0.1         | 0.8         | 7.5                    |
| Tractor grading .....                     | 14.5        | 22.8        | 15.3        | 13.1        | 8.3         | 78.5                   |
| Surfaced .....                            | 1.1         | 1.7         | 2.6         | 2.1         | 2.1         | 8.9                    |
| <b>Total percentage constructed .....</b> | <b>20.7</b> | <b>29.0</b> | <b>24.5</b> | <b>18.2</b> | <b>13.4</b> | <b>113.9*</b>          |

Note: The tables show the actual number of miles improved under each class of construction in any one year and during the five year period. This makes the total number of miles constructed in excess of the number of miles in the county road system, 16,863.72 miles, for the reason that during the five year period miles of road were constructed to permanent grades and surfaced that earlier in the period had been graded with the tractor or built to temporary grades.

#### DAIR COUNTY.

##### Roads.

The total county road expenditure was \$23,225 24, of which \$2,849.20, or 12.2% was spent for permanent work; \$5,456.66, or 23.5% was spent for temporary work; \$1,314.73, or 5.7% was spent for repairs; \$11,869.75, or 51.2% was spent for maintenance; \$1,402.40, or 6.1% was spent for equipment and unused material; \$332.50, or 1.3% was spent for special cases.

Four miles were built to permanent grade at a cost of \$2,230.12. No roads were built to temporary grade. 64 miles were built to natural grade at a cost of \$4,632.72. No roads were surfaced.

The county road system was dragged an average of 46 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$76.65 per mile of county road. The total expenditure per mile of county road was \$135.03.

Of the 172 miles in the county road system, 93 were patrolled, there being 4 districts with an average length of 23.25 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$35,870.37.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$59,551.43, of which \$25,094.65, or 42.2% was spent for permanent bridges and culverts; \$6,953.37, or 11.6% was spent for temporary bridges and culverts; \$9,307.68, or 15.6% was spent for repairs; \$10,742.91, or 18.0% was spent for culvert material for townships; \$1,297.00, or 2.2% was spent for equipment and unused materials; \$5,405.82, or 9.1% was spent for filling bridges and culverts; \$750.00, or 1.3% was spent for special cases.

Of the total amount \$32,048.02 spent for new bridges and culverts; \$25,094.65, or 78.4% was spent for permanent work; \$6,953.37, or 21.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 3 concrete box culverts, \$4,133.79; 30 concrete pipe with headwalls, \$9,177.76; 1 concrete slab bridge, \$2,052.68; 2 I-beam spans on concrete abutments, \$7,215.53; 1 pony truss with concrete abutments, \$2,514.89; 84 concrete pipe without headwalls, \$5,684.54; 4 wood pile bridges, \$1,268.83.

#### ADAMS COUNTY.

##### Roads.

The total county road expenditure was \$23,868.35, of which \$5,518.39, or 23.2% was spent for permanent work; \$2,198.20, or 9.2% was spent for temporary work; \$5,954.01, or 24.8% was spent for repairs; \$5,523.86, or 23.2% was spent for maintenance; \$3,307.39, or 13.9% was spent for equipment and unused material; \$1,366.50, or 5.7% was spent for special cases.

No roads were built to permanent grade. 5.5 miles were built to temporary grade at a cost of \$5,518.39. 24.5 miles were built to natural grade at a cost of \$2,198.20. No roads were surfaced.

The county road system was dragged an average of 27.4 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$90.55 per mile of county road. The total average expenditure per mile of county road was \$188.31.

Of the 126.75 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from all of the 12 townships was \$25,459.57.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$49,165.96, of which \$14,111.83, or 28.6% was spent for permanent bridges and culverts; \$6,239.15, or 12.7% was spent for temporary bridges and culverts; \$12,906.05, or 26.3% was spent for repairs; \$3,975.72, or 8.1% was spent for culvert material for townships; \$3,450.26, or 7.0% was spent for equipment and unused materials; \$1,168.77, or 2.4% was spent for filling bridges and culverts; \$7,314.18, or 14.9% was spent for special cases.

Of the total amount \$20,350.98 was spent for new bridges and culverts; \$14,111.83, or 69.4% was spent for permanent work; \$6,239.15, or 30.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 2 concrete box culverts, \$3,512.13; 34 concrete pipe with headwalls, \$10,547.99; 1 headwall on culvert previously constructed, \$51.71; 4 concrete pipe without headwalls, \$280.98; 1 pony truss on piling—wood floor, \$545.93; 16 wood pile bridges, \$5,412.24.

#### ALLAMAKEE COUNTY.

##### Roads.

The total county road expenditures were \$34,883.51, of which \$100.00 or 0.3% was spent for permanent work; \$21,205.35 or 60.8% was spent for temporary work; \$6,836.21 or 1.9% was spent for repairs; \$3,566.92 or 10.2% was spent for maintenance; \$1,253.03 or 3.6% was spent for equipment and unused material; \$1,922.00 or 5.5% was spent for special cases.

0.8 miles were built to permanent grade at a cost of \$100.00. No roads were built to temporary grade. 28.5 miles were built to natural grade at a cost of \$21,205.35. No roads were surfaced.

The county road system was dragged an average of 22 times, the average cost of dragging being \$1.20 per mile one round trip. The average cost of repairs and maintenance was \$68.44 per mile of county road. The total average expenditure per mile of county road was \$229.50.

Of the 152 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from 16 of the 18 townships was \$29,219.68.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$41,616.98, of which \$7,580.49 or 18.2% was spent for permanent bridges and culverts; \$8,909.48 or 21.5% was spent for temporary bridges and culverts; \$21,053.78 or 50.5% was spent for repairs; \$2,058.35 or 4.9% was spent for culvert material for townships; \$1,199.08 or 2.9% was spent for filling bridges and culverts; \$815.80 or 2.0% was spent for special cases.

Of the total amount \$16,489.97 spent for new bridges and culverts \$7,580.49 or 46.0% was spent for permanent work; \$8,909.48 or 54.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 5 concrete box culverts, costing \$3,508.21; 2 concrete slab bridges, \$2,069.12; 2 I-beam spans on concrete abutments, \$2,003.16; 33 concrete pipe without headwalls, \$1,523.00; 1 pony truss on piling—wood floor, \$1,410.43; 5 wood pile bridges, \$5,976.05.

#### APPANOOSE COUNTY.

##### Roads.

The total county road expenditure was \$28,077.65, of which \$1,560.35 or 5.5% was spent for permanent work; \$1,186.90 or 4.3% was spent for temporary work; \$9,414.72 or 33.6% was spent for repairs; \$9,346.21 or 33.3% was spent for maintenance; \$1,652.22 or 5.8% was spent for equipment and unused material; \$4,917.25 or 17.5% was spent for special cases.

No miles were built to permanent grade. 0.5 miles were built to temporary grade at a cost of \$1,560.35. 7 miles were built to natural grade at a cost of \$1,186.90. No roads were surfaced.

The county road system was dragged an average of 38 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$112.67 per mile of county road. The total average expenditure per mile of county road was \$168.63.

Of the 166.5 miles in the county road system, 30 were patrolled, there being 3 districts with an average length of 10 miles.

The total township road expenditure as shown by reports from 15 of the 17 townships was \$26,476.60.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$32,773.38, of which \$3,585.70 or 10.9% was spent for permanent bridges and culverts. \$2,977.68 or 9.1% was spent for temporary bridges and culverts; \$5,110.21 or 15.6% was spent for repairs; \$11,859.07 or 36.2% was spent for

culvert material for townships; \$2,754.62 or 8.4% was spent for equipment and unused materials; \$2,649.26 or 8.1% was spent for filling bridges and culverts; \$3,836.84 or 11.7% was spent for special cases.

Of the total amount \$6,563.38 spent for new bridges and culverts \$3,585.70 or 54.6% was spent for permanent work; \$2,977.68 or 45.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 1 concrete box culvert, \$788.05; 1 I-beam concrete abutments, \$2,576.19; 1 steel girder concrete abutments, \$221.46; 23 boiler pipe culverts without headwalls, \$2,997.68.

#### AUDUBON COUNTY.

##### Roads.

The total county road expenditure was \$27,770.79, of which \$29.85 or 0.1% was spent for permanent work; \$9,045.00 or 32.3% was spent for repairs; \$10,887.90 or 39.0% was spent for maintenance; \$3,519.88 or 12.5% was spent for equipment and unused material; \$4,288.66 or 16.2% was spent for special cases.

No roads were built to permanent grade. No roads were built to temporary or natural grades, and none were surfaced.

The county road system was dragged an average of 43.6 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$139.39 per mile of county road. The total average expenditure per mile of county road was \$194.20.

Of the 143 miles in the county road system, 143 were patrolled, there being 3 districts with an average length of 47.66 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$34,063.04.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$67,584.30, of which \$33,061.55 or 48.9% was spent for permanent bridges and culverts; \$13,982.26 or 20.8% was spent for temporary bridges and culverts; \$9,090.77 or 13.5% was spent for repairs; \$5,544.94 or 8.2% was spent for culvert material for townships; \$1,737.16 or 2.6% was spent for equipment and unused materials; \$3,329.37 or 4.8% was spent for filling bridges and culverts; \$838.25 or 1.2% was spent for special cases.

Of the total amount \$47,043.81 spent for new bridges and culverts \$33,061.55 or 70.5% was spent for permanent work; \$13,982.26 or 29.5% was spent for temporary work.

The amounts last above named were spent on the following construction: 19 concrete box culverts, \$25,295.66; 9 concrete pipe with headwalls, \$1,965.89; 1 I-beam span on concrete abutments, \$5,800.00; 7 concrete pipe without headwalls, \$676.40; 8 corrugated pipe without headwalls, \$474.00; 43 miscellaneous bridges and culverts, \$12,831.86.

#### BENTON COUNTY.

##### Roads.

The total county road expenditure was \$59,332.29, of which \$1,044.31 or 1.8% was spent for permanent work; \$4,042.64 or 6.8% was spent for temporary work; \$15,361.07 or 25.9% was spent for repairs; \$12,663.67 or 21.4% was spent for maintenance; \$25,291.45 or 42.5% was spent for equipment and unused material; \$929.15 or 1.6% was spent for special cases.

No roads were built to permanent grade, and none were built to temporary grade. 48 miles were built to natural grade at a cost of \$4,042.64. No roads were surfaced.

The county road system was dragged an average of 24.31 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$130.65 per mile of county road. The total average expenditure per mile of county road was \$276.61.

Of the 214.5 miles in the county road system, 214.5 were patrolled, there being 1 district with an average length of 214.5 miles.

The total township road expenditure as shown by reports from 15 of the 20 townships was \$54,464.86.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$110,775.58, of which \$76,634.59 or 69.1% was spent for permanent bridges and culverts; \$2,213.59 or 2.1% was spent for temporary bridges and culverts; \$16,289.73 or 14.7% was spent for repairs; \$2,449.22 or 2.2% was spent for equipment and unused materials; \$4,060.96 or 3.7% was spent for culvert material for townships; \$6,689.22 or 6.1% was spent for filling bridges and culverts; \$2,338.42 or 2.1% was spent for special cases.

Of the total amount \$78,948.03 spent for new bridges and culverts \$76,634.44 or 97.1% was spent for permanent work; \$2,313.59 or 2.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 61 concrete box culverts, \$42,447.54; 1 cast iron pipe with headwalls, \$96.48; 5 concrete slab bridges, \$10,491.30; 5 concrete through girders, \$10,773.94; 1 I-beam span on concrete abutments, \$1,143.25; 3 pony trusses with concrete abutments, \$11,681.93; 99 corrugated pipe without headwalls, \$1,990.06; 30 miscellaneous bridges and culverts, \$323.53.

#### BLACK HAWK COUNTY.

##### Roads.

The total county road expenditure was \$56,822.23, of which \$5,161.70 or 9.0% was spent for permanent work; \$5,124.39 or 8.8% was spent for temporary work; \$17,964.17 or 31.7% was spent for repairs; \$16,141.54 or 28.4% was spent for maintenance; \$10,645.43 or 18.9% was spent for equipment and unused material; \$1,785.00 or 3.2% was spent for special cases.

2 miles were built to permanent grade at a cost of \$562.46. No roads were built to temporary grade. 15 miles were built to natural grade at a cost of \$5,124.39. No roads were surfaced.

The county road system was dragged an average of 40 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$185.35 per mile of county road. The total average expenditure per mile of county road was \$308.81.

Of the 184 miles of the county road system, 184 were patrolled, there being 13 districts with an average length of 14 miles.

The total township road expenditure as shown by reports from all of the 18 townships was \$38,825.34.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$57,567.70, of which \$36,942.08 or 64.2% was spent for permanent bridges and culverts, \$2,260.95 or 3.9% was spent for temporary bridges and culverts; \$10,198.25 or 17.6% was spent for repairs; \$2,428.82 or 4.2% was spent for culvert material for townships; \$1,472.79 or 2.6% was spent for equipment and unused materials; \$1,925.18 or 3.4% was spent for filling bridges and culverts; \$2,339.63 or 4.1% was spent for special cases.

Of the total amount \$39,203.03 spent for new bridges and culverts, \$36,942.08 or 94.2% was spent for permanent work; \$2,260.95 or 5.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 55 concrete box culverts, \$28,168.40; 2 I-beam spans on concrete abutments, \$4,342.80; 2 pony trusses with concrete abutments, \$4,430.88; 52 corrugated pipe without headwalls, \$878.90; 5 wood pile bridges, \$1,382.05.

## BOONE COUNTY.

**Roads.**

The total county road expenditure was \$97,131.07, of which \$57,491.61 or 58.5% was spent for permanent work; \$2,849.81 or 3.0% was spent for temporary work; \$14,484.14 or 15.1% was spent for repairs; \$15,386.16 or 16.1% was spent for maintenance, \$3,421.69 or 3.6% was spent for equipment and unused material; \$3,497.66 or 3.7% was spent for special cases.

5.5 miles were built to permanent grade at a cost of \$9,261.74. 1.4 miles were built to temporary grade at a cost of \$4,205.41. 12.75 miles were built to natural grade at a cost of \$2,849.81. 13.5 miles were surfaced with gravel at a cost of \$25,819.38.

The county road system was dragged an average of 60 times, the average cost of dragging being \$1.22 per mile one round trip. The average cost of repairs and maintenance was \$182.69 per mile of county road. The total average expenditure per mile of county road was \$594.07.

Of the 163.5 miles in the county road system, 143.5 were patrolled, there being 6 districts with an average length of 23.9 miles.

The total township road expenditure as shown by reports from 15 of the 17 townships was \$51,392.79.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$110,501.77, of which \$85,074.71 or 77.0% was spent for permanent bridges and culverts; \$832.15 or 0.8% was spent for temporary bridges and culverts; \$9,266.33 or 8.4% was spent for repairs; \$2,781.62 or 2.5% was spent for culvert material for townships; \$2,966.30 or 2.7% was spent for equipment and unused materials; \$9,433.06 or 8.5% was spent for filling bridges and culverts; \$147.60 or 0.1% was spent for special cases.

Of the total amount \$85,906.86 spent for new bridges and culverts, \$85,074.71 or 99.0% was spent for permanent work; \$832.15 or 1.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 86 concrete box culverts, \$50,088.79; 8 circular concrete culverts, \$1,578.85; 3 concrete slab bridges, \$7,595.62; 4 concrete arch bridges, \$18,673.70; 3 concrete deck girders, \$6,927.12; 1 I-beam span on concrete abutments, \$210.63; 23 corrugated pipe without headwalls, \$688.82; 5 miscellaneous bridges and culverts, \$143.33.

**Roads.**

The total county road expenditure was \$33,667.27, of which \$16,074.14 or 47.4% was spent for permanent work; \$4,703.61 or 14.0% was spent for temporary work; \$4,278.53 or 12.7% was spent for repairs; \$6,309.44 or 18.7% was spent for maintenance, \$1,921.55 or 5.7% was spent for equipment and unused material; \$380.00 or 1.5% was spent for special cases.

2.50 miles were built to permanent grade at a cost of \$7,024.04. 0.15 miles were built to temporary grade at a cost of \$1,233.40. 21.25 miles were built to natural grade at a cost of \$4,703.61. 1.5 miles were surfaced with gravel at a cost of \$2,868.30.

The county road system was dragged an average of 24 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$81.13 per mile of county road. The total average expenditure per mile of county road was \$257.99.

Of the 130.5 miles in the county road system, 43 were patrolled, there being 2 districts with an average length of 21.5 miles.

The total township road expenditure as shown by reports from 11 of the 14 townships was \$26,040.08.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$70,242.30, of which \$53,898.94 or 76.5% was spent for permanent bridges and culverts; \$1,601.10 or 2.3% was spent for temporary bridges and culverts; \$3,460.73 or 4.9% was spent for repairs; \$2,175.60 or 3.1% was spent for culvert material for townships; \$4,650.55 or 6.6% was spent for equipment and unused materials; \$2,439.83 or 3.5% was spent for filling bridges and culverts; \$2,015.55 or 2.9% was spent for special cases.

Of the total amount \$55,500.04 spent for new bridges and culverts, \$53,898.94 or 97.1% was spent for permanent work; \$1,601.10 or 2.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 55 concrete box culverts, \$23,530.01; 18 concrete pipe with headwalls, \$2,595.09; 2 concrete slab bridges, \$5,033.00; 1 concrete deck girder, \$10,467.52; 1 steel girder concrete abutments, \$3,774.24; 2 pony trusses with concrete abutments, \$8,499.08; 8 corrugated pipe without headwalls, \$191.91; 7 wood pile bridges, \$1,363.29; 1 miscellaneous bridges and culverts, \$45.90.

## BUCHANAN COUNTY.

**Roads.**

The total county road expenditure was \$47,044.83, of which \$8,676.57 or 18.4% was spent for permanent work; \$6,440.26 or 13.7% was spent for temporary work; \$16,012.03 or 34.0% was spent for repairs; \$10,101.06 or 21.4% was spent for maintenance; \$3,787.88 or 8.2% was spent for equipment and unused material; \$2,027.03 or 4.3% was spent for special cases.

No roads were built to permanent or to temporary grade. 28.55 miles were built to natural grade at a cost of \$6,440.26. No roads were surfaced.

The county road system was dragged an average of 21 times, the average cost of dragging being \$0.70 per mile one round trip. The average cost of repairs and maintenance was \$145.07 per mile of county road. The total average expenditure per mile of county road was \$261.36.

Of the 180 miles in the county road system, 179.5 were patrolled, there being 13 districts with an average length of 13.8 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$41,392.46.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$58,820.89, of which \$36,497.14 or 62.2% was spent for permanent bridges and culverts; \$4,787.63 or 8.1% was spent for temporary bridges and culverts; \$12,231.39 or 20.7% was spent for repairs; \$3,980.10 or 6.8% was spent for culvert material for townships; \$258.84 or 0.4% was spent for equipment and unused materials; \$371.79 or 0.6% was spent for filling bridges and culverts; \$695.00 or 1.2% was spent for special cases.

Of the total amount \$41,284.77 spent for new bridges and culverts \$36,497.14 or 88.4% was spent for permanent work; \$4,787.63 or 11.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 54 concrete box culverts, \$23,641.56; 11 circular concrete culverts, \$1,375.00; 1 headwall on culvert previously constructed, \$147.38; 5 concrete slab bridges, \$10,685.30; 1 retaining wall, \$450.00; 1 deck truss concrete abutments, \$197.90; 82 corrugated pipe without headwalls, \$2,032.30; 1 pony truss on piling—wood floor, \$277.05; 7 wood pile bridges, \$2,478.28.

## BUENA VISTA COUNTY.

**Roads.**

The total county road expenditure was \$67,994.28, of which \$41,037.64 or 60.2% was spent for permanent work; \$5,381.84 or 7.9% was spent for repairs; \$11,036.22 or 16.2% was spent for maintenance; \$2,369.78 or 3.5%

was spent for equipment and unused material; \$8,168.80 or 12.2% was spent for special cases.

No roads were built to permanent or to temporary grade. 38.85 miles were surfaced with gravel at a cost of \$39,130.61.

The county road system was dragged an average of 40.3 times, the average cost of dragging being \$0.93 per mile one round trip. The average cost of repairs and maintenance was \$96.43 per mile of county road. The total average expenditure per mile of county road was \$399.38.

Of the 170.25 miles in the county road system, all were patrolled, there being 5 districts with an average length of 34.05 miles.

The total township road expenditure as shown by reports from 15 of the 17 townships was \$43,860.48.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$20,242.70, of which \$11,995.51 or 59.2% was spent for permanent bridges and culverts; \$11.75 or 0.1% was spent for temporary bridges and culverts; \$2,612.93 or 12.9% was spent for repairs; \$4,114.08 or 20.4% was spent for culvert material for townships; \$469.95 or 2.3% was spent for equipment and unused materials; \$207.77 or 1.0% was spent for filling bridges and culverts; \$830.71 or 4.1% was spent for special cases.

Of the total amount \$12,007.26 spent for new bridges and culverts \$11,995.51 or 99.9% was spent for permanent work; \$11.75 or 0.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts, \$9,205.36; 1 concrete abutment (footing lowered), \$302.80; 1 retaining wall, \$389.42; 2 I-beam spans on concrete abutments, \$2,097.93; 4 corrugated pipe without headwalls, \$11.75.

#### BUTLER COUNTY.

##### Roads.

The total county road expenditures was \$58,325.88, of which \$244.50 or 0.4% was spent for permanent work; \$12,531.38 or 21.5% was spent for temporary work; \$14,713.38 or 25.2% was spent for repairs; \$17,274.62 or 29.7% was spent for maintenance; \$13,250.86 or 22.7% was spent for equipment and unused material; \$310.56 or 0.5% was spent for special cases.

No roads were built to permanent or to temporary grade. 22 miles were built to natural grade at a cost of \$11,629.63. No roads were surfaced.

The county road system was dragged an average of 25.52 times, the average cost of dragging being \$0.75 per miles one round trip. The average cost of repairs and maintenance was \$172.91 per mile of county road. The total average expenditure per mile of county road was \$315.27.

Of the 185 miles in the county road system, all were patrolled, there being 12 districts with an average length of 15.46 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$45,934.10.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$48,972.03, of which \$4,324.31 or 8.8% was spent for permanent bridges and culverts; \$16,758.10 or 34.2% was spent for temporary bridges and culverts; \$16,652.07 or 34.1% was spent for repairs; \$935.91 or 1.9% was spent for culvert material for townships; \$4,299.36 or 8.8% was spent for equipment and unused materials; \$2,759.97 or 5.6% was spent for filling bridges and culverts; \$3,242.31 or 6.6% was spent for special cases.

Of the total amount \$21,082.41 spent for new bridges and culverts \$4,324.31 or 20.5% was spent for permanent work; \$16,758.10 or 79.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts, \$4,324.31; 14 corrugated pipe without headwalls, \$565.29; 38 wood pile bridges, \$16,192.81.

#### CALHOUN COUNTY.

##### Roads.

The total county road expenditure was \$53,974.00, of which \$19,439.08 or 36.1% was spent for permanent work; \$588.07 or 1.1% was spent for temporary work; \$6,544.22 or 12.1% was spent for repairs; \$8,170.27 or 15.1% was spent for maintenance; \$11,198.05 or 20.7% was spent for equipment and unused material; \$8,034.31 or 14.9% was spent for special cases.

11.5 miles were built to permanent grade at a cost of \$14,759.58. No roads were built to temporary grade. 14 miles were built to natural grade at a cost of \$588.07. 4 miles were surfaced with gravel at a cost of \$3,719.37.

The county road system was dragged an average of 35 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$84.20 per mile of county road. The total average expenditure per mile of county road was \$308.86.

Of the 174.75 miles in the county road system, none were patrolled, there being no districts.

The total township road expenditure as shown by reports from all of the 16 townships was \$49,154.92.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$33,846.39, of which \$20,484.97 or 60.6% was spent for permanent bridges and culverts; \$1,454.28 or 4.3% was spent for temporary bridges and culverts; \$2,434.84 or 7.2% was spent for repairs; \$2,740.72 or 8.1% was spent for culvert material for townships; \$5,566.27 or 16.4% was spent for equipment and unused materials; \$743.95 or 2.2% was spent for filling bridges and culverts; \$421.36 or 1.2% was spent for special cases.

Of the total amount \$21,939.25 spent for new bridges and culverts, \$20,484.97 or 93.4% was spent for permanent work; \$1,454.28 or 6.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 13 concrete box culverts, \$10,007.90; 50 circular concrete culverts, \$7,615.82; 8 concrete abutments, \$529.15; 1 concrete deck girder, \$10.00; 1 I-beam span on concrete abutments, \$2,322.10; 31 concrete pipe without headwalls, \$787.83; 1 I-beam span on piling abutments, \$32.28; 1 pony truss on piling—wood floor, \$587.27; 1 wood pile bridge, \$22.50; 1 miscellaneous bridges and culverts, \$44.40.

#### CARROLL COUNTY

##### Roads.

The total county road expenditures were \$34,365.56, of which \$8,840.35 or 25.8% was spent for permanent work; \$7,865.06 or 22.8% was spent for temporary work; \$6,173.07 or 17.9% was spent for repairs; \$9,207.49 or 26.8% was spent for maintenance; \$2,093.99 or 6.1% was spent for equipment and unused materials; \$185.60 or 0.6% was spent for special cases.

8.5 miles were built to permanent grade at a cost of \$5,442.35. No roads were built to temporary grade. 21 miles were built to natural grade at a cost of \$7,686.26. 1.13 miles were surfaced with gravel at a cost of \$2,684.91.

The county road system was dragged an average of 24 times, the average cost of dragging being \$2.00 per mile one round trip. The average cost of repairs and maintenance was \$85.45 per mile of county road. The total average expenditure per mile of county road was \$190.91.

Of the 180 miles in the county road system, 36 were patrolled, there being 3 districts with an average length of 12 miles. The total township road



expenditure as shown by reports from 15 of the 16 townships was \$43,684.20.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$64,860.89, of which \$34,372.02 or 52.8% was spent for permanent bridges and culverts; \$4,154.96 or 6.4% was spent for temporary bridges and culverts; \$7,180.34 or 11.1% was spent for repairs; \$5,757.43 or 8.9% was spent for culvert material for townships; \$9,119.94 or 14.1% was spent for equipment and unused materials; \$1,822.27 or 2.8% was spent for filling bridges and culverts; \$2,453.93 or 3.8% was spent for special cases.

Of the total amount \$38,526.98 spent for new bridges and culverts, \$34,372.02 or 89.2% was spent for permanent work; \$4,154.96 or 10.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 40 concrete box culverts, \$24,071.01; 1 headwall on culverts previously constructed, \$289.88; 1 concrete slab bridge, \$630.00; 1 retaining wall, \$1.95; 2 I-beam spans on concrete abutments, \$9,379.08; 8 concrete pipe without headwalls, \$420.38; 30 corrugated pipe without headwalls, \$1,659.89; 6 wood pile bridges, \$1,762.19; 3 miscellaneous bridges and culverts, \$313.50.

### CASS COUNTY.

#### Roads.

The total county road expenditure was \$28,785.67, of which \$13,586.71 or 47.0% was spent for repairs; \$10,296.25 or 35.6% was spent for maintenance; \$2,951.41 or 10.6% was spent for equipment and unused material and \$1,951.30 or 6.8% was spent for special cases.

No roads were built to permanent, temporary or natural grade and none were surfaced.

The county road system was dragged an average of 35 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$151.83 per mile of county road. The total average expenditure per mile of county road was \$182.94.

The total township road expenditure as shown by reports from all of the 16 townships was \$41,690.10.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$107,938.51, of which \$75,000.69 or 69.4% was spent for permanent bridges and culverts; \$13,330.20 or 12.3% was spent for temporary bridges and culverts; \$4,602.57 or 4.3% was spent for repairs; \$977.20 or 0.9% was spent for culvert material for townships; \$3,434.31 or 3.2% was spent for equipment and unused materials; \$10,563.70 or 9.8% was spent for filling bridges and culverts and \$29.84 or 0.1% was spent for special cases.

Of the total amount, \$88,330.89 spent for new bridges and culverts, \$75,000.69 or 85.0% was spent for permanent work and \$13,330.20 or 15.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 26 concrete box culverts, \$45,295.38; 43 concrete pipe with headwalls, \$19,025.59; 1 boiler pipe culvert, \$155.38; 3 headwalls on culverts previously constructed, \$358.00; 1 concrete slab bridge, \$3,781.39; 3 I-beam spans on concrete abutments, \$6,188.28; 1 pony truss with concrete abutments, \$196.67; 41 concrete pipe without headwalls, \$8,414.54 and 19 wood pile bridges, \$4,915.66.

### CEDAR COUNTY.

#### Roads.

The total county road expenditure was \$29,921.74, of which \$3,764.33 or 12.5% was spent for permanent work; \$8,619.74 or 28.9% was spent for temporary work; \$2,597.25 or 8.7% was spent for repairs; \$8,444.81 or 28.2% was spent for maintenance; \$2,131.51 or 7.1% was spent for equipment and unused material; \$4,364.10 or 14.6% was spent for special cases.

0.67 miles were built to permanent grade at a cost of \$2,001.78. 0.37 miles were built to temporary grade at a cost of \$144.00. 82.95 miles were built to natural grade at a cost of \$8,582.24. 0.37 miles were surfaced with lime stone at a cost of \$482.90.

The county road system was dragged an average of 21.5 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$68.37 per mile of county road. The total average expenditure per mile of county road was \$185.27.

Of the 161.5 miles in the county road system, 126 were patrolled, there being 4 districts with an average length of 31.5 miles.

The total township road expenditure as shown by reports from 9 of the 17 townships was \$38,783.53.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$76,080.62, of which \$54,178.83 or 71.2% was spent for permanent bridges and culverts; \$490.50 or 0.6% was spent for temporary bridges and culverts; \$13,303.35 or 17.6% was spent for repairs; \$6,273.42 or 8.2% was spent for equipment and unused materials; \$848.40 or 1.1% was spent for filling bridges and culverts; \$986.12 or 1.3% was spent for special cases.

Of the total amount \$54,669.33 spent for new bridges and culverts, \$54,178.83 or 99.1% was spent for permanent work; \$490.50 or 0.9% was spent for temporary work.

The amounts last above named were spent on the following construction: 64 concrete box culverts, \$27,406.75; 4 I-beam spans on concrete abutments, \$9,949.43; 3 pony truss with concrete abutments, \$16,822.65; 1 corrugated pipe without headwalls (placing only), \$5.00; miscellaneous bridges and culverts, \$485.50.

### CERRO GORDO COUNTY.

#### Roads.

The total county road expenditure was \$88,420.59, of which \$58,844.01 or 66.6% was spent for permanent work; \$3,491.00 or 3.8% was spent for temporary work; \$10,614.71 or 12.0% was spent for repairs; \$10,692.59 or 12.1% was spent for equipment and unused materials; \$840.10 or 1.0% was spent for special cases.

No roads were built to permanent or temporary grades. 13 miles were built to natural grade at a cost of \$3,491.00. 1.80 miles were surfaced with concrete at a cost of \$51,737.72.

The county road system was dragged an average of 31 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$128.92 per mile of county road. The total average expenditure per mile of county road was \$535.01.

Of the 165.27 miles in the county road system, 110.5 were patrolled, there being 7 districts with an average length of 15.78 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$65,544.56.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$61,742.92, of which \$43,661.71 or 70.8% was spent for permanent bridges and culverts; \$2,346.90 or 3.8% was spent for temporary bridges and culverts; \$6,929.14 or 11.2% was spent for repairs; \$2,506.01 or 4.1% was spent for culvert material for townships; \$3,744.50 or 6.0% was spent for equipment and unused materials; \$1,300.51 or 2.1% was spent for filling bridges and culverts; \$1,254.15 or 2.0% was spent for special cases.

The amounts last above referred to were spent on the following construction: 26 concrete box culverts, \$9,022.96; 30 circular concrete culverts, \$3,925.92; 2 concrete slab bridges, \$6,661.39; 6 concrete deck girders, \$43,661.71 or 94.9% was spent for permanent work; \$2,346.90 or 5.1% was spent for temporary work.

Of the total amount \$46,008.61 spent for new bridges and culverts, \$43,661.71 or 94.9% was spent for permanent work; \$2,346.90 or 5.1% was spent for temporary work.

\$20,279.00: 2 I-beam spans on concrete abutments, \$3,772.44; 10 corrugated pipe without headwalls, \$193.90; 1 I-beam span on piling abutments, \$2,153.

#### CHEROKEE COUNTY.

##### Roads.

The total county road expenditure was \$65,701.49, of which \$39,208.44 or 59.6% was spent for permanent work; \$3,231.31 or 4.9% was spent for temporary work; \$7,130.39 or 10.9% was spent for repairs; \$11,958.33 or 18.2% was spent for maintenance; \$2,006.86 or 3.0% was spent for equipment and unused materials; \$2,166.16 or 3.3% was spent for special cases.

11.25 miles were built to permanent grade at a cost of \$38,035.32. No roads were built to temporary grade. 13.5 miles were built to natural grade at a cost of \$3,231.31. No roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$0.98 per mile one round trip. The average cost of repairs and maintenance was \$123.55 per mile of county road. The total average expenditure per mile of county road was \$425.25.

Of the 154.5 miles in the county road system, 72 were patrolled, there being 5 districts with an average length of 14.4 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was \$36,582.17.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$175,827.59, of which \$133,278.53 or 75.7% was spent for permanent bridges and culverts; \$3,986.88 or 2.3% was spent for temporary bridges and culverts; \$15,318.52 or 8.8% was spent for repairs; \$2,227.40 or 1.3% was spent for culvert material for townships; \$8,984.44 or 5.1% was spent for equipment and unused materials; \$5,855.05 or 3.3% was spent for filling bridges and culverts; \$6,176.77 or 3.5% was spent for special cases.

Of the total amount \$137,265.41 spent for new bridges and culverts, \$133,278.53 or 97.7% was spent for permanent work; \$3,986.88 or 2.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 118 concrete box culverts, \$76,679.28; 4 corrugated pipe with headwalls, \$628.07; 9 concrete slab bridges, \$21,194.58; 12 I-beam spans on concrete abutments, \$27,621.60; 2 pony trusses with concrete abutments, \$7,155.00; 35 cast iron pipe without headwalls, \$1,489.75; 3 I-beam spans on piling abutments, \$1,343.01; 3 wood pile bridges, \$1,154.12.

#### CHICKASAW COUNTY.

##### Roads.

The total county road expenditure was \$27,070.85, of which \$8,891.81 or 32.8% was spent for permanent work; \$4,414.73 or 16.3% was spent for temporary work; \$2,232.96 or 8.3% was spent for repairs; \$6,972.26 or 25.8% was spent for maintenance; \$2,844.11 or 10.5% was spent for equipment and unused material; \$1,714.98 or 6.3% was spent for special cases.

4.5 miles were built to permanent grade at a cost of \$2,543.33. No roads were built to temporary grade. 20.5 miles were built to natural grade at a cost of \$4,414.73. 7 miles were surfaced with gravel at a cost of \$5,988.48.

The county county road system was dragged an average of 21 times, the average cost of dragging being \$1.00 per mile one round trip. The aver-

age cost of repairs and maintenance was \$58.82 per mile of county road. The total average expenditure per mile of county road was \$172.98.

Of the 156.5 miles in the county road system, all were patrolled, there being 16 districts with an average length of 9.8 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$36,833.77.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$34,089.49, of which \$14,559.35 or 42.7% was spent for permanent bridges and culverts; \$7,744.82 or 22.7% was spent for temporary bridges and culverts; \$6,734.58 or 19.9% was spent for repairs; \$1,100.00 or 3.2% was spent for culvert material for townships; \$1,685.74 or 4.9% was spent for equipment and unused materials; \$2,265.00 or 6.6% was spent for filling bridges and culverts.

Of the total amount \$22,304.17 spent for new bridges and culverts \$14,559.35 or 65.4% was spent for permanent work; \$7,744.82 or 34.6% was spent for temporary work.

The amounts last above named were spent on the following construction: 12 concrete box culverts, \$6,393.89; 2 I-beam spans on concrete abutments, \$7,965.46; 40 corrugated pipe without headwalls, \$1,046.44; 36 wood pile bridges, \$6,698.38.

#### CLARKE COUNTY.

##### Roads.

The total county road expenditure was \$24,561.17, of which \$6,000.00 or 24.6% was spent for temporary work; \$1,399.18 or 5.8% was spent for repairs; \$11,783.58 or 47.7% was spent for maintenance; \$3,898.21 or 15.8% was spent for equipment and unused material; \$1,480.20 or 6.1% was spent for special cases.

No roads were built to permanent or temporary grade, and no roads were surfaced. No mileage was reported built to natural grade.

The county road system was dragged an average of 45.13 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$111.12 per mile of county road. The total average expenditure per mile of county road was \$207.04.

Of the 118.63 miles in the county road system all were patrolled, there being 4 districts with an average length of 29.66 miles.

The total township road expenditures as shown by reports from all of the 12 townships was \$21,333.37.

##### Bridges:

The total expenditures for bridge and culvert work during 1919 were \$35,399.41, of which \$15,231.59 or 42.9% was spent for permanent bridges and culverts; \$2,402.19 or 6.8% was spent for temporary bridges and culverts; \$7,049.06 or 19.9% was spent for repairs; \$1,185.80 or 3.4% was spent for culvert material for townships; \$3,278.10 or 9.3% was spent for equipment and unused materials; \$6,252.67 or 17.7% was spent for filling bridges and culverts.

Of the total amount \$17,633.78 spent for new bridges and culverts \$15,231.59 or 86.3% was spent for permanent work; \$2,402.19 or 13.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 21 concrete box culverts, \$14,598.09; 1 concrete pipe with headwalls, \$260.50; 1 corrugated pipe with headwalls, \$202.87; 1 headwall on culvert previously constructed, \$170.13; 2 concrete pipe without headwalls, \$409.24; 18 corrugated pipe without headwalls, \$1,073.65; 2 pony trusses on piling—wood floor, \$919.30.

## CLAY COUNTY.

**Roads.**

The total county road expenditure was \$33,193.87 of which \$16,570.76 or 49.9% was spent for permanent work; \$3,821.31 or 11.5% was spent for repairs; \$6,937.03 or 20.8% was spent for maintenance; \$3,543.33 or 10.8% was spent for equipment and unused materials; \$2,321.44 or 7.0% was spent for special cases.

No roads were built to permanent, temporary or natural grade. 10 miles were surfaced with gravel at a cost of \$15,311.53.

The county road system was dragged an average of 35 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$69.85 per mile of county road. The total average expenditure per mile of county road was \$215.54.

Of the 154 miles in the county road system, 36 were patrolled, there being 3 districts with an average length of 12 miles.

The total township road expenditures as shown by reports from 10 of the 16 townships was \$35,324.99.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$43,229.12 of which \$28,697.01 or 66.3% was spent for permanent bridges and culverts; \$2,638.27 or 6.1% was spent for temporary bridges and culverts; \$1,803.49 or 4.2% was spent for repairs; \$3,657.12 or 8.5% was spent for culvert material for townships; \$6,109.33 or 14.1% was spent for equipment and unused materials; \$288.90 or 0.7% was spent for filling bridges and culverts; \$35.00 or 0.1% was spent for special cases.

Of the total amount \$31,335.28 spent for new bridges and culverts, \$28,697.01 or 91.5% was spent for permanent work; \$2,638.27 or 8.5% was spent for temporary work.

The amount last above referred to, were spent on the following construction: 14 concrete box culverts, \$10,493.79; 1 concrete arch bridge paving, \$7,334.51; 1 concrete pier, \$2,376.35; 2 pony trusses with concrete abutments, \$8,492.36; 10 corrugated pipe without headwalls, \$72.15; 1/2 pony truss on piling, wood floor, \$475.50; 7 wood pile bridges, \$2,090.62.

## CLAYTON COUNTY.

**Roads.**

The total county road expenditures was \$29,471.14, of which \$1,060.10 or 3.6% was spent for permanent work; \$3,161.92 or 10.7% was spent for repairs; \$18,497.85 or 62.8% was spent for maintenance; \$6,342.97 or 21.5% was spent for equipment and unused material; \$408.30 or 1.4% was spent for special cases.

No roads were built to permanent grade. 0.5 miles were built to temporary grade at a cost of \$1,060.10. No roads were built to natural grade and no roads were surfaced.

The county road system was dragged an average of 55 times, the average cost of dragging being \$0.76 per mile one round trip. The average cost of repairs and maintenance was \$104.74 per mile of county road. The total average expenditure per mile of county road was \$142.50.

Of the 206.8 miles in the county road system, all were patrolled, there being 44 districts with an average length of 4.70 miles.

The total township road expenditure as shown by reports from all of the 22 townships was \$57,290.23.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$60,026.86, of which \$45,689.58 or 76.2% was spent for permanent bridges and culverts; \$3,506.81 or 5.8% was spent for temporary bridges and culverts; \$6,872.51 or 11.4% was spent for repairs; \$2,481.48 or 4.1% was

spent for culvert material for townships; \$523.90 or 0.9% was spent for filling bridges and culverts; \$817.93 or 1.4% was spent for special cases.

Of the total amount \$49,196.39 spent for new bridges and culverts \$45,689.58 or 92.9% was spent for permanent work; \$3,506.81 or 7.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 33 box culverts, concrete, \$22,162.73; 3 concrete slab bridges, \$2,531.90; 2 I-beam spans on concrete abutments, \$2,233.15; 2 high steel trusses, concrete abutments, \$18,761.80; 33 corrugated pipe without headwalls, \$989.89; 2 I-beam spans on piling abutments, \$643.24; 2 pony trusses on piling, wood floor, \$1,153.50; 2 wood pile bridges, \$720.18.

## CLINTON COUNTY.

**Roads.**

The total county road expenditure was \$76,821.62, of which \$35,961.18 or 47.1% was spent for permanent work; \$7,508.20 or 9.8% was spent for temporary work; \$12,513.34 or 16.3% was spent for repairs; \$7,903.98 or 10.3% was spent for maintenance; \$10,519.97 or 13.6% was spent for equipment and unused materials; \$2,414.95 or 2.9% was spent for special cases.

11.61 miles were built to permanent grade at a cost of \$32,919.17. No roads were built to temporary or natural grade. 0.4 miles were surfaced with gravel at a cost of \$2,068.60.

The county road system was dragged an average of 37.6 times, the average cost of dragging being \$0.87 per mile one round trip. The average cost of repairs and maintenance was \$98.28 per mile of county road. The total average expenditure per mile of county road was \$369.77.

Of the 207.75 miles in the county road system, 13 were patrolled, there being 2 districts with an average length of 6.5 miles.

The total township road expenditure as shown by reports from 19 of the 20 townships was \$60,084.02.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$89,334.24, of which \$66,032.53 or 74.0% was spent for permanent bridges and culverts; \$1,536.99 or 1.7% was spent for temporary bridges and culverts; \$6,297.39 or 7.0% was spent for repairs; \$3,439.34 or 3.8% was spent for culvert material for townships; \$7,660.76 or 8.6% was spent for equipment and unused materials; \$2,733.24 or 3.1% was spent for filling bridges and culverts; \$1,633.99 or 1.8% was spent for special cases.

Of the total amount \$67,569.52 spent for new bridges and culverts \$66,032.53 or 97.7% was spent for permanent work; \$1,536.99 or 2.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 39 concrete box culverts, \$33,752.56; 1 concrete slab bridge, \$1,378.87; 3 I-beam spans on concrete abutments, \$6,759.60; 3 pony trusses with concrete abutments, \$15,617.30; 1 high steel truss concrete abutments, \$8,524.30; 49 corrugated pipe without headwalls, \$1,085.08; 3 boiler pipe culverts without headwalls, \$160.90; 1 I-beam spans on piling abutments, \$60.00; 4 wood pile bridges, \$231.01.

## CRAWFORD COUNTY.

**Roads.**

The total county road expenditure was \$151,105.57, of which \$109,395.77 or 72.2% was spent for permanent work; \$24,203.89 or 16.2% was spent for repairs; \$12,779.54 or 8.4% was spent for maintenance; \$839.77 or 0.6% was spent for equipment and unused materials; \$3,886.60 or 2.6% was spent for special cases.

14.54 miles were built to permanent grade at a cost of \$109,395.77. No roads were built to temporary or natural grade and no roads were surfaced.

The county road system was dragged an average of 52.66 times, the average cost of dragging being \$0.95 per mile one round trip. The average cost of repairs and maintenance was \$231.91 per mile of county road. The total average expenditure per mile of county road was \$951.61.

Of the 158.79 miles in the county road system, 69 were patrolled, there being 12 districts with an average length of 6.75 miles. The total township road expenditure as shown by reports from all of the 20 townships was \$66,299.84.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$202,347.17, of which \$41,844.26 or 20.7% was spent for permanent bridges and culverts; \$5,762.88 or 2.8% was spent for temporary bridges and culverts; \$29,011.75 or 14.3% was spent for repairs; \$5,781.60 or 2.9% was spent for filling bridges and culverts; \$14,638.08 or 7.3% was spent for special cases.

Of the total amount \$14,760.14 spent for new bridges and culverts \$141,844.26 or 96.1% was spent for permanent work; \$5,762.88 or 3.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 75 concrete box culverts, \$77,683.68; 4 circular concrete culverts, \$1,518.92; 2 boiler pipe culverts with headwalls, \$185.00; 1 concrete slab bridge, \$4,500.00; 4 I-beam spans on concrete abutments, \$10,384.86; 4 pony trusses on concrete abutments, \$47,571.80; 59 corrugated pipe without headwalls, \$1,811.90; 26 wood pile bridges, \$3,950.98.

#### DALLAS COUNTY.

##### Roads.

The total county road expenditure was \$58,200.87, of which \$20,091.59 or 34.4% was spent for permanent work; \$2,575.30 or 4.4% was spent for temporary work; \$7,197.79 or 12.4% was spent for repairs; \$11,221.00 or 19.3% was spent for maintenance; \$3,705.30 or 6.4% was spent for equipment and unused materials; \$13,409.89 or 23.1% was spent for special cases.

7.12 miles were built to permanent grade at a cost of \$4,762.80. No roads were built to temporary grade. 25.75 miles were built to natural grade at a cost of \$2,575.30. 7.19 miles were surfaced with gravel at a cost of \$13,210.59.

The county road system was dragged an average of 47.76 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$107.58 per mile of county road. The total average expenditure per mile of county road was \$339.96.

Of the 171.2 miles in the county road system, all were patrolled, there being 3 districts with an average length of 57 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$54,345.32.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$51,628.87, of which \$31,766.31 or 61.4% was spent for permanent bridges and culverts; \$1,578.30 or 2.9% was spent for temporary bridges and culverts; \$8,473.19 or 16.4% was spent for repairs; \$4,659.19 or 9.0% was spent for culvert material for townships; \$394.31 or 0.8% was spent for equipment and unused materials; \$3,476.37 or 6.8% was spent for filling bridges and culverts; \$1,381.20 or 2.7% was spent for special cases.

Of the total amount \$33,244.61 spent for new bridges and culverts \$31,766.31 or 95.5% was spent for permanent work; \$1,478.30 or 4.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 23 concrete box culverts, \$20,377.85; 45 circular concrete culverts, \$8,394.16; 1 concrete pier, \$2,994.30; 50 concrete pipe without headwalls, \$427.68; 18 corrugated pipe without headwalls, \$1,050.62.

#### DAVIS COUNTY.

##### Roads.

The total county road expenditure was \$20,369.56, of which \$5,824.60 or 28.6% was spent for repairs; \$6,472.08 or 31.8% was spent for maintenance; \$6,808.85 or 33.3% was spent for equipment and unused material; \$1,246.03 or 6.3% was spent for special cases.

No roads were built to permanent, temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 39.6 times, the average cost of dragging being \$0.70 per mile one round trip. The average cost of repairs and maintenance was \$74.16 per mile of county road. The total average expenditure per mile of county road was \$122.86.

Of the 165.8 miles in the county road system, all were patrolled, there being 20 districts with an average length of 8.29 miles.

The total township road expenditure as shown by reports from all of the 15 townships was \$24,161.64.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$49,520.91, of which \$31,042.57 or 62.7% was spent for permanent bridges and culverts; \$1,681.17 or 3.4% was spent for temporary bridges and culverts; \$11,236.64 or 22.8% was spent for repairs; \$496.90 or 1.0% was spent for culvert material for townships; \$916.34 or 1.8% was spent for equipment and unused materials; \$3,747.54 or 7.5% was spent for filling bridges and culverts; \$399.75 or 0.8% was spent for special cases.

Of the total amount \$32,723.74 spent for new bridges and culverts, \$31,042.57 or 94.9% was spent for permanent work; \$1,681.17 or 5.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 23 concrete box culverts, \$17,756.39; 3 circular concrete culverts, \$805.73; 105 concrete pipe with headwalls, \$11,210.95; 1 corrugated pipe with headwalls, \$88.10; 11 headwalls on culverts previously constructed, \$1,181.40; 1 corrugated pipe without headwalls, \$82.05; 1 pony truss on piling—wood floor, \$31.35; 7 wood pile bridges, \$1,567.77.

#### DECATUR COUNTY.

##### Roads.

The total county road expenditure was \$33,927.36, of which \$2,136.19 or 6.3% was spent for temporary work; \$2,326.72 or 6.8% was spent for repairs; \$18,371.23 or 54.1% was spent for maintenance; \$6,514.72 or 19.3% was spent for equipment and unused material; \$4,578.50 or 13.5% was spent for special cases.

No roads were built to permanent or temporary grade. 18.73 miles were built to natural grade at a cost of \$2,136.19. No roads were surfaced.

The county road system was dragged an average of 65 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$129.97 per mile of county road. The total average expenditure per mile of county road was \$213.05.

Of the 159.25 miles in the county road system 159.25 miles were patrolled, there being 8 districts with an average length of 20 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was \$17,555.46.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$111,194.16, of which \$45,557.69 or 41.0% was spent for permanent bridges and culverts; \$4,152.30 or 3.7% was spent for temporary bridges and culverts; \$24,671.70 or 22.2% was spent for repairs; \$3,586.73 or 3.2% was spent for culvert material for townships; \$26,307.57 or 23.6% was spent for equipment and unused materials; \$5,625.73 or 5.1% was spent for filling bridges and culverts; \$1,292.44 or 1.2% was spent for special cases.

Of the total amount \$49,709.99 spent for new bridges and culverts \$45,557.69 or 91.6% was spent for permanent work; \$4,152.30 or 8.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 14 concrete box culverts, \$19,183.65; 13 circular concrete culverts, \$4,267.20; 12 concrete pipe with headwalls, \$6,121.56; 2 concrete slab, \$7,135.58; 3 I-beam spans on concrete abutments, \$8,849.70; 15 concrete pipe without headwalls, \$2,033.54; 22 corrugated pipe without headwalls, \$857.57; 1 boiler pipe without headwalls, \$103.30; 6 miscellaneous bridges and culverts, \$1,157.89.

## DELAWARE COUNTY.

**Roads.**

The total county road expenditure was \$38,246.65, of which \$10,832.59 or 28.2% was spent for permanent work; \$3,291.75 or 8.5% was spent for temporary work; \$1,501.45 or 3.9% was spent for repairs; \$17,421.16 or 45.4% was spent for maintenance; \$4,247.10 or 11.5% was spent for equipment and unused materials; \$952.60 or 2.5% was spent for special cases.

3 miles were built to permanent grade at a cost of \$4,642.75. No roads were built to temporary grade. 13 miles were built to natural grade at a cost of \$3,291.75. 5.25 miles were surfaced with gravel at a cost of \$5,957.20.

The county road system was dragged an average of 42 times, the average cost of dragging being \$0.82 per mile one round trip. The average cost of repairs and maintenance was \$107.51 per mile of county road. The total average expenditure per mile of county road was \$217.31.

Of the 176 miles in the county road system, all were patrolled, there being 8 districts with an average length of 22 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was \$42,555.43.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$50,626.71, of which \$33,275.99 or 65.8% was spent for permanent bridges and culverts; \$759.06 or 1.5% was spent for temporary bridges and culverts; \$7,870.30 or 15.5% was spent for repairs; \$3,278.25 or 6.5% was spent for culvert material for townships; \$1,442.96 or 2.8% was spent for equipment and unused materials; \$3,842.65 or 7.6% was spent for filling bridges and culverts; \$157.50 or 0.3% was spent for special cases.

Of the total amount \$34,035.05 spent for new bridges and culverts \$33,275.99 or 97.8% was spent for permanent work; \$759.06 or 2.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 29 concrete box culverts, \$16,533.86; 20 circular concrete culverts, \$3,339.93; 1 headwall on culvert previously constructed, \$307.00; 1 concrete slab bridge, \$4,456.00; 3 I-beam spans on concrete abutment, \$6,010.00; 1 pony truss with concrete abutment, \$2,629.20; 27 corrugated pipe without headwalls, \$759.06.

## DES MOINES COUNTY.

**Roads.**

The total county road expenditure was \$15,557.70, of which \$169.53 or 1.5% was spent for permanent work; \$80.11 or 0.6% was spent for temporary work; \$1,753.44 or 11.1% was spent for repairs; \$11,651.19 or 74.8% was spent for maintenance; \$1,591.21 or 10.0% was spent for equipment and unused material; \$312.22 or 2.0% was spent for special cases.

No roads were built to permanent, temporary or natural grades, and no roads were surfaced.

The county road system was dragged an average of 24 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$156.50 per mile of county road. The total average expenditure per mile of county road was \$181.64.

Of the 85.65 miles in the county road system, all were patrolled, there being 6 districts with an average length of 14.28 miles.

The total township road expenditures as shown by reports from all of the 12 townships was \$31,147.07.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$30,261.73, of which \$13,214.30 or 43.6% was spent for permanent bridges and culverts; \$544.01 or 1.8% was spent for temporary bridges and culverts; \$7,208.98 or 23.7% was spent for repairs; \$4,824.07 or 16.0% was spent for culvert material for townships; \$2,257.45 or 7.5% was spent for equipment and unused materials; \$2,212.92 or 7.4% was spent for special cases.

Of the total amount \$13,758.31 spent for new bridges and culverts \$13,214.30 or 96.1% was spent for permanent work; \$544.01 or 3.9% temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts, \$9,975.92; 9 concrete pipe with headwalls, \$2,114.69; 1 pony truss with concrete abutments, \$1,123.69; 2 corrugated pipe without headwalls, \$100.50; 1 I-beam span on piling, \$443.51.

## DICKINSON COUNTY.

**Roads.**

The total county road expenditure was \$40,630.94, of which \$1,430.74 or 3.5% was spent for permanent work; \$3,488.06 or 8.6% was spent for temporary work; \$13,380.59 or 32.8% was spent for repairs; \$14,799.50 or 36.5% was spent for maintenance; \$1,529.80 or 3.8% was spent for equipment and unused material; \$6,002.25 or 14.8% was spent for special cases.

No roads were built to permanent or temporary grade. 14 miles were built to natural grade at a cost of \$3,488.06. No roads were surfaced.

The county road system was dragged an average of 45 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$251.61 per mile of county road. The total average expenditure per mile of county road was \$362.78.

Of the 112 miles in the county road system, 112 were patrolled, there being 11 districts with an average length of 10.2 miles.

The total township road expenditure as shown by reports from 9 of the 12 townships was \$25,677.66.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$16,329.70, of which \$11,706.22 or 71.7% was spent for permanent bridges and culverts; \$468.54 or 2.9% was spent for temporary bridges and culverts; \$2,791.94 or 17.0% was spent for repairs; \$160.42 or 1.0% was spent for culvert material for townships; \$1,202.58 or 7.4% was spent for equipment and unused materials.

Of the total amount \$12,174.76 spent for new bridges and culverts \$11,706.22 or 96.1% was spent for permanent work; \$468.54 or 3.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 29 concrete box culverts, \$10,790.22; 6 circular concrete culverts, \$916.00; 2 wood pile bridges, \$468.54.

#### DUBUQUE COUNTY.

##### Roads.

The total county road expenditure was \$53,522.22, of which \$15,080.41 or 28.2% was spent for permanent work; \$4,556.72 or 8.6% was spent for temporary work; \$2,743.32 or 5.1% was spent for repairs; \$19,602.47 or 36.7% was spent for maintenance; \$11,469.30 or 21.4% was spent for equipment and unused material; \$70.00 was spent for special cases.

No roads were built to permanent grade. 6 miles were built to temporary grade at a cost of \$7,642.89. 23 miles were built to natural grade at a cost of \$3,991.27. 6 miles were surfaced with gravel at a cost of \$6,728.13.

The county road system was dragged an average of 52.75 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$129.50 per mile of county road. The total average expenditure per mile of county road was \$310.18.

Of the 172.55 miles in the county road system, 119 were patrolled, there being 17 districts with an average length of 7 miles.

The total township road expenditure as shown by reports from 8 of the 17 townships was \$16,909.88.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$50,433.65, of which \$11,132.43 or 22.1% was spent for permanent bridges and culverts; \$5,673.13 or 11.2% was spent for temporary bridges and culverts; \$23,643.13 or 46.8% was spent for repairs; \$472.96 or 0.9% was spent for culvert material for townships; \$7,875.46 or 15.7% was spent for equipment and unused materials; \$159.98 or 0.3% was spent for filling bridges and culverts, \$1,476.58 or 3.0% was spent for special cases.

Of the total amount \$16,805.54 spent for new bridges and culverts, \$11,132.43 or 66.3% was spent for permanent work; \$5,673.11 or 33.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 15 concrete box culverts, \$7,775.88; 1 corrugated pipe with headwalls, \$712.80; 1 I-beam span on concrete abutments, \$2,643.75; 49 corrugated pipe without headwalls, \$1,683.11; 2 wood pile bridges, \$3,990.00.

#### EMMET COUNTY.

##### Roads.

The total county road expenditure was \$84,708.26 of which \$65,740.20 or 77.7% was spent for permanent work; \$103.50 or 0.1% was spent for temporary work; \$4,717.91 or 5.6% was spent for repairs; \$12,173.75 or 14.3% was spent for maintenance; \$1,474.65 or 1.7% was spent for equipment and unused material; \$498.25 or 0.6% was spent for special cases.

14.95 miles were built to permanent grade at a cost of \$30,835.35. 3 miles were built to natural grade at a cost of \$103.50; 38.5 miles were surfaced with gravel at a cost of \$33,514.50. No roads were built to temporary grade.

The county road system was dragged an average of 16 times, the average cost of dragging being \$2.06 per mile one round trip. The average cost of repairs and maintenance was \$159.36 per mile of county road. The total average expenditure per mile of county road was \$799.13.

Of the 106 miles in the county road system, all were patrolled, there being 7 districts with an average length of 15.14 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$41,466.86.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$20,956.81 of which \$15,004.74 or 71.6% was spent for permanent bridges and culverts; \$763.79 or 3.7% was spent for temporary bridges and culverts; \$2,005.12 or 9.5% was spent for repairs; \$919.31 or 4.4% was spent and culverts; \$85.20 or 0.4% was spent for special cases.

Of the total amount, \$15,768.53 spent for new bridges and culverts, \$15,004.74 or 95.2% was spent for permanent work; \$763.79 or 4.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 11 concrete box culverts, \$5,836.26; 28 circular concrete culverts, \$4,775.40; 3 concrete slab bridges, \$3,549.93; 1 concrete deck girder hand-rail, \$114.61; 1 retaining wall, \$146.29; 1 I-beam span on concrete abutments, \$582.25; 1 corrugated pipe without headwalls, \$4.00; 4 wood pile bridges, \$759.79.

#### FAYETTE COUNTY.

##### Roads.

The total county road expenditure was \$50,484.37, of which \$207.95 or 0.4% was spent for permanent work; \$20,812.27 or 41.2% was spent for temporary work; \$12,482.86 or 24.8% was spent for repairs; \$9,779.41 or 19.4% was spent for maintenance, \$2,772.76 or 5.5% was spent for equipment and unused material; \$4,419.12 or 8.7% was spent for special cases.

20.87 miles were built to natural grade at a cost of \$20,812.27. No roads were built to permanent or temporary grade, and none were surfaced.

The county road system was dragged an average of 22 times, the average cost of dragging being \$0.70 per mile one round trip. The average cost of repairs and maintenance was \$110.25 per mile of county road. The total average expenditure per mile of county road was \$249.92.

Of the 202 miles in the county road system, all were patrolled, there being 6 districts with an average length of 33.6 miles.

The total township road expenditure as shown by reports from all of the 20 townships, was \$52,526.27.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$77,682.56 of which \$37,702.50 or 48.5% was spent for permanent bridges and culverts; \$4,199.90 or 5.4% was spent for temporary bridges and culverts; \$25,084.65 or 32.3% was spent for repairs; \$3,820.80 or 4.9% was spent for culvert material for townships; \$5,489.84 or 7.1% was spent for equipment and unused materials; \$36.00 or 0.1% was spent for filling bridges and culverts; \$1,348.87 or 1.7% was spent for special cases.

Of the total amount \$41,902.40 spent for new bridges and culverts \$37,702.50 or 90% was spent for permanent work; \$4,199.90 or 10% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 19 concrete box culverts, \$11,685.60; 5 concrete slab bridges, \$16,046.62; 1 concrete through girder, \$3,066.70; 1 I-beam span on concrete abutments, \$6,000.37; sidewalk placed on two high steel trusses, \$588.50; 1 high steel truss, concrete abutments, \$414.71; 125 corrugated pipe culverts without headwalls, \$4,002.80; 2 boiler pipe culverts without headwalls, \$197.10.

## FLOYD COUNTY.

**Roads.**

The total county road expenditure was \$59,114.52 of which \$30,391.85 or 51.4% was spent for permanent work; \$1,041.13 or 1.8% was spent for temporary work; \$9,742.21 or 16.5% was spent for repairs; \$6,612.56 or 11.2% was spent for maintenance; \$9,706.77 or 16.4% was spent for equipment and unused material; \$1,620.00 or 2.7% was spent for special cases.

4.63 miles were built to permanent grade at a cost of \$4,275.75. 1.25 miles were built to temporary grade at a cost of \$1,155.62. 1 mile was built to natural grade at a cost of \$230.00. 12.1 miles were surfaced with gravel at a cost of \$10,069.92.

The county road system was dragged an average of 28.7 times, the average cost of dragging being \$0.75 per mile one round trip. The average cost of repairs and maintenance was \$110.19 per mile of county road. The total average expenditure per mile of county road was \$398.29.

Of the 148.42 miles in the county road system, all were patrolled, there being 8 districts with an average length of 18.55 miles.

The total township road expenditure as shown by reports from 11 of the 12 townships, was \$35,778.33.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$57,551.92 of which \$24,163.87 or 42.1% was spent for permanent bridges and culverts; \$14,039.15 or 24.3% was spent for temporary bridges and culverts; \$7,120.31 or 12.4% was spent for repairs; \$1,342.64 or 2.3% was spent for culvert material for townships; \$7,881.00 or 13.7% was spent for equipment and unused materials; \$1,735.50 or 3.0% was spent for filling bridges and culverts; \$1,269.35 or 2.2% was spent for special cases.

Of the total amount \$38,203.02 spent for new bridges and culverts \$24,163.87 or 63.4% was spent for permanent work; \$14,039.15 or 36.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 34 concrete box culverts, \$14,084.01; 7 circular concrete culverts, \$1,135.35; 1 corrugated pipe with headwalls, \$205.15; 3 concrete slab bridges, \$5,024.14; 2 concrete abutments, \$1,397.82; 2 concrete deck girders, \$2,307.40; 25 wood pile bridges, \$14,018.15; miscellaneous bridges and culverts, \$21.00.

## FRANKLIN COUNTY.

**Roads.**

The total county road expenditure was \$50,416.25 of which \$21,137.59 or 41.9% was spent for permanent work; \$4,861.41 or 9.7% was spent for temporary work; \$8,138.53 or 16.1% was spent for repairs; \$7,213.61 or 14.3% was spent for maintenance; \$4,542.71 or 9.0% was spent for equipment and unused material; \$4,522.40 or 9.0% was spent for special cases.

10.13 miles were built to permanent grade at a cost of \$11,276.11. 22 miles were built to natural grade at a cost of \$4,861.41. 3.5 miles were surfaced with gravel at a cost of \$5,363.11. No roads were built to temporary grade.

The county road system was dragged an average of 39.6 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$96.70 per mile of county road. The total average expenditure per mile of county road was \$317.82.

Of the 158.75 miles in the county road system, 20 were patrolled, there being 3 districts with an average length of 6.66 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was \$56,889.69.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$49,309.67, of which \$31,093.32 or 63.0% was spent for permanent bridges

and culverts; \$1,070.71 or 2.2% was spent for temporary bridges and culverts; \$10,378.47 or 21.1% was spent for repairs; \$3,195.60 or 6.5% was spent for culvert material for townships; \$2,717.90 or 5.5% was spent for equipment and unused materials; \$407.44 or 0.8% was spent for filling bridges and culverts; \$445.22 or 0.9% was spent for special cases.

Of the total amount \$32,165.04 spent for new bridges and culverts \$31,093.32 or 96.7% was spent for permanent work; \$1,071.72 or 3.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 44 concrete box culverts, \$23,952.85; 4 circular concrete culverts, \$314.55; 3 concrete slab bridges, \$5,339.26; 1 I-beam span on concrete abutments, \$41.79; 1 pony truss with concrete abutments, \$1,444.87; 46 corrugated pipe without headwalls, \$1,071.72.

## FREMONT COUNTY.

**Roads.**

The total county road expenditure was \$40,096.66, of which \$5,567.67 or 13.9% was spent for permanent work; \$15,651.41 or 39.1% was spent for repairs; \$11,627.34 or 29.2% was spent for maintenance; \$1,437.24 or 3.6% was spent for equipment and unused material, and \$5,804.00 or 14.2% was spent for special cases.

2.25 miles were built to permanent grade at a cost of \$5,576.67. There were no roads built to temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$0.85 per mile one round trip. The average cost of repairs and maintenance was \$196.25 per mile of county road. The total average expenditure per mile of county road was \$288.47.

Of the 139 miles in the county road system, all were patrolled, there being 5 districts with an average length of 28 miles.

The total township road expenditure as shown by reports from 11 of the 13 townships was \$29,727.70.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$64,929.12, of which \$14,519.29 or 22.3% was spent for permanent bridges and culverts; \$18,649.44 or 28.8% was spent for temporary bridges and culverts; \$16,964.99 or 26.2% was spent for repairs; \$3,250.64 or 5.0% was spent for culvert material for townships; \$7,922.76 or 12.2% was spent for equipment and unused materials; \$3,591.00 or 5.5% was spent for filling bridges and culverts, and \$27.00 was spent for special cases.

Of the total amount \$33,168.73 spent for new bridges and culverts \$14,519.29 or 43.8% was spent for permanent work and \$18,649.44 or 56.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 8 concrete box culverts, \$8,263.68; 22 concrete pipe with headwalls, \$3,829.01; 3 corrugated pipe with headwalls, \$446.60; 22 headwalls on culverts previously constructed, \$1,980.00; 33 wood pile bridges, \$11,900.33; 70 miscellaneous bridges and culverts, \$6,749.11.

## GREENE COUNTY.

**Roads.**

The total county road expenditure was \$59,476.51, of which \$23,399.32 or 39.2% was spent for permanent work; \$2,181.50 or 3.7% was spent for temporary work; \$8,936.56 or 15.0% was spent for repairs; \$12,981.33 or 21.8% was spent for maintenance; \$5,422.27 or 9.1% was spent for equipment and unused material, and \$6,555.53 or 11.2% was spent for special cases.

7.5 miles were built to permanent grade at a cost of \$18,294.31. No roads

were built to temporary grade. 9.5 miles were built to natural grade at a cost of \$2,181.50. 2.83 miles were surfaced with gravel at a cost of \$3,304.04.

The county road system was dragged an average of 59.7 times, the average cost of dragging being \$0.85 per mile one round trip. The average cost of repairs and maintenance was \$157.81 per mile of county road. The total average expenditure per mile of county road was \$428.27.

Of the 138.88 miles in the county road system 34 miles were patrolled, there being 5 districts with an average length of 6.8 miles.

The total township road expenditure as shown by 14 of the 15 townships was \$55,739.10.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$157,335.68, of which \$118,203.81 or 75.0% was spent for permanent bridges and culverts; \$3,314.04 or 2.1% was spent for temporary bridges and culverts; \$23,319.46 or 14.8% was spent for repairs; \$1,522.67 or 1.0% was spent for culvert material for townships; \$5,406.71 or 3.5% was spent for equipment and unused materials; \$562.07 or 0.4% was spent for filling bridges and culverts, and \$5,006.92 or 3.2% was spent for special cases.

Of the total amount \$121,517.85 spent for new bridges and culverts \$118,203.81 or 97.3% was spent for permanent work and \$3,314.04 or 2.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 37 concrete box culverts, \$36,640.28; 59 circular concrete culverts, \$19,085.76; 7 concrete pipe with headwalls, \$774.86; 4 concrete slab bridges, \$13,013.30; 7 concrete deck girders, \$42,521.01; 2 pony trusses with concrete abutments, \$6,168.60; 2 concrete pipe without headwalls, \$25.86; 4 wood pile bridges, \$3,191.51; 1 miscellaneous bridge, \$96.67.

#### GRUNDY COUNTY.

##### Roads.

The total county road expenditure was \$40,920.66, of which \$16,489.13 or 40.2% was spent for permanent work; \$3,713.00 or 9.1% was spent for temporary work; \$11,994.13 or 29.4% was spent for repairs; \$3,518.24 or 8.6% was spent for maintenance; \$4,920.09 or 12.0% was spent for equipment and unused material, and \$286.07 or 0.7% was spent for special cases.

7 miles were built to permanent grade at a cost of \$16,350.17. No roads were built to temporary grade. 10 miles were built to natural grade at a cost of \$3,713.00. No roads were surfaced.

The county road system was dragged an average of 56.7 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$86.66 per mile of county road. The total average expenditure per mile of county road was \$228.60.

The total township road expenditure as shown by reports from 12 of the 14 townships was \$47,216.42.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$150,197.44, of which \$116,518.36 or 77.5% was spent for permanent bridges and culverts; \$8,758.80 or 5.9% was spent for temporary bridges and culverts; \$8,961.01 or 6.0% was spent for repairs; \$2,975.48 or 2.0% was spent for culvert material for townships; \$2,762.47 or 1.8% was spent for equipment and unused materials; \$8,517.79 or 5.7% was spent for filling bridges and culverts, and \$1,702.53 or 1.1% was spent for special cases.

Of the total amount \$125,277.16 spent for new bridges and culverts \$116,518.36 or 93.0% was spent for permanent work, and \$8,758.80 or 7.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 118 concrete box culverts, \$76,241.82; 3 concrete slab bridges, \$7,465.98; 5 I-beam spans on concrete abutments, \$14,462.24; 2 pony trusses with concrete abutments, \$18,348.32; 52 corrugated pipe without headwalls, \$1,076.80, and 7 wood pile bridges, \$7,682.00.

#### GUTHRIE COUNTY.

##### Roads.

The total county road expenditure was \$46,433.60, of which \$13,671.05 or 29.5% was spent for permanent work; \$72.76 or 0.2% was spent for temporary work; \$13,231.78 or 28.4% was spent for repairs, \$14,428.14 or 31.0% was spent for maintenance; \$4,590.06 or 9.9% was spent for equipment and unused material, and \$439.81 or 1.0% was spent for special cases.

2.76 miles were built to permanent grade at a cost of \$9,942.86. No roads were built to temporary grade and no roads were built to natural grade. 1.25 miles were surfaced with gravel at a cost of \$2,374.40.

The county road system was dragged an average of 34.2 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$141.12 per mile of county road. The total average expenditure per mile of county road was \$236.90.

Of the 196 miles in the county road system 65 miles were patrolled, there being 2 districts with an average length of 32.50 miles.

The total township road expenditure as shown by reports from 12 of the 17 townships was \$26,787.21.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$71,759.36, of which \$37,438.21 or 52.2% was spent for permanent bridges and culverts; \$3,359.86 or 4.7% was spent for temporary bridges and culverts; \$14,949.73 or 20.8% was spent for repairs; \$6,715.21 or 9.4% was spent for culvert material for townships; \$5,038.12 or 7.0% was spent for equipment and unused materials; \$3,368.48 or 4.7% was spent for filling bridges and culverts, and \$889.75 or 1.2% was spent for special cases.

Of the total amount \$40,798.07 spent for new bridges and culverts \$37,438.21 or 91.8% was spent for permanent work and \$3,359.86 or 8.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 25 concrete box culverts, \$28,602.28; 36 concrete pipe with headwalls, \$6,744.51; 2 headwalls on culverts previously constructed, \$1,077.62; 1 I-beam span on concrete abutments, \$230.60; 1 pony truss with concrete abutments, \$783.20; 9 concrete pipe without headwalls, \$826.00; 33 corrugated pipe without headwalls, \$1,221.25; 6 wood pile bridges, \$659.51; and 32 miscellaneous bridges and culverts, \$653.10.

#### HAMILTON COUNTY.

##### Roads.

The total county road expenditure was \$119,912.95, of which \$87,776.68 or 73.3% was spent for permanent work, \$9,168.95 or 7.6% was spent for repair; \$11,830.53 or 9.9% was spent for maintenance; \$6,364.87 or 5.3% was spent for equipment and unused material, and \$4,771.92 or 3.9% was spent for special cases.

No roads were built to permanent grade. 4.9 miles were built to temporary grade at a cost of \$2,498.98. No roads were built to natural grade. 34.5 miles were surfaced with gravel at a cost of \$74,906.86.

The county road system was dragged an average of 39.7 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$104.37 per mile of county road. The total average expenditure per mile of county road was \$595.98.



Of the 201.2 miles in the county road system 31 miles were patrolled, there being 3 districts with an average length of 10.33 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was \$54,237.77.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$78,626.64, of which \$68,139.55 or 86.7% was spent for permanent bridges and culverts; \$1,139.00 or 1.4% was spent for temporary bridges and culverts; \$5,598.04 or 7.0% was spent for repairs; \$2,563.24 or 3.3% was spent for culvert material for townships; \$431.45 or 0.6% was spent for filling bridges and culverts, and \$755.36 or 1.0% was spent for special cases.

Of the total amount \$69,278.55 spent for new bridges and culverts \$68,139.55 or 98.4% was spent for permanent work, and \$1,139.00 or 1.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 43 concrete box culverts, \$25,440.07; 10 circular concrete culverts, \$1,166.35; 1 concrete slab bridge, \$1,565.39; 1 concrete abutment, \$912.00; 2 concrete through girders, \$7,875.90; 4 concrete deck girders, \$9,898.48; 3 I-beam spans on concrete abutments, \$4,381.36; 1 pony truss with concrete abutments, \$7,600.00; 1 high steel truss with concrete abutments, \$9,300.00; 24 corrugated pipe without headwalls, \$436.05; 2 I-beam spans on piling abutments, \$702.95.

#### HANCOCK COUNTY.

##### Roads.

The total county road expenditure was \$40,449.03, of which \$18,005.22 or 44.4% was spent for permanent work; \$1,493.02 or 3.7% was spent for temporary work; \$4,069.87 or 10.1% was spent for repairs; \$12,608.99 or 31.2% was spent for maintenance; \$533.05 or 1.3% was spent for equipment and unused material, and \$3,738.88 or 9.3% was spent for special cases.

6.2 miles were built to permanent grade at a cost of \$7,506.65. No roads were built to temporary grade. 5.85 miles were built to natural grade at a cost of \$1,493.02. 6.15 miles were surfaced with gravel at a cost of \$6,042.70.

The county road system was dragged an average of 48 times, the average cost of dragging being \$0.85 per mile one round trip. The average cost of repairs and maintenance was \$100.06 per mile of county road. The total average expenditure per mile of county road was \$242.74.

Of the 166.63 miles in the county road system, all were patrolled, there being 6 patrol districts with an average length of 27.77 miles.

The total township road expenditure as shown by reports from 12 of the 16 townships was \$43,874.22.

#### Bridges:

The total expenditure for bridge and culvert work during 1919 was \$20,703.83, of which \$7,039.51 or 34.0% was spent for permanent bridges and culverts; \$3,237.20 or 15.5% was spent for temporary bridges and culverts; \$5,525.40 or 26.7% was spent for repairs; \$4,232.10 or 20.5% was spent for culvert material for townships; \$202.86 or 1.0% was spent for equipment and unused materials; \$466.76 or 2.3% was spent for filling bridges and culverts.

Of the total amount \$10,276.71 spent for new bridges and culverts \$7,039.51 or 68.5% was spent for permanent work, and \$3,237.20 or 31.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 3 concrete box culverts, \$2,695.77; 3 circular concrete culverts, \$359.20; 3 concrete slab bridges, \$3,984.54; 15 corrugated pipe without headwalls, \$286.50; 6 wood pile bridges, \$2,950.70.

#### HARDIN COUNTY.

##### Roads.

The total county road expenditure was \$69,521.34, of which \$33,663.60 or 48.3% was spent for permanent work; \$2,835.50 or 4.7% was spent for temporary work; \$5,214.59 or 7.4% was spent for repairs; \$8,008.05 or 11.5% was spent for maintenance; \$6,246.13 or 8.8% was spent for equipment and unused material, and \$13,553.47 or 19.3% was spent for special cases.

12.61 miles were built to permanent grade at a cost of \$18,958.44. No roads were built to temporary grade. 17.5 miles were built to natural grade at a cost of \$2,808.75. 12.5 miles were surfaced with gravel at a cost of \$13,330.62.

The county road system was dragged an average of 28.7 times, the average cost of dragging being \$1.03 per mile one round trip. The average cost of repairs and maintenance was \$72.41 per mile of county road. The total average expenditure per mile of county road was \$380.68.

Of the 182.62 miles in the county road system 84.75 miles were patrolled, there being 6 districts with an average length of 14.12 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was \$38,556.27.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$150,526.70, of which \$128,103.53 or 85.1% was spent for permanent bridges and culverts; \$1,665.62 or 1.1% was spent for temporary bridges and culverts; \$6,170.86 or 4.1% was spent for repairs; \$1,340.00 or 0.9% was spent for culvert material for townships; \$4,106.70 or 2.7% was spent for equipment and unused materials; \$7,119.30 or 4.8% was spent for filling bridges and culverts, and \$2,020.69 or 1.3% was spent for special cases.

Of the total amount \$129,769.15 spent for new bridges and culverts, \$128,103.53 or 98.7% was spent for permanent work, and \$1,665.62 or 1.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 86 concrete box culverts, \$33,216.05; 70 circular concrete culverts, \$8,073.62; 1 boiler pipe culvert with headwalls, \$260.50; 2 cast iron pipe with headwalls, \$205.95; 5 concrete slab bridges, \$12,395.66; 1 concrete arch bridge, \$14,933.60; 5 concrete deck bridges, \$23,637.60; 3 retaining walls, \$984.35; 2 I-beam spans on concrete abutments, \$6,762.20; 3 pony trusses on concrete abutments, \$18,944.00; 1 high steel truss, tube abutments, \$8,690.00; 9 corrugated pipe without headwalls, \$1,165.62; 1 wood pile bridge, \$500.00.

#### HARRISON COUNTY.

##### Roads.

The total county road expenditure was \$38,420.69, of which \$10,733.92 or 27.9% was spent for temporary work; \$5,450.25 or 14.2% was spent for repairs; \$14,609.24 or 38.1% was spent for maintenance; \$1,898.14 or 4.9% was spent for equipment and unused material, and \$5,729.14 or 14.9% was spent for special cases.

No roads were built to permanent grade and no roads were built to temporary grade. 21.5 miles were built to natural grade at a cost of \$10,733.92. No roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$0.78 per mile one round trip. The average cost of repairs and maintenance was \$119.40 per mile of county road. The total average expenditure per mile of county road was \$228.69.

Of the 168 miles in the county road system all were patrolled, there being 3 districts with an average length of 56 miles.

The total township road expenditure as shown by reports from all of the 20 townships was \$56,690.54.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$71,017.36, of which \$16,841.52 or 23.1% was spent for permanent bridges and culverts; \$12,386.88 or 17.0% was spent for temporary bridges and culverts; \$33,322.74 or 46.6% was spent for repairs; \$785.53 or 1.1% was spent for culvert material for townships; \$6,807.77 or 9.3% was spent for equipment and unused materials; \$1,418.55 or 1.9% was spent for filling bridges and culverts, and \$1,444.37 or 2.0% was spent for special cases.

Of the total amount \$29,228.40 spent for new bridges and culverts, \$15,841.52 or 57.6 was spent for permanent work, and \$12,386.88 or 42.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 1 concrete box culvert, \$1,765.58; 5 concrete pipe with headwalls, \$2,616.82; 2 I-beam spans on concrete abutments, \$5,743.06; 2 pony trusses with concrete abutments, \$6,716.06; 1 concrete pipe without headwalls, \$79.60; 3 corrugated pipe without headwalls, \$361.09; 1 pony truss on piling, wood floor, \$2,550.00, and 18 wood pile bridges, \$9,396.28.

**HENRY COUNTY.****Roads.**

The total county road expenditure was \$20,307.03, of which \$441.73 or 2.2% was spent for permanent work; \$2,409.56 or 11.8% was spent for repairs; \$11,642.04 or 57.3% was spent for maintenance; \$5,504.47 or 27.2% was spent for equipment and unused material, and \$309.23 or 1.5% was spent for special cases.

No roads were built to permanent, temporary or natural grades, and no roads were surfaced.

The county road system was dragged an average of 37.6 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$98.95 per mile of county road. The total average expenditure per mile of county road was \$143.01.

Of the 142 miles in the county road system 41 miles were patrolled, there being 4 districts with an average length of 10.25 miles.

The total township road expenditure as shown by reports from 11 of the 12 townships was \$30,150.46.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$41,920.64, of which \$30,902.43 or 72.0% was spent for permanent bridges and culverts; \$290.26 or 0.7% was spent for temporary bridges and culverts; \$3,302.01 or 7.7% was spent for repairs; \$3,294.67 or 7.7% was spent for culvert material for townships; \$1,862.20 or 4.3% was spent for equipment and unused materials; \$2,639.56 or 6.1% was spent for filling bridges and culverts, and \$629.51 or 1.5% was spent for special cases.

Of the total amount \$31,192.69 spent for new bridges and culverts \$28,902.43 or 99.1% was spent for permanent work, and \$290.26 or 0.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 54 concrete box culverts, \$23,405.52; 2 concrete slab bridges, \$4,126.07; 2 concrete abutments, \$1,563.47; 2 I-beam spans on concrete abutments, \$1,807.37; 8 corrugated pipe without headwalls, \$290.26.

**HOWARD COUNTY.****Roads.**

The total county road expenditure was \$28,506.39, of which \$15,948.01 or 55.9% was spent for permanent work; \$4,533.26 or 15.9% was spent for temporary work; \$760.08 or 2.7% was spent for repairs; \$3,901.55 or 13.7% was spent for maintenance; \$1,848.04 or 6.5% was spent for equipment and unused material, and \$1,515.45 or 5.3% was spent for special cases.

2.25 miles were built to permanent grade at a cost of \$8,279.26. No roads were built to temporary grade. 16 miles were built to natural grade at a cost of \$4,533.26, and 4.35 miles were surfaced with gravel at a cost of \$4,566.01.

The county road system was dragged an average of 21.92 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$38.12 per mile of county road. The total average expenditure per mile of county road was \$233.08.

Of the 122.3 miles in the county road system 80 miles were patrolled, there being 4 districts with an average length of 20 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$27,499.11.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$35,789.01, of which \$17,633.90 or 49.3% was spent for permanent bridges and culverts; \$7,504.13 or 20.9% was spent for temporary bridges and culverts; \$6,894.89 or 19.3% was spent for repairs; \$1,725.54 or 4.8% was spent for culvert material for townships; \$1,201.55 or 3.4% was spent for equipment and unused materials; \$387.10 or 1.1% was spent for filling bridges and culverts, and \$441.90 or 1.2% was spent for special cases.

Of the total amount \$25,138.03 spent for new bridges and culverts \$17,633.90 or 70.1% was spent for permanent work, and \$7,504.13 or 29.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 38 concrete box culverts, \$12,914.27; 2 circular concrete culverts, \$348.67; 2 I-beam spans on concrete abutments, \$1,105.60; 1 pony truss with concrete abutments, \$3,265.36; 24 corrugated pipe without headwalls, \$442.04; 25 wood pile bridges, \$7,062.09.

**HUMBOLDT COUNTY.****Roads.**

The total county road expenditure was \$68,457.59, of which \$53,812.07 or 78.7% was spent for permanent work; \$3,306.64 or 4.8% was spent for repairs; \$5,527.41 or 8.1% was spent for maintenance; \$1,462.47 or 2.1% was spent for equipment and unused material, and \$4,349.00 or 6.3% was spent for special cases.

12.6 miles were built to permanent grade at a cost of \$15,603.41. No roads were built to temporary grade and no roads were built to natural grade. 12.5 miles were surfaced with gravel at a cost of \$32,666.44.

The county road system was dragged an average of 23 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$65.24 per mile of county road. The total average expenditure per mile of county road was \$505.60.

The total township road expenditure as shown by reports from 11 of the 12 townships was \$40,305.25.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$19,992.78 of which \$14,468.11 or 72.3% was spent for permanent bridges and culverts; \$76.25 or .4% was spent for temporary bridges and culverts; \$1,816.51 or 9.1% was spent for repairs; \$455.29 or 2.3% was spent for culvert material for townships; \$3,123.19 or 15.6% was spent for equipment and unused material; \$37.80 or .2% was spent for filling bridges and culverts, and \$13.62 or .1% was spent for special cases.

Of the total amount \$14,544.36 spent for new bridges and culverts \$14,468.11 or 99.5% was spent for permanent work and \$76.25 or .5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 5 concrete box culverts, \$1,055.12; 1 circular concrete culvert, \$166.00; 3 concrete slab bridges, \$5,667.20; 3 I-beam spans on concrete abutments, \$3,597.29; 1 pony truss with concrete abutments, \$3,982.50; 8 corrugated pipe without headwalls, \$76.25.

## IDA COUNTY.

**Roads.**

The total county road expenditure was \$38,063.77, of which \$18,182.85 or 47.7% was spent for repairs; \$10,940.31 or 28.7% was spent for maintenance; \$6,790.06 or 17.8% was spent for equipment and unused material, and \$2,150.55 or 5.8% was spent for special cases.

No roads were built to permanent, temporary, or natural grades, and no roads were surfaced.

The county road system was dragged an average of 41.85 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$220.63 per mile of county road. The total average expenditure per mile of county road was \$288.36.

Of the 132 miles in the county road system all were patrolled, there being 6 districts with an average length of 22 miles.

The total township road expenditure as shown by reports from 10 of the 12 townships was \$30,539.85.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$97,582.02, of which \$50,240.92 or 51.5% was spent for permanent bridges and culverts; \$1,934.84 or 2.0% was spent for temporary bridges and culverts; \$26,133.89 or 26.8% was spent for repairs; \$7,643.14 or 7.7% was spent for culvert material for townships; \$4,582.87 or 4.7% was spent for equipment and unused materials; \$5,830.16 or 6.0% was spent for filling bridges and culverts, and \$1,216.20 or 1.3% was spent for special cases.

Of the total amount, \$52,175.76 spent for new bridges and culverts \$50,240 or 96.3% was spent for permanent work and \$1,934.84 or 3.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 22 concrete box culverts, \$37,867.74; 1 concrete arch culvert, \$2,491.40; 3 concrete slab bridges, \$6,733.63; 2 concrete pipe with headwalls, \$1,047.20; 2 retaining walls, \$1,065.95; 1 I-beam span on concrete abutments, \$1,035.00; 22 concrete pipe without headwalls, \$1,217.34; 13 corrugated pipe without headwalls, \$717.50.

## IOWA COUNTY.

**Roads.**

The total county road expenditure was \$49,643.18, of which \$7,480.17 or 15.2% was spent for permanent work; \$5,841.90 or 11.8% was spent for temporary work; \$16,355.93 or 32.9% was spent for repairs; \$13,337.60 or 26.8% was spent for maintenance; \$6,558.18 or 13.3% was spent for equipment and unused material, and \$68.86 was spent for special cases.

0.88 miles were built to permanent grade at a cost of \$7,197.41. No roads were built to temporary grade. 14 miles were built to natural grade at a cost of \$5,618.55. No roads were surfaced.

The county road system was dragged an average of 47 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$166.82 per mile of county road. The total average expenditure per mile of county road was \$278.89.

Of the 178 miles in the county road system all were patrolled, there being 5 districts with an average length of 35.6 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$56,455.30.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$117,105.20, of which \$67,980.90 or 58.1% was spent for permanent bridges and culverts; \$9,268.40 or 7.9% was spent for temporary bridges and culverts; \$14,606.15 or 12.4% was spent for repairs; \$17,912.24 or 15.2% was spent for culvert material for townships; \$299.73 or 0.3% was spent for equipment and unused materials; \$2,988.50 or 2.6% was spent for filling bridges and culverts, and \$4,049.28 or 3.5% was spent for special cases.

Of the total amount \$77,249.30 spent for new bridges and culverts \$67,980.90 or 87.8% was spent for permanent work and \$9,268.40 or 12.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 30 concrete box culverts, \$29,656.66; 3 concrete slab bridges, \$5,423.59; 1 concrete abutment, \$620.00; 3 I-beam spans on concrete abutments, \$4,978.17; 4 pony trusses with concrete abutments, \$27,302.48; 2 pony trusses on piling—wood floor—\$3,556.90, and 8 wood pile bridges, \$5,711.50.

## JACKSON COUNTY.

**Roads.**

The total county road expenditure was \$39,565.60, of which \$11,194.57 or 28.4% was spent for permanent work; \$692.91 or 1.8% was spent for temporary work; \$8,391.22 or 21.3% was spent for repairs; \$11,428.85 or 29.0% was spent for maintenance; \$7,107.20 or 18.0% was spent for equipment and unused material, and \$750.85 or 1.9% was spent for special cases.

1.5 miles were built to permanent grade at a cost of \$11,194.57. No roads were built to temporary grade, no roads were built to natural grade, and no roads were surfaced.

The county road system was dragged an average of 42 times, the average cost of dragging being \$0.85 per mile one round trip. The average cost of repairs and maintenance was \$121.97 per mile of county road. The total average expenditure per mile of county road was \$243.48.

Of the 162.5 miles in the county road system, 136 were patrolled, there being 8 districts with an average length of 17 miles.

The total township road expenditure as shown by reports from 16 of the 18 townships was \$35,594.55.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$39,245.01, of which \$6,908.39 or 17.6% was spent for permanent bridges and culverts; \$3,661.86 or 9.3% was spent for temporary bridges and culverts; \$23,877.93 or 60.7% was spent for repairs; \$1,939.97 or 5.0% was spent for culvert material for townships; \$1.88 or 0.1% was spent for equipment and unused materials; \$309.44 or 0.8% was spent for filling bridges and culverts, and \$2,545.54 or 6.5% was spent for special cases.

Of the total amount \$10,570.25 spent for new bridges and culverts \$6,908.39 or 65.3% was spent for permanent work and \$3,661.86 or 34.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts, \$3,768.70; 4 circular concrete culverts, \$1,136.00; 1 corrugated pipe with headwalls, \$200.00; 3 headwalls on culverts previously constructed, \$461.35; 1 concrete abutment, \$545.10; 1 I-beam span on concrete abutments, \$797.24; 11 concrete pipe without headwalls, \$425.53; 1 I-beam span on piling abutments, \$211.26; 17 wood pile bridges, \$2,957.53; 3 miscellaneous bridges and culverts, \$67.54.

## JASPER COUNTY.

**Roads.**

The total county road expenditure was \$76,911.82, of which \$28,652.53 or 37.3% was spent for permanent work; \$1,545.65 or 2.0% was spent for temporary work; \$8,193.32 or 10.6% was spent for repairs; \$22,814.65 or 29.7% was spent for maintenance; \$12,295.47 or 16.0% was spent for equipment and unused material; \$3,410.20 or 4.4% was spent for special cases.

3.75 miles were built to permanent grade at a cost of \$15,751.75. 1.00 miles were built to temporary grade at a cost of \$5,571.36; 15.75 miles were built to natural grade at a cost of \$1,545.65. 4.12 miles were surfaced with gravel at a cost of \$6,935.83.

The county road system was dragged an average of 25 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$151.40 per mile of county road. The total average expenditure per mile of county road was \$375.54.

Of the 204.8 miles in the county road system 155 were patrolled, there being 9 districts with an average length of 17 miles.

The total township road expenditure as shown by reports from 15 of the 19 townships was \$56,323.61.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$138,791.91, of which \$88,101.94 or 63.5% was spent for permanent bridges and culverts; \$26,789.38 or 19.3% was spent for repairs; \$20.00 or 0.1% was spent for culvert material for townships; \$1,635.02 or 1.2% was spent for equipment and unused materials; \$21,168.87 or 15.1% was spent for filling bridges and culverts, and \$1,076.70 or 0.8% was spent for special cases.

Of the total amount \$88,101.94 spent for new bridges and culverts \$88,101.94 or 100% was spent for permanent work.

The amounts last above referred to were spent on the following construction: 52 concrete box culverts, \$36,394.28; 2 boiler pipe culverts with headwalls, \$415.90; 8 concrete slab bridges, \$11,097.33; 1 retaining wall, \$56.79; 4 I-beam spans on concrete abutments, \$14,950.57; 4 pony trusses with concrete abutments, \$25,187.07.

## JEFFERSON COUNTY.

**Roads.**

The total county road expenditure was \$26,718.23, of which \$680.35 or 2.6% was spent for temporary work; \$4,269.26 or 16.1% was spent for repairs; \$10,905.94 or 40.8% was spent for maintenance; \$1,249.04 or 4.7% was spent for equipment and unused material; \$9,613.64 or 35.8% was spent for special cases.

No roads were built to permanent or temporary grade. 5 miles were built to natural grade at a cost of \$680.35. No roads were surfaced.

The county road system was dragged an average of 28 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$107.63 per mile of county road. The total average expenditure per mile of county road was \$189.49.

Of the 141 miles in the county road system, all were patrolled, there being 2 districts with an average length of 70.5 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$40,164.99.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$77,279.06, of which \$59,845.36 or 77.4% was spent for permanent bridges and culverts; \$1,470.46 or 1.9% was spent for temporary bridges and culverts; \$9,048.21 or 11.8% was spent for repairs; \$4,839.30 or 6.2% was spent

for culvert material for townships; \$1,202.17 or 1.5% was spent for equipment and unused materials; \$287.70 or 0.4% was spent for filling bridges and culverts; \$585.86 or 0.8% was spent for special cases.

Of the total amount \$61,315.82 spent for new bridges and culverts \$59,845.36 or 97.6% was spent for permanent work; \$1,470.46 or 2.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 46 concrete box culverts, \$25,407.05; 22 circular concrete culverts, \$3,825.70; 3 concrete slab bridges, \$7,295.02; 4 pony trusses with concrete abutments, \$23,317.59; 9 wood pile bridges, \$1,470.46.

## JOHNSON COUNTY.

**Roads.**

The total county road expenditure was \$69,316.85, of which \$29,342.50 or 42.3% was spent for permanent work; \$684.25 or 1.0% was spent for temporary work; \$15,782.26 or 22.8% was spent for repairs; \$18,553.75 or 26.7% was spent for maintenance; \$3,522.93 or 5.1% was spent for equipment and unused material; \$1,421.16 or 2.1% was spent for special cases.

5 miles were built to permanent grade at a cost of \$28,595.30. No roads were built to temporary grade. 3.5 miles were built to natural grade at a cost of \$684.25. No roads were surfaced.

The county road system was dragged an average of 31.7 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$196.20 per mile of county road. The total average expenditure per mile of county road was \$396.16.

Of the 175 miles in the county road system, all were patrolled, there being 9 districts with an average length of 19.4 miles.

The total township road expenditures as shown by reports from 18 of the 21 townships was \$49,266.00.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$70,622.76, of which \$29,942.21 or 42.4% was spent for permanent bridges and culverts; \$8,388.53 or 11.9% was spent for temporary bridges and culverts; \$15,555.41 or 22.1% was spent for repairs; \$9,187.47 or 13.0% was spent for culvert material for townships; \$1,163.09 or 1.6% was spent for equipment and unused materials; \$4,680.27 or 6.6% was spent for filling bridges and culverts; \$1,705.78 or 2.4% was spent for special cases.

Of the total amount \$38,330.74 spent for new bridges and culverts \$29,942.21 or 78.2% was spent for permanent work; \$8,388.53 or 21.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 33 concrete box culverts, \$16,737.99; 1 circular concrete culvert, \$301.79; 1 corrugated pipe with headwalls, \$275.66; 1 concrete abutment, \$1,099.32; 1 I-beam span on concrete abutments, \$103.75; 1 high steel truss concrete abutment, \$11,423.70; 56 concrete pipe without headwalls, \$2,879.86; 7 wood pile bridges, \$1,487.69; 238 miscellaneous bridges and culverts, \$4,020.98.

## JONES COUNTY.

**Roads.**

The total county road expenditure was \$24,878.31, of which \$4,145.65 or 16.6% was spent for permanent work; \$1,187.41 or 4.8% was spent for temporary work; \$7,822.24 or 31.5% was spent for repairs; \$9,087.04 or 36.5% was spent for maintenance; \$1,639.71 or 6.6% was spent for equipment and unused material; \$996.26 or 4.0% was spent for special cases.

No roads were built to permanent, temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 27 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$88.64 per mile of county road. The total average expenditure per mile of county road was \$130.42.

Of the 190.75 miles in the county road system, 158.00 were patrolled, there being 5 districts with an average length of 31.60 miles.

The total township road expenditure as shown by reports from 13 of the 16 townships was \$37,129.35.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$45,558.45, of which \$19,226.68 or 42.2% was spent for permanent bridges and culverts; \$2,391.38 or 5.3% was spent for temporary bridges and culverts; \$20,500.47 or 45.0% was spent for repairs; \$2,209.46 or 4.8% was spent for culvert material for townships; \$506.70 or 1.1% was spent for equipment and unused materials; \$359.20 or 0.8% was spent for filling bridges and culverts; \$364.56 or 0.8% was spent for special cases.

Of the total amount \$21,618.06 spent for new bridges and culverts \$19,226.68 or 88.9% was spent for permanent work; \$2,391.38 or 11.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 29 concrete box culverts, \$13,157.78; 1 circular concrete culvert, \$120.00; 2 retaining walls, \$450.40; 2 I-beam spans on concrete abutments, \$5,493.50; 20 concrete pipe without headwalls, \$1,296.42; 2 corrugated pipe without headwalls, \$99.26; 1 wood pile bridge, \$995.70.

### KEOKUK COUNTY.

#### Roads.

The total county road expenditure was \$24,191.11, of which \$284.05 or 1.2% was spent for permanent work; \$8,861.85 or 36.5% was spent for repairs; \$8,247.52 or 34.1% was spent for maintenance; \$1,917.09 or 8.0% was spent for equipment and unused material; \$4,880.60 or 20.2% was spent for special cases.

No roads were built to permanent, temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 22 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$101.96 per mile of county road. The total average expenditure per mile of county road was \$144.17.

Of the 167.8 miles in the county road system 60 were patrolled, there being 6 districts with an average length of 10 miles.

The total township road expenditure as shown by reports from all of the 17 townships was \$42,314.60.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$71,494.03, of which \$47,377.00 or 66.2% was spent for permanent bridges and culverts; \$269.98 or 0.4% was spent for temporary bridges and culverts; \$12,539.58 or 17.6% was spent for repairs; \$4,567.71 or 6.4% was spent for culvert material for townships; \$2,580.93 or 3.6% was spent for equipment and unused materials, \$3,953.50 or 5.5% was spent for filling bridges and culverts; \$205.33 or 0.3% was spent for special cases.

Of the total amount \$47,646.98 spent for new bridges and culverts \$47,377.00 or 99.4% was spent for permanent work; \$269.98 or 0.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 60 concrete box culverts, \$36,595.42; 18 circular concrete culverts, \$3,929.41; 4 concrete pipe with headwalls, \$674.03; 2 corrugated pipe with headwalls, \$107.88; 2 retaining walls, \$70.13; 1 I-beam spans on concrete abutments, \$506.53; 1 pony truss with concrete abutments, \$5,493.60; 1 wood pile bridge, \$269.98.

### KOSSUTH COUNTY.

#### Roads.

The total county road expenditure was \$112,947.22, of which \$67,023.48 or 59.3% was spent for permanent work; \$7,519.65, or 6.7% was spent for temporary work; \$16,704.59 or 14.8% was spent for repairs; \$15,801.00 or 14.0% was spent for maintenance; \$3,340.22 or 3.0% was spent for equipment and unused material; \$2,558.28 or 2.2% was spent for special cases.

22.07 miles were built to permanent grade at a cost of \$54,976.17. No roads were built to temporary grade. 28 miles were built to natural grade at a cost of \$7,519.65. 2.4 miles were surfaced with gravel at a cost of \$5,149.30.

The county road system was dragged an average of 42.4 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$116.09 per mile of county road. The total average expenditure per mile of county road was \$403.38.

Of the 280 miles in the county road system, 210.5 were patrolled, there being 4 districts with an average length of 52.6 miles.

The total township road expenditure as shown by reports from 18 of the 28 townships was \$76,032.03.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$54,422.43, of which \$5,537.90 or 10.3% was spent for permanent bridges and culverts; \$20,566.00 or 37.9% was spent for temporary bridges and culverts; \$23,142.27 or 42.4% was spent for repairs; \$3,416.52 or 6.2% was spent for culvert material for townships; \$1,259.74 or 2.3% was spent for filling bridges and culverts; \$500.00 or 0.9% was spent for special cases.

Of the total amount \$26,103.90 spent for new bridges and culverts, \$5,537.90 or 21.2% was spent for permanent work; \$20,566.00 or 78.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 1 concrete slab bridge, \$537.90; 1 concrete arch bridge, \$5,000.00; 3 concrete pipe without headwalls, \$54.10; 93 corrugated pipe without headwalls, \$1,814.58; 22 wood pile bridges, \$18,697.32.

### LEE COUNTY.

#### Roads.

The total county road expenditures was \$26,444.28 of which \$5,804.48 or 21.9% was spent for temporary work; \$7,357.47 or 27.9% was spent for repairs; \$10,469.49 or 39.5% was spent for maintenance; \$2,812.84 or 10.7% was spent for equipment and unused material.

No roads were built to permanent, temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 59.4 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$112.47 per mile of county road. The total average expenditure per mile of county road was \$166.84.

Of the 158.5 miles in the county road system, all were patrolled, there being 30 districts with an average length of 5.28 miles.

The total township road expenditure as shown by reports from 14 of the 15 townships was \$32,802.27.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$49,962.96, of which \$32,798.54 or 65.6% was spent for permanent bridges and culverts; \$137.15 or 0.3% was spent for temporary bridges and culverts; \$9,485.76 or 19.0% was spent for repairs; \$887.79 or 1.8% was spent for culvert material for townships; \$1,856.76 or 3.7% was spent for equip-

ment and unused materials; \$1,640.59 or 3.3% was spent for filling bridges and culverts; \$3,156.37 or 6.3% was spent for special cases.

Of the total amount \$32,935.69 spent for new bridges, \$32,798.54 or 99.6% was spent for permanent work; \$137.15 or 0.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 30 concrete box culverts, \$13,977.89; 22 circular concrete culverts, \$4,221.23; 7 boiler pipe culverts with headwalls, \$1,395.66; 1 retaining wall, \$375.00; 4 I-beam spans on concrete abutments, \$9,569.29; 1 pony truss with concrete abutments, \$3,259.47; 1 wood pile bridge, \$137.15.

#### LINN COUNTY.

##### Roads.

The total county road expenditure was \$118,180.91 of which \$49,225.71 or 41.6% was spent for permanent work; \$13,300.62 or 11.3% was spent for temporary work; \$21,028.25 or 17.8% was spent for repairs; \$20,231.10 or 17.1% was spent for maintenance; \$8,874.40 or 7.5% was spent for equipment and unused material; \$5,529.83 or 4.7% was spent for special cases.

1 mile was built to permanent grade at a cost of \$1,432.11. Roads were built to temporary grade at a cost of \$15,233.10. 73 miles were built to natural grade at a cost of \$10,728.12; 2 miles were surfaced with brick at a cost of \$26,478.65.

The county road system was dragged an average of 40.64 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$194.61 per mile of county road. The total average expenditure per mile of county road was \$557.45.

Of the 212 miles in the county road system, all were patrolled, there being 20 districts with an average length of 10.6 miles.

The total township road expenditures as shown by reports from all of the 20 townships was \$58,132.65.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$110,738.07 of which \$61,414.48 or 55.5% was spent for permanent bridges and culverts; \$6,263.56 or 5.7% was spent for temporary bridges and culverts; \$18,688.91 or 16.8% was spent for repairs; \$6,944.31 or 6.3% was spent for culvert material for townships; \$14,449.66 or 13.0% was spent for equipment and unused materials; \$2,429.00 or 2.2% was spent for filling bridges and culverts; \$557.15 or 0.5% was spent for special cases.

Of the total amount \$67,678.94 spent for new bridges and culverts, \$61,414.48 or 90.8% was spent for permanent work; \$6,263.56 or 9.2% was spent for temporary work.

The amounts last above referred to, were spent on the following construction: 47 concrete box culverts, \$32,584.03; 21 circular concrete culverts, \$5,833.76; 2 concrete slab bridges, \$5,578.15; 1 concrete abutment, \$3,598.00; 1 high steel truss, concrete abutments, \$12,910.54; 4 corrugated pipe without headwalls, \$136.44; 1 pony truss on piling, wood floor, \$539.22; 10 wood pile bridges \$5,487.90.

#### LOUISA COUNTY.

##### Roads.

The total county road expenditure was \$32,216.82, of which \$1,720.88 or 7.8% was spent for repairs; \$12,865.89 or 58.1% was spent for maintenance; \$5,305.94 or 23.9% was spent for equipment and unused material; \$2,314.11 or 10.2% was spent for special cases.

No roads were built to permanent, temporary or natural grade, and no roads were surfaced.

The county road system was dragged an average of 20 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$126.92 per mile of county road. The total average expenditure per mile of county road was \$193.19.

Of the 115 miles in the county road system, 95 were patrolled, there being 6 districts with an average length of 19.17 miles.

The total township road expenditure as shown by reports from 9 of the 12 townships was \$31,222.94.

##### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$44,441.18, of which \$11,852.05 or 26.8% was spent for permanent bridges and culverts; \$2,742.83 or 6.2% was spent for temporary bridges and culverts; \$25,082.77 or 56.3% was spent for repairs; \$2,832.11 or 6.4% was spent for culvert material for townships; \$1,309.76 or 2.9% was spent for equipment and unused materials; \$407.61 or 0.9% was spent for filling bridges and culverts; \$213.05 or 0.5% was spent for special cases.

Of the total amount \$14,595.88 spent for new bridges and culverts, \$11,852.05 or 81.1% was spent for permanent work; \$2,742.83 or 18.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 11 concrete box culverts, \$7,727.31; 1 high steel truss, concrete abutments, \$4,124.74; 5 wood pile bridges, \$2,743.83.

#### LUCAS COUNTY.

##### Roads.

The total county road expenditure was \$31,604.40, of which \$3,000.00 or 9.5% was spent for temporary work; \$12,550.40 or 39.7% was spent for repairs; \$10,670.87 or 33.7% was spent for maintenance; \$1,827.43 or 5.8% was spent for equipment and unused material; \$3,556.70 or 11.3% was spent for special cases.

No roads were built to permanent or temporary grade. 20 miles were built to natural grade at a cost of \$3,000.00. No roads were surfaced.

The county road system was dragged an average of 23 times, the average cost of dragging being \$0.86 per mile one round trip. The average cost of repairs and maintenance was \$149.81 per mile of county road. The total average expenditure per mile of county road was \$202.90.

All of the 155 miles in the county road system were patrolled, there being 10 districts with an average length of 15.5 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$26,852.52.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$62,451.24, of which \$50,241.33 or 80.2% was spent for permanent bridges and culverts; \$3,034.27 or 3.6% was spent for temporary bridges and culverts; \$5,944.21 or 7.1% was spent for repairs; \$8,221.44 or 9.9% was spent for culvert material for townships; \$1,388.20 or 1.7% was spent for equipment and unused materials; \$10,859.07 or 13.0% was spent for filling bridges and culverts, and \$2,762.52 or 4.5% was spent for special cases.

Of the total amount, \$51,275.90, spent for new bridges and culverts, \$50,241.33 or 94.3% was spent for permanent work, \$3,034.27 or 5.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 49 concrete box culverts, \$21,860.83; 26 concrete pipe with headwalls, \$2,851.60; 5 headwalls on culverts previously constructed, \$482.26; 3 I-beam spans on concrete abutments, \$9,069.31; 2 pony trusses with concrete abutments, \$16,985.63; 47 concrete pipe without headwalls, \$1,615.75; 19 corrugated pipe without headwalls, \$550.84; 5 wood pile bridges, \$535.00; 27 miscellaneous bridges and culverts, \$332.68.

## LYON COUNTY.

**Roads.**

The total country road expenditure was \$29,576.38, of which \$9,230.15 or 31.2% was spent for permanent work; \$3,455.49 or 11.7% was spent for temporary work; \$7,147.25 or 24.1% was spent for repairs; \$7,151.11 or 24.3% was spent for maintenance; \$2,329.45 or 7.9% was spent for equipment and unused material; \$262.93 or 0.8% was spent for special cases.

2.1 miles were built to permanent grade at a cost of \$4,473.80. 34.5 miles were built to natural grade at a cost of \$3,455.49. 1 mile was surfaced with gravel at a cost of \$4,753.85. No roads were built to temporary grade.

The county road system was dragged an average of 22 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$75.90 per mile of county road. The total average expenditure per mile of county road was \$157.00.

Of the 188.38 miles in the county road system, 163.5 were patrolled, there being 4 districts with an average length of 40.9 miles.

The total township road expenditure as shown by reports from 15 of the 18 townships was \$31,554.14.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$53,085.80 of which \$20,321.35 or 38.3% was spent for permanent bridges and culverts; \$2,949.07 or 5.6% was spent for temporary bridges and culverts; \$13,773.34 or 25.9% was spent for repairs; \$4,624.25 or 8.7% was spent for culvert material for townships; \$6,119.35 or 11.5% was spent for equipment and unused materials; \$4,388.37 or 8.3% was spent for filling bridges and culverts; \$910.07 or 1.7% was spent for special cases.

Of the total amount \$23,270.42 spent for new bridges and culverts, \$20,321.35 or 87.3% was spent for permanent work; \$2,949.07 or 12.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts, \$8,840.63; 1 concrete deck girder, \$106.01; 3 I-beam spans on concrete abutments, \$7,198.46; 2 pony trusses with concrete abutments, \$1,263.75; 2 high steel trusses with concrete abutments, \$2,912.50; 15 corrugated pipe without headwalls, \$561.20; 5 wood pile bridges, \$2,387.87.

## MADISON COUNTY.

**Roads.**

The total county road expenditure was \$29,620.94 of which \$201.95 or 0.7% was spent for permanent work; \$6,748.76 or 22.8% was spent for temporary work; \$7,808.64 or 26.4% was spent for repairs; \$7,282.37 or 24.6% was spent for maintenance; \$3,000.91 or 10.2% was spent for equipment and unused material; \$4,578.31 or 15.3% was spent for special cases.

22.25 miles were built to natural grade at a cost of \$6,066.26. No roads were built to permanent or temporary grade, and none were surfaced.

The county road system was dragged an average of 35 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$91.46 per mile of county road. The total average expenditure per mile of county road was \$179.52.

Of the 165 miles in the county road system, none were patrolled.

The total township road expenditure as shown by reports from all of the 16 townships was \$36,545.14.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$63,400.61 of which \$20,904.99 or 32.9% was spent for permanent bridges and

culverts; \$5,396.75 or 8.5% was spent for temporary bridges and culverts; \$16,360.93 or 25.9% was spent for repairs; \$9,845.10 or 15.5% was spent for culvert material for townships; \$7,417.51 or 11.7% was spent for equipment and unused materials; \$2,308.95 or 3.6% was spent for filling bridges and culverts; \$1,166.38 or 1.9% was spent for special cases.

Of the total amount \$26,301.74 spent for new bridges and culverts, \$20,904.99 or 79.5% was spent for permanent work; \$5,396.75 or 20.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts, \$13,147.91; 15 concrete pipe with headwalls, \$7,161.06; 2 boiler pipe culverts with headwalls, \$323.10; 1 masonry box culvert, \$272.92; 17 concrete pipe without headwalls, \$493.05; 43 corrugated pipe without headwalls, \$1,594.79; 6 wood pile bridges, \$3,308.91.

## MAHASKA COUNTY.

**Roads.**

The total county road expenditure was \$32,654.23, of which \$4,567.96 or 14.0% was spent for permanent work; \$1,451.60 or 4.4% was spent for temporary work; \$3,457.43 or 10.6% was spent for repairs; \$14,349.63 or 43.8% was spent for maintenance; \$8,204.61 or 25.2% was spent for equipment and unused material; \$623.00 or 2.0% was spent for special cases.

0.75 of a mile was built to permanent grade at a cost of \$2,310.35. 0.5 of a mile was built to temporary grade at a cost of \$808.25. 12 miles were built to natural grade at a cost of \$1,426.60. No roads were surfaced.

The county road system was dragged an average of 26 times, the average cost of dragging being \$0.91 per mile one round trip. The average cost of repairs and maintenance was \$116.01 per mile of county road. The total average expenditure per mile of county road was \$212.71.

Of the 153.5 miles in the county road system, all were patrolled, there being 3 districts with an average length of 51 miles.

The total township road expenditure as shown by reports from all of the 18 townships was \$55,916.18.

**Bridges.**

The total expenditures for bridge and culvert work during 1919 were \$62,200.42 of which \$47,370.95 or 76.2% was spent for permanent bridges and culverts; \$555.60 or 0.9% was spent for temporary bridges and culverts; \$4,250.77 or 6.9% was spent for repairs; \$5,041.27 or 8.1% was spent for culvert material for townships; \$765.94 or 1.2% was spent for equipment and unused materials; \$2,655.50 or 4.2% was spent for filling bridges and culverts; \$1,560.39 or 2.5% was spent for special cases.

Of the total amount \$47,926.55 spent for new bridges and culverts, \$47,370.95 or 98.9% was spent for permanent work; \$555.60 or 1.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 21 concrete box culverts, \$18,974.25; 1 concrete pipe with headwalls, \$212.10; 6 headwalls on culverts previously constructed, \$1,955.74; 1 I-beam span on concrete abutments, \$93.61; 3 high steel trusses, concrete abutments, \$26,135.25; 1 concrete pipe without headwalls, \$37.65; 16 corrugated pipe without headwalls, \$382.95; 4 boiler pipe culverts without headwalls, \$107.60; 1 wood pile bridge, \$27.40.

## MARION COUNTY.

**Roads.**

The total county road expenditure was \$53,325.62 of which \$1,652.15 or 3.1% was spent for permanent work; \$13,956.62 or 26.2% was spent for temporary work; \$8,638.79 or 16.2% was spent for repairs; \$11,468.01 or 21.5% was spent for

maintenance; \$15,248.31 or 28.6% was spent for equipment and unused material; \$2,361.74 or 4.4% was spent for special cases.

0.5 miles were built to permanent grade at a cost of \$1,652.15; 38 miles were built to natural grade at a cost of \$13,956.62. No roads were built to temporary grade and none were surfaced.

The county road system was dragged an average of 37 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$105.82 per mile of county road. The total average expenditure per mile of county road was \$280.66.

Of the 190 miles in the county road system, 59.5 were patrolled, there being 4 districts with an average length of 14.87 miles.

The total township road expenditure as shown by reports from all of the 15 townships, was \$44,854.20.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$42,566.34 of which \$22,991.86 or 54.2% was spent for permanent bridges and culverts; \$91.10 or 0.2% was spent for temporary bridges and culverts; \$7,345.33 or 17.2% was spent for repairs; \$3,505.92 or 8.2% was spent for culvert material for townships; \$5,642.68 or 13.2% was spent for equipment and unused materials; \$2,372.55 or 5.6% was spent for filling bridges and culverts; \$616.90 or 1.4% was spent for special cases.

Of the total amount \$23,082.96 spent for new bridges and culverts, \$22,991.86 or 99.6% was spent for permanent work; \$91.10 or 0.4% was spent for temporary work.

The amounts last above referred to, were spent on the following construction: 28 concrete box culverts, \$6,013.20; 20 circular concrete culverts, \$1,054.01; 1 reinforced concrete bridge floor, \$93.00; 2 I-beam spans on concrete abutments, \$6,621.95; 1 pony truss with concrete abutments, \$9,209.70; 5 corrugated pipe without headwalls, \$91.10.

### MARSHALL COUNTY.

#### Roads.

The total county road expenditure was \$90,259.53 of which \$55,094.55 or 61.1% was spent for permanent work; \$3,256.65 or 3.6% was spent for temporary work; \$6,041.87 or 6.7% was spent for repairs; \$14,165.79 or 15.7% was spent for maintenance; \$5,143.87 or 5.7% was spent for equipment and unused material; \$6,556.80 or 7.2% was spent for special cases.

10 miles were built to permanent grade at a cost of \$53,959.45. 32 miles were built to natural grade at a cost of \$3,256.65. No roads were built to temporary grade, and none were surfaced.

The county road system was dragged an average of 42.5 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$106.89 per mile of county road. The total average expenditure per mile of county road was \$477.44.

Of the 189.05 miles in the county road system, all were patrolled, there being 11 districts with an average length of 17.19 miles.

The total township road expenditure as shown by reports from all of the 18 townships was \$50,914.89.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$132,649.41 of which \$98,912.76 or 74.8% was spent for permanent bridges and culverts; \$1,906.62 or 1.4% was spent for temporary bridges and culverts; \$6,832.88 or 5.1% was spent for repairs; \$4,431.04 or 3.3% was spent for culvert material for townships; \$9,073.48 or 6.7% was spent for equipment and unused materials; \$4,480.91 or 3.4% was spent for filling bridges and culverts; \$7,011.72 or 5.3% was spent for special cases.

Of the total amount \$100,819.38 spent for new bridges and culverts, \$98,912.76 or 98.1% was spent for permanent work; \$1,906.62 or 1.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 69 concrete box culverts, \$66,469.68; 15 circular concrete culverts, \$4,859.04; 1 corrugated pipe with headwalls, \$115.00; 1 concrete slab bridge, \$2,829.71; 1 concrete arch bridge, \$1,244.80; 1 I-beam span on concrete abutments, \$3,799.85; 2 pony trusses with concrete abutments, \$10,115.71; 1 high steel truss with concrete abutments, \$9,478.97; 12 corrugated pipe without headwalls, \$887.26; 2 cast iron pipe without headwalls, \$248.53; 1 wood pile bridge, \$770.83.

### MILLS COUNTY.

#### Roads.

The total county road expenditure was \$45,347.23, of which \$5,124.95 or 11.3% was spent for temporary work; \$16,000.31 or 35.3% was spent for repairs; \$13,787.44 or 30.4% was spent for maintenance; \$5,283.76 or 11.6% was spent for equipment and unused material; \$5,150.77 or 11.4% was spent for special cases.

11.5 miles were built to natural grade at a cost of \$3,562.95. No roads were built to permanent or temporary grade, and none were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$270.80 per mile of county road. The total average expenditure per mile of county road was \$412.24.

Of the 110 miles in the county road system, 95 were patrolled, there being 8 districts with an average length of 11.87 miles.

The total township road expenditure as shown by reports from 11 of the 13 townships was \$30,139.30.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$88,203.83 of which \$28,106.43 or 31.8% was spent for permanent bridges and culverts; \$18,970.74 or 21.5% was spent for temporary bridges and culverts; \$13,885.30 or 15.7% was spent for repairs; \$3,927.51 or 4.4% was spent for culvert material for townships; \$14,109.76 or 16.1% was spent for equipment and unused materials; \$6,945.74 or 7.9% was spent for filling bridges and culverts; \$2,258.35 or 2.6% was spent for special cases.

Of the total amount, \$47,077.17 spent for new bridges and culverts, \$28,106.43 or 59.7% was spent for permanent work; \$18,970.74 or 40.3% was spent for temporary work.

The amounts last above referred to, were spent on the following construction: 14 concrete box culverts, \$27,218.33; 1 corrugated pipe with headwalls, \$141.70; 1 boiler pipe culvert with headwalls, \$347.90; 2 headwalls on culverts previously constructed, \$398.50; 15 concrete pipe without headwalls, \$1,890.82; 5 corrugated pipe without headwalls, \$462.36; 2 pony trusses on piling, wood floors, \$9,981.32; miscellaneous bridges and culverts, \$6,636.24.

### MITCHELL COUNTY.

#### Roads.

The total county road expenditure was \$47,472.23 of which \$13,899.25 or 29.3% was spent for permanent work; \$4,035.28 or 8.5% was spent for temporary work; \$6,964.91 or 14.6% was spent for repairs; \$8,008.95 or 16.9% was spent for maintenance; \$12,608.72 or 26.6% was spent for equipment and unused material; \$1,955.12 or 4.1% was spent for special cases.

8 miles were built to permanent grade at a cost of \$8,065.97. 15.5 miles were built to natural grade at a cost of \$4,035.28. 2.25 miles were sur-



faced with gravel at a cost of \$3,368.54. No roads were built to temporary grade.

The county road system was dragged an average of 33.57 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$112.88 per mile of county road. The total average expenditure per mile of county road was \$357.87.

Of the 132.65 miles in the county road system, 9 were patrolled, there being 2 districts with an average length of 4.5 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$34,852.25.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$71,753.17 of which \$52,334.40 or 73.0% was spent for permanent bridges and culverts; \$852.88 or 1.1% was spent for temporary bridges and culverts; \$8,442.80 or 11.8% was spent for repairs; \$1,326.92 or 1.8% was spent for culvert material for townships; \$5,172.82 or 7.2% was spent for equipment and unused materials; \$3,549.85 or 5.0% was spent for filling bridges and culverts; \$73.50 or 0.1% was spent for special cases.

Of the total amount \$53,187.28 spent for new bridges and culverts, \$52,334.40 or 99.8% was spent for permanent work; \$852.88 or 0.2% was spent for temporary work.

The amount last above referred to were spent on the following construction: 60 concrete box culverts, \$23,242.72; 1 concrete slab bridge, \$10,633.34; 1 concrete deck girder, \$5,836.72; 2 I-beam spans on concrete abutments, \$2,395.49; 1 pony truss with concrete abutments, \$10,226.13; 39 corrugated pipe without headwalls, \$852.88.

### MONONA COUNTY.

#### Roads.

The total county road expenditure was \$22,618.67 of which \$6,648.80 or 29.4% was spent for repairs; \$14,514.34 or 64.1% was spent for maintenance; \$1,083.28 or 4.8% was spent for equipment and unused material; \$372.25 or 1.7% was spent for special cases.

No roads were built to permanent, temporary or natural grade, and none were surfaced.

The county road system was dragged an average of 50.3 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$127.11 per mile of county road. The total average expenditure per mile of county road was \$135.84.

Of the 166.5 miles in the county road system, 141.5 were patrolled, there being 9 districts with an average length of 15.7 miles.

The total township road expenditure as shown by reports from 14 of the 19 townships, was \$30,686.74.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$59,873.06 of which \$22,462.26 or 37.5% was spent for permanent bridges and culverts; \$7,991.44 or 13.4% was spent for temporary bridges and culverts; \$15,604.69 or 26.1% was spent for repairs; \$1,280.42 or 2.1% was spent for culvert material for townships; \$4,393.30 or 7.3% was spent for equipment and unused materials; \$4,415.32 or 7.4% was spent for filling bridges and culverts; \$3,725.63 or 6.2% was spent for special cases.

Of the total amount \$30,453.70 spent for new bridges and culverts, \$22,462.26 or 73.7% was spent for permanent work; \$7,991.44 or 26.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 34 concrete box culverts, \$18,918.76; 2 concrete slab bridges, \$3,543.50; 3 concrete pipe without headwalls, \$246.55; 19 corrugated pipe without headwalls, \$645.49; 1 I-beam span on piling abutments, \$187.10; 3 pony trusses on piling, wood floors, \$6,441.80; 2 wood pile bridges, \$470.50.

### MONROE COUNTY.

#### Roads.

The total county road expenditure was \$33,273.54, of which \$5,556.15 or 16.7% was spent for repairs; \$17,687.04 or 53.3% was spent for maintenance; \$8,742.39 or 26.3% was spent for equipment and unused material, and \$1,287.96 or 3.7% was spent for special cases.

No roads were built to permanent, temporary, or natural grade, and no roads were surfaced.

The county road system was dragged an average of 37 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$135.13 per mile of county road. The total average expenditure per mile of county road was \$193.45.

Of the 172 miles in the county road system 120 miles were patrolled, there being 10 districts with an average length of 12 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$26,197.21.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$67,676.00, of which \$43,337.22 or 64.2% was spent for permanent bridges and culverts; \$1,448.26 or 2.1% was spent for temporary bridges and culverts; \$11,912.19 or 17.6% was spent for repairs; \$4,832.47 or 7.1% was spent for culvert material for townships; \$815.00 or 1.2% was spent for equipment and unused materials; \$3,877.76 or 5.7% was spent for filling bridges and culverts, and \$1,453.10 or 2.1% was spent for special cases.

Of the total amount, \$44,785.48, spent for new bridges and culverts, \$43,337.22 or 96.8% was spent for permanent work and \$1,448.26 or 3.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 24 concrete box culverts, \$25,114.17; 18 circular concrete culverts, \$5,502.95; 2 cast iron pipe with headwalls, \$1,026.24; 5 masonry box culverts, \$3,930.60; 1 concrete deck girder, \$7,763.26; 22 corrugated pipe without headwalls, \$1,293.82; 1 wood pile bridge, \$154.44.

### MONTGOMERY COUNTY.

#### Roads.

The total county road expenditure was \$43,232.43, of which \$5,129.29 or 11.9% was spent for permanent work; \$9,172.70 or 21.3% was spent for temporary work; \$8,749.76 or 20.3% was spent for repairs; \$11,408.60 or 26.3% was spent for maintenance; \$2,311.54 or 5.4% was spent for equipment and unused material; \$6,460.54 or 14.8% was spent for special cases.

No roads were built to permanent grade. 4 miles were built to temporary grade at a cost of \$5,040.40. 54.3 miles were built to natural grade at a cost of \$9,172.70. No roads were surfaced.

The county road system was dragged an average of 65.67 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$156.27 per miles of county road. The total average expenditure per mile of county road was \$335.14.

Of the 129 miles in the county road system 106 were patrolled, there being 5 districts with an average length of 21.2 miles.

The total township road expenditure as shown by reports from all of the 12 townships was \$33,399.86.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$188,635.16, of which \$120,705.34 or 64.0% was spent for permanent bridges and culverts; \$22,313.98 or 11.8% was spent for temporary bridges and culverts; \$12,448.63 or 6.4% was spent for repairs; \$8,406.03 or 4.5% was

spent for culvert material for townships; \$17,996.93 or 9.6% was spent for equipment and unused materials; \$4,600.20 or 2.5% was spent for filling bridges and culverts; \$2,164.05 or 1.2% was spent for special cases.

Of the total amount, \$143,019.32, spent for new bridges and culverts, \$120,705.34 or 84.4% was spent for permanent work and \$22,313.98 or 15.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 23 concrete box culverts, \$56,387.78; 7 circular concrete culverts, \$5,360.76; 62 concrete pipe with headwalls, \$18,631.01; 1 corrugated pipe with headwalls, \$254.60; 18 headwalls on culverts previously constructed, \$2,570.51; 1 concrete deck girder, \$3,112.50; 3 I-beam spans on concrete abutments, \$25,597.98; 2 pony trusses with concrete abutments, \$8,090.20; 1 high steel truss concrete abutments, \$700.00; 10 concrete pipe without headwalls, \$1,150.06; 12 corrugated pipe without headwalls, \$361.75; 2 pony trusses on piling, wood floor, \$4,497.89; 31 wood pile bridges, \$15,806.95; 5 miscellaneous bridges and culverts, \$497.33.

#### MUSCATINE COUNTY.

##### Roads.

The total county road expenditure was \$36,988.55, of which \$15,317.85 or 41.3% was spent for permanent work; \$3,498.23 or 9.5% was spent for temporary work; \$520.97 or 1.4% was spent for repairs; \$13,350.60 or 36.1% was spent for maintenance; \$3,383.77 or 9.2% was spent for equipment and unused material, and \$917.13 or 2.5% was spent for special cases.

5.74 miles were built to permanent grade at a cost of \$9,279.41. No roads were built to temporary grade. 19.0 miles were built to natural grade at a cost of \$1,760.38. 3.06 miles were surfaced with black dirt at a cost of \$5,586.86.

The county road system was dragged an average of 61.5 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$98.38 per mile of county road. The total average expenditure per mile of county road was \$262.33.

Of the 141 miles in the county road system all were patrolled, there being 7 districts with an average length of 20.1 miles.

The total township road expenditure as shown by reports from all of the 14 townships was \$34,170.98.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$42,577.49, of which \$22,291.44 or 52.4% was spent for permanent bridges and culverts; \$625.29 or 1.5% was spent for temporary bridges and culverts; \$9,301.87 or 21.9% was spent for repairs; \$2,782.11 or 6.6% was spent for culvert material for townships; \$1,847.38 or 4.3% was spent for equipment and unused materials; \$1,247.74 or 2.9% was spent for filling bridges and culverts, and \$4,481.66 or 10.4% was spent for special cases.

Of the total amount, \$22,916.73 spent for new bridges and culverts, \$22,291.44 or 99.7% was spent for permanent work and \$625.29 or 0.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 39 concrete box culverts, \$12,500.58; 2 circular concrete culverts, \$352.52; 1 concrete pipe with headwalls, \$96.30; 2 boiler pipe culverts with headwalls, \$261.96; 1 cast iron pipe with headwalls, \$127.22; 2 concrete slab bridges, \$4,222.88; 1 pony truss with concrete abutments, \$4,729.98; 8 concrete pipe without headwalls, \$189.96; 21 corrugated pipe without headwalls, \$308.13; 2 boiler pipe culverts without headwalls, \$98.00; 5 miscellaneous bridges and culverts, \$29.20.

#### O'BRIEN COUNTY.

##### Roads.

The total county road expenditure was \$36,875.89, of which \$17,841.79 or 48.2% was spent for permanent work; \$2,458.50 or 6.7% was spent for temporary work; \$3,532.04 or 9.6% was spent for repairs; \$9,608.50 or 26.0% was spent for maintenance; \$2,286.11 or 6.2% was spent for equipment and unused material, and \$1,148.95 or 3.3% was spent for special cases.

4.25 miles were built to permanent grade at a cost of \$12,499.16; 1.75 miles were built to temporary grade at a cost of \$1,251.84; 21.5 miles were built to natural grade at a cost of \$2,458.50. No roads were surfaced.

The county road system was dragged an average of 29.86 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$69.16 per mile of county road. The total average expenditure per mile of county road was \$194.08.

All of the 190 miles in the county road system were patrolled, there being 6 district swith an average length of 31.66 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$40,011.59.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$73,659.40, of which \$52,700.93 or 71.4% was spent for permanent bridges and culverts; \$2,465.36 or 3.3% was spent for temporary bridges and culverts; \$12,779.31 or 17.5% was spent for repairs; \$1,621.91 or 2.2% was spent for culvert material for townships; \$3,330.30 or 4.5% was spent for equipment and unused materials; \$39.20 or 0.1% was spent for filling bridges and culverts, and \$722.39 or 1.0% was spent for special cases.

Of the total amount, \$55,166.29, spent for new bridges and culverts, \$52,700.93 or 95.5% was spent for permanent work, and \$2,465.36 or 4.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 44 concrete box culverts, \$33,527.17; 4 concrete slab bridges, \$6,252.90; 4 I-beam spans on concrete abutments, \$4,678.77; 6 pony trusses with concrete abutments, \$8,242.09; 90 concrete pipe without headwalls, \$2,465.36.

#### OSCEOLA COUNTY.

##### Roads.

The total county road expenditure was \$23,562.17, of which \$8,741.96 or 37.1% was spent for permanent work; \$838.22 or 3.6% was spent for temporary work; \$3,550.59 or 15.1% was spent for repairs; \$9,303.48 or 39.5% was spent for maintenance, and \$1,127.92 or 4.7% was spent for equipment and unused material.

No roads were built to permanent grade and no roads were built to temporary grade. 8.5 miles were built to natural grade at a cost of \$838.22. No roads were surfaced.

The county road system was dragged an average of 31 times, the average cost of dragging being \$0.75 per mile one round trip. The average cost of repairs and maintenance was \$97.37 per mile of county road. The total average expenditure per mile of county road was \$178.50.

Of the 132 miles in the county road system 108 miles were patrolled, there being 12 districts with an average length of 9 miles.

The total township road expenditure as shown by reports from all of the 11 townships was \$31,411.91.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$68,075.73, of which \$42,096.53 or 61.9% was spent for permanent bridges and culverts; \$16,640.71 or 24.4% was spent for temporary bridges and culverts; \$2,452.67 or 3.6% was spent for repairs; \$2,847.01 or 4.2% was spent for cul-

vert material for townships; \$2,934.46 or 4.3% was spent for equipment and unused materials; \$968.55 or 1.4% was spent for filling bridges and culverts, and \$135.80 or 0.2% was spent for special cases.

Of the total amount, \$58,737.24, spent for new bridges and culverts, \$42,096.53 or 71.6% was spent for permanent work and \$16,640.71 or 28.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 48 concrete box culverts, \$17,879.96; 15 circular concrete culverts, \$2,165.31; 1 concrete deck girder, \$2,509.00; 2 pony trusses with concrete abutments, \$19,542.26; 1 corrugated pipe without headwalls, \$11.70; 22 wood pile bridges, \$11,531.04; 6 miscellaneous bridges and culverts, \$5,097.97.

#### PAGE COUNTY.

##### Roads.

The total county road expenditure was \$38,937.53, of which \$17,317.54 or 44.4% was spent for permanent work; \$1,313.60 or 3.4% was spent for temporary work; \$6,102.67 or 15.7% was spent for repairs; \$7,960.27 or 20.5% was spent for maintenance; \$1,641.14 or 4.2% was spent for equipment and unused material, and \$4,602.31 or 11.8% was spent for special cases.

No roads were built to permanent grade. 4 miles were built to temporary grade at a cost of \$16,395.02. 12.95 miles were built to natural grade at a cost of \$1,313.60. No roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$76.72 per mile of county road. The total average expenditure per mile of county road was \$212.42.

Of the 183.3 miles in the county road system none were patrolled.

The total township road expenditure as shown by reports from all of the 16 townships was \$39,634.61.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$81,163.30, of which \$34,063.12 or 41.9% was spent for permanent bridges and culverts; \$9,627.71 or 11.9% was spent for temporary bridges and culverts; \$17,918.94 or 22.0% was spent for repairs; \$8,505.60 or 10.5% was spent for culvert material for townships; \$983.82 or 1.2% was spent for equipment and unused materials; \$6,790.49 or 8.3% was spent for filling bridges and culverts, and \$6,273.62 or 7.7% was spent for special cases.

Of the total amount \$43,690.83 spent for new bridges and culverts \$34,063.12 or 77.9% was spent for permanent work and \$9,627.71 or 22.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 29 concrete box culverts, \$33,003.91; 2 concrete pipe with headwalls, \$720.20; 1 boiler pipe culvert with headwalls, \$339.01; 6 concrete pipe without headwalls, \$612.16; 8 corrugated pipe without headwalls, \$276.10; 2 high trusses on piling—wood floor—\$7,819.80; 2 wood pile bridges, \$919.65.

#### PALO ALTO COUNTY.

##### Roads.

The total county road expenditure was \$30,355.17, of which \$8,942.19 or 29.4% was spent for permanent work; \$2,275.00 or 7.5% was spent for repairs; \$11,519.15 or 37.9% was spent for maintenance; \$1,839.30 or 6.1% was spent for equipment and unused material and \$5,779.53 or 19.1% was spent for special cases.

1.9 miles were built to permanent grade at a cost of \$5,311.01. No roads were built to temporary or natural grade and none were surfaced.

The county road system was dragged an average of 42.5 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost

of repairs and maintenance was \$82.75 per mile of county road. The total average expenditure per mile of county road was \$182.11.

Of the 166.69 miles in the county road system, 94 were patrolled, there being 7 districts with an average length of 13.4 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was \$27,996.35.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$87,123.75, of which \$60,574.39 or 69.4% was spent for permanent bridges and culverts; \$2,626.33 or 3.0% was spent for temporary bridges and culverts; \$779.88 or 0.9% was spent for repairs; \$2,605.07 or 3.0% was spent for culvert material for townships; \$3,119.37 or 3.6% was spent for equipment and unused materials; \$9,849.43 or 11.4% was spent for filling bridges and culverts and \$7,569.28 or 8.7% special cases.

Of the total amount \$63,200.72 spent for new bridges and culverts \$60,574.39 or 95.8% was spent for permanent work; \$2,626.33 or 4.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 12 concrete box culverts, \$14,905.00; 4 concrete slab bridges, \$8,205.60; 60 I-beam spans on concrete abutments, \$27,380.13; 1 pony truss with concrete abutments, \$4,863.00; 1 high steel truss on concrete abutments, \$5,220.66; 59 corrugated pipe without headwalls, \$1,066.54; 1 wood pile bridge, \$457.55 and 9 miscellaneous bridges and culverts, \$1,102.24.

#### PLYMOUTH COUNTY.

##### Roads.

The total county road expenditure was \$39,931.66, of which \$657.27 or 1.7% was spent for permanent work; \$4,592.70 or 11.5% was spent for temporary work; \$21,545.34 or 54.0% was spent for repairs; \$11,106.17 or 27.8% was spent for maintenance; \$1,308.18 or 3.2% was spent for equipment and unused material and \$722.00 or 1.8% was spent for special cases.

No roads were built to permanent or temporary grade. 12 miles were built to natural grade at a cost of \$4,592.70. No roads were surfaced.

The county road system was dragged an average of 26 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$151.87 per mile of county road. The total average expenditure per mile of county road was \$185.72.

Of the 215 miles in the county road system, 20 were patrolled, there being one district with an average length of 20 miles.

The total township road expenditure as shown by reports from 23 of the 24 townships was \$60,374.53.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$46,741.57, of which \$2,471.26 or 5.3% was spent for permanent bridges and culverts; \$11,246.14 or 24.0% was spent for temporary bridges and culverts; \$20,767.17 or 44.5% was spent for repairs; \$3,484.80 or 7.4% was spent for culvert material for townships; \$6,783.70 or 14.5% was spent for equipment and unused materials and \$1,988.50 or 4.3% was spent for filling bridges and culverts.

Of the total amount \$13,717.40 spent for new bridges and culverts \$2,471.26 or 18.0% was spent for permanent work and \$11,246.14 or 82.0% was spent for special cases.

The amounts last above referred to were spent on the following construction: 3 concrete box culverts, \$2,290.09; 1 pony truss with concrete abutments, \$181.17; 10 concrete pipe without headwalls, \$319.90; 5 corrugated pipe without headwalls, \$158.33 and 37 wood pile bridges, \$10,767.91.

## POCAHONTAS COUNTY.

**Roads.**

The total county road expenditure was \$79,792.86, of which \$39,263.50 or 49.0% was spent for permanent work; \$6,482.63 or 8.1% was spent for repairs; \$16,907.09 or 21.2% was spent for maintenance; \$12,562.83 or 15.9% was spent for equipment and unused material and \$4,576.81 or 5.8% was spent for special cases.

7.3 miles were built to permanent grade at a cost of \$11,106.85. No roads were built to temporary or natural grade. 17.2 miles were surfaced with gravel at a cost of \$25,249.78.

The county road system was dragged an average of 38.4 times, the average cost of dragging being \$0.98 per mile one round trip. The average cost of repairs and maintenance was \$135.14 per mile of county road. The total average expenditure per mile of county road was \$461.02.

Of the 173.08 miles in the county road system, 168 were patrolled, there being 12 districts with an average length of 14 miles.

The total township road expenditure as shown by reports from 17 of the 18 townships was \$60,320.03.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$25,393.00, of which \$9,632.20 or 37.9% was spent for permanent bridges and culverts; \$7,358.78 or 28.9% was spent for temporary bridges and culverts; \$4,686.06 or 18.5% was spent for repairs; \$2,059.48 or 8.1% was spent for culvert material for townships; \$902.92 or 3.6% was spent for equipment and unused materials; \$303.56 or 1.2% was spent for filling bridges and culverts and \$450.00 or 1.8% was spent for special cases.

Of the total amount \$16,990.98 spent for new bridges and culverts, \$9,632.20 or 56.6% was spent for permanent work and \$7,358.78 or 43.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 5 concrete box culverts, \$2,374.11; 1 concrete slab bridge, \$817.34; 1 concrete deck girder, \$3,677.54; 2 I-beam spans on concrete abutments, \$2,763.21; 50 corrugated pipe without headwalls, \$1,073.00; 12 wood pile bridges, \$5,477.90, and miscellaneous bridges and culverts, \$897.88.

## POLK COUNTY.

**Roads.**

The total county road expenditure was \$117,089.84, of which \$105,436.73 or 89.5% was spent for permanent work; \$11,148.76 or 9.5% was spent for repairs; \$45,770.48 or 39.1% was spent for maintenance; \$7,038.01 or 6.0% was spent for equipment and unused material, and \$7,695.86 or 6.6% was spent for special cases.

25.25 miles were built to permanent grade at a cost of \$80,378.35. No roads were built to temporary or natural grade. 18.50 miles were surfaced with gravel at a cost of \$24,599.02.

The county road system was dragged an average of 25 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$296.45 per mile of county road. The total average expenditure per mile of county road was \$922.34.

Of the 192 miles in the county road system all were patrolled, there being 18 districts with an average length of 10.5 miles.

The total township road expenditure as shown by reports from all of the 19 townships was \$49,691.60.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$112,857.93, of which \$64,982.28 or 57.4% was spent for permanent bridges and culverts; \$8,666.41 or 7.7% was spent for temporary bridges and culverts;

\$17,135.85 or 15.3% was spent for repairs; \$10,554.21 or 9.4% was spent for culvert material for townships; \$5,080.74 or 4.5% was spent for equipment and unused materials; \$6,199.44 or 5.5% was spent for filling bridges and culverts, and \$239.00 or 0.2% was spent for special cases.

Of the total amount \$73,648.69 spent for new bridges and culverts \$64,982.28 or 88.2% was spent for permanent work and \$8,666.41 or 11.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 76 concrete box culverts, \$54,028.58; 1 headwall on culvert previously constructed, \$801.00; 1 concrete slab bridge, \$3,899.10; 1 concrete deck girder, \$6,253.60; 14 concrete pipe without headwalls, \$2,303.31; 160 corrugated pipe without headwalls, \$3,079.20; 7 wood pile bridges, \$2,748.90; 2 miscellaneous bridges and culverts, \$535.00.

## POTTAWATTAMIE COUNTY.

**Roads.**

The total county road expenditure was \$65,890.09, of which \$14,799.61 or 22.4% was spent for temporary work; \$24,050.01 or 36.5% was spent for repairs; \$18,820.06 or 28.6% was spent for maintenance; \$7,419.58 or 11.3% was spent for equipment and unused material; and \$800.83 or 1.2% was spent for special cases.

No roads were built to permanent or temporary grade. 10.5 miles were built to natural grade at a cost of \$1,307.90. No roads were surfaced.

The county road system was dragged an average of 31 times, the average cost of dragging being \$1.80 per mile one round trip. The average cost of repairs and maintenance was \$158.15 per mile of county road. The total average expenditure per mile of county road was \$243.06.

The total township road expenditure as shown by reports from 11 of the 28 townships was \$27,677.47.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$156,323.67, of which \$54,002.39 or 34.5% was spent for permanent bridges and culverts; \$48,980.19 or 31.3% was spent for temporary bridges and culverts; \$20,243.84 or 12.9% was spent for repairs; \$279.27 or 0.2% was spent for culvert material for townships; \$14,795.56 or 9.5% was spent for equipment and unused materials; \$9,967.46 or 6.4% was spent for filling bridges and culverts and \$8,054.96 or 5.2% was spent for special cases.

Of the total amount \$102,982.58 spent for new bridges and culverts \$54,002.39 or 52.6% was spent for permanent work and \$48,980.19 or 47.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts, \$8,390.33; 91 concrete pipe with headwalls, \$44,772.02; 3 headwalls on culverts previously constructed, \$840.04; 4 concrete pipe without headwalls, \$554.21; 8 corrugated pipe without headwalls, \$245.84; 5 I-beam spans on piling abutments, \$3,703.04; 5 pony trusses on piling—wood floors—\$12,920.56; 89 wood pile bridges, \$31,215.39 and 17 miscellaneous bridges and culverts, \$341.15.

## POWESHIEK COUNTY.

**Roads.**

The total county road expenditure was \$32,262.04, of which \$1,681.97 or 5.2% was spent for permanent work; \$10,703.02 or 33.2% was spent for repairs; \$17,157.19 or 53.2% was spent for maintenance; \$2,336.67 or 7.2% was spent for equipment and unused material and \$383.19 or 1.2% was spent for special cases.

No roads were built to permanent grade. 0.1 mile was built to temporary grade at a cost of \$1,173.62. No roads were built to natural grade and none surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$176.33 per mile of county road. The total average expenditure per mile of county road was \$204.19.

Of the 158 miles in the county road system, all were patrolled, there being 10 districts with an average length of 15.8 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$51,331.21.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$51,927.59, of which \$13,265.04 or 25.4% was spent for permanent bridges and culverts; \$8,186.74 or 15.8% was spent for temporary bridges and culverts, \$20,117.14 or 38.7% was spent for repairs; \$7,320.15 or 14.2% was spent for culvert material for townships; \$665.96 or 1.3% was spent for equipment and unused materials; \$1,904.71 or 3.7% was spent for filling bridges and culverts and \$467.85 or 0.9% was spent for special cases.

Of the total amount, \$21,451.78 spent for new bridges and culverts, \$13,265.04 or 61.8% was spent for permanent work and \$8,186.74 or 38.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 14 concrete box culverts, \$10,373.47; 3 circular concrete culverts, \$862.99; 6 headwalls on culverts previously constructed, \$214.11; 1 I-beam span on concrete abutments, \$1,815.17; 1 concrete pipe without headwalls, \$175.35; 42 corrugated pipe without headwalls, \$2,206.98 and 16 wood pile bridges, \$5,804.41.

#### RINGGOLD COUNTY.

##### Roads.

The total county road expenditure was \$26,304.22, of which \$15,576.42 or 59.2% was spent for repairs; \$7,908.80 or 30.1% was spent for maintenance; \$1,004.35 or 3.8% was spent for equipment and unused material and \$1,814.65 or 6.9% was spent for special cases.

No roads were built to permanent, temporary or natural grade and none were surfaced.

The county road system was dragged an average of 24 times, the average cost of dragging being \$0.70 per mile one round trip. The average cost of repairs and maintenance was \$126.95 per mile of county road. The total average expenditure per mile of county road was \$142.18.

Of the 185 miles in the county road system, 75 were patrolled, there being 3 districts with an average length of 25 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was \$16,163.80.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$96,773.24, of which \$59,322.80 or 61.3% was spent for permanent bridges and culverts; \$10,379.00 or 10.7% was spent for temporary bridges and culverts; \$13,738.18 or 14.2% was spent for repairs; \$3,155.62 or 3.3% was spent for culvert material for townships; \$4,854.00 or 5.0% was spent for equipment and unused materials; \$5,073.36 or 5.2% was spent for filling bridges and culverts and \$250.28 or 0.3% was spent for special cases.

Of the total amount, \$69,701.80 spent for new bridges and culverts, \$59,322.80 or 85.1% was spent for permanent work and \$10,379.00 or 14.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 48 concrete box culverts, \$34,876.35; 32 circular concrete culverts, \$9,415.09; 18 concrete pipe with headwalls, \$4,052.23; 1 I-beam span on concrete abutments, \$2,667.63; 1 pony truss with concrete abutments, \$8,311.50; 21 concrete pipe without headwalls, \$1,594.80; 1 pony truss on piling, wood floor, \$873.82, and 36 wood pile bridges, \$7,910.38.

#### SAC COUNTY.

##### Roads.

The total county road expenditure was \$31,881.25, of which \$7,587.77 or 24.7% was spent for permanent work; \$9,249.74 or 29.0% was spent for repairs; \$11,008.56 or 34.5% was spent for maintenance; \$705.63 or 2.2% was spent for equipment and unused material and \$3,059.55 or 9.6% was spent for special cases.

No roads were built to permanent grade. 3.06 miles were built to temporary grade at a cost of \$4,833.23. No roads were built to natural grade. 1.19 miles were surfaced with gravel at a cost of \$1,101.15.

The county road system was dragged an average of 32 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$134.29 per mile of county road. The total average expenditure per mile of county road was \$211.34.

Of the 150.85 miles in the county road system, 62 were patrolled, there being 5 districts with an average length of 12.5 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$50,339.83.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$54,476.57, of which \$41,322.68 or 75.8% was spent for permanent bridges and culverts; \$1,457.94 or 2.7% was spent for temporary bridges and culverts; \$4,357.73 or 7.9% was spent for repairs; \$2,072.80 or 3.8% was spent for culvert material for townships; \$1,771.93 or 3.3% was spent for equipment and unused materials; \$956.85 or 1.8% was spent for filling bridges and culverts and \$2,536.64 or 4.7% was spent for special cases.

Of the total amount \$42,780.62 spent for new bridges and culverts, \$41,322.68 or 96.6% was spent for permanent work and \$1,457.94 or 3.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 43 concrete box culverts, \$27,474.52; 1 circular concrete culvert, \$1,256.43; 6 concrete arch culverts, \$839.22; 5 I-beam spans on concrete abutments, \$11,111.99; 1 pony truss with concrete abutments, \$640.52; 15 corrugated pipe without headwalls, \$753.86; and 2 wood pile bridges, \$704.08.

#### SCOTT COUNTY.

##### Roads.

The total county road expenditure was \$52,642.40, of which \$19,664.87 or 37.3% was spent for permanent work; \$15,376.41 or 29.3% was spent for temporary work; \$642.95 or 1.2% was spent for repairs; \$11,007.18 or 20.9% was spent for maintenance; \$5,890.99 or 11.2% was spent for equipment and unused material and \$60.00 or 0.1% was spent for special cases.

4.83 miles were built to permanent grade at a cost of \$12,747.58. No roads were built to temporary grade. 39 miles were built to natural grade at a cost of \$2,384.60. 3 miles were surfaced with macadam at a cost of \$4,546.65.

The county road system was dragged an average of 27 times, the average cost of dragging being \$0.48 per mile one round trip. The average cost of repairs and maintenance was \$84.32 per mile of county road. The total average expenditure per mile of county road was \$331.02.

Of the 138.16 miles in the county road system, 123.5 were patrolled, there being 7 districts with an average length of 17.64 miles.

The total township road expenditure as shown by reports from all of the 15 townships was \$35,993.42.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 was \$69,740.56, of which \$46,819.18 or 67.2% was spent for permanent bridges and culverts; \$984.42 or 1.4% was spent for temporary bridges and culverts; \$7,379.22 or 10.6% was spent for repairs; \$1,512.62 or 2.2% was spent for culvert material for townships; \$7,647.22 or 10.9% was spent for equipment and unused materials; \$1,265.10 or 1.8% was spent for filling bridges and culverts and \$4,132.80 or 5.9% was spent for special cases.

Of the total amount, \$47,803.60 spent for new bridges and culverts, \$46,819.18 or 97.6% was spent for permanent work and \$984.42 or 2.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 36 concrete box culverts, \$35,068.43; 5 circular concrete culverts, \$928.84; 1 headwall on culvert previously constructed, \$357.60; 2 concrete slab bridges, \$2,663.76; 1 concrete deck girder, \$2,894.20; 1 retaining wall, \$1,590.75; 1 I-beam span on concrete abutments, \$3,315.60; 44 corrugated pipe without headwalls, \$964.62; 1 boiler pipe culvert without headwall, \$19.80.

#### SHELBY COUNTY.

##### Roads.

The total county road expenditure was \$15,352.54, of which \$518.15 or 3.3% was spent for temporary work; \$4,731.73 or 30.9% was spent for repairs; \$9,121.01 or 59.4% was spent for maintenance; \$692.95 or 4.5% was spent for equipment and unused material and \$288.70 or 1.9% was spent for special cases.

No roads were built to permanent or temporary grade. 4 miles were built to natural grade at a cost of \$518.15. No roads were surfaced.

The county road system was dragged an average of 50 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$87.81 per mile of county road. The total average expenditure per mile of county road was \$97.32.

Of the 157.75 miles in the county road system, all were patrolled, there being 8 districts with an average length of 20 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$54,104.32.

#### Bridges.

The total expenditure for bridge and culvert work during 1920 was \$79,758.01, of which \$19,558.60 or 24.4% was spent for permanent bridges and culverts; \$18,713.66 or 23.5% was spent for temporary bridges and culverts; \$17,639.58 or 22.2% was spent for repairs; \$4,334.44 or 5.4% was spent for culvert material for townships; \$4,402.31 or 5.5% was spent for equipment and unused materials; \$13,446.72 or 16.9% was spent for filling bridges and culverts and \$1,662.70 or 2.1% was spent for special cases.

Of the total amount, \$38,272.26 spent for new bridges and culverts, \$19,558.60 or 51.2% was spent for permanent work and \$18,713.66 or 48.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 10 concrete box culverts, \$16,596.74; 1 headwall on culvert previously constructed, \$792.86; 1 concrete deck girder, \$2,169.00; 2 concrete pipe without headwalls, \$324.00; 8 corrugated pipe without headwalls, \$532.80, and 34 wood pile bridges, \$17,856.86.

#### SIoux COUNTY.

##### Roads.

The total county road expenditure was \$43,490.95, of which \$8,135.61 or 18.7% was spent for permanent work; \$10,957.35 or 25.2% was spent for temporary work; \$2,665.08 or 6.1% was spent for repairs; \$10,008.78 or 23.0% was spent for maintenance; \$10,037.77 or 23.1% was spent for equipment and unused material and \$1,686.36 or 3.9% was spent for special cases.

10 miles were built to permanent grade at a cost of \$7,018.05. 0.37 mile was built to temporary grade at a cost of \$1,117.56. 29.5 miles were built to natural grade at a cost of \$10,957.35. No roads were surfaced.

The county road system was dragged an average of 17.69 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$58.67 per mile of county road. The total average expenditure per mile of county road was \$201.35.

Of the 216 miles in the county road system, 126 were patrolled, there being 7 districts with an average length of 18 miles.

The total township road expenditure as shown by reports from all of the 23 townships was \$52,027.07.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$45,058.48, of which \$14,262.34, or 31.5% was spent for permanent bridges and culverts; \$9,703.44 or 21.5% was spent for temporary bridges and culverts; \$17,158.86 or 38.1% was spent for repairs; \$2,257.47 or 5.2% was spent for culvert material for townships; \$244.90 or 0.5% was spent for equipment and unused materials; \$134.55 or 0.3% was spent for filling bridges and culverts and \$1,296.92 or 2.9% was spent for special cases.

Of the total amount, \$23,965.78 spent for new bridges and culverts, \$14,262.34 or 59.5% was spent for permanent work and \$9,703.44 or 40.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts, \$11,810.64; 1 concrete slab bridge, \$506.16; 2 concrete deck girders, \$100.00; 1 I-beam span on concrete abutments, \$1,845.54; 5 corrugated pipe without headwalls, \$304.99; 11 wood pile bridges, \$9,018.34, and 13 miscellaneous bridges and culverts, \$380.11.

#### STORY COUNTY.

##### Roads.

The total county road expenditure was \$90,848.68, of which \$57,742.85 or 63.6% was spent for permanent work; \$5,179.65 or 5.6% was spent for repairs; \$16,884.63 or 18.6% was spent for maintenance; \$3,137.35 or 3.4% was spent for equipment and unused material and \$7,904.20 or 8.8% was spent for special cases.

No roads were built to permanent, temporary or natural grade. 27 miles were surfaced with gravel at a cost of \$46,765.06.

The county road system was dragged an average of 39 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$159.31 per mile of county road. The total average expenditure per mile of county road was \$655.94.

Of the 138.5 miles in the county road system, all were patrolled, there being 7 districts with an average length of 19.8 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was \$48,094.10.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$59,950.48, of which \$28,289.31 or 47.3% was spent for permanent bridges and culverts; \$5,238.27 or 8.7% was spent for temporary bridges and culverts; \$19,070.60 or 31.7% was spent for repairs; \$3,296.04 or 5.5% was spent for

culvert material for townships; \$2,414.96 or 4.0% was spent for equipment and unused materials; \$1,364.30 or 2.3% was spent for filling bridges and culverts, and \$277.00 or 0.5% was spent for special cases.

Of the total amount, \$33,527.58 spent for new bridges and culverts, \$28,289.31 or 84.4% was spent for permanent work and \$5,238.27 or 15.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 57 concrete box culverts, \$11,348.10; 21 circular concrete culverts, \$1,396.50; 7 I-beam spans on concrete abutments, \$7,397.05; 2 steel girders on concrete abutments, \$8,147.66 and 2 wood pile bridges, \$5,238.27.

#### TAMA COUNTY.

##### Roads.

The total county road expenditure was \$37,517.73, of which \$5,097.66 or 13.6% was spent for permanent work; \$5,370.63 or 14.3% was spent for temporary work; \$7,025.60 or 18.8% was spent for repairs; \$14,958.66 or 39.9% was spent for maintenance; \$2,635.62 or 7.0% was spent for equipment and unused material and \$2,429.56 or 6.4% was spent for special cases.

Roads were built to permanent grade at a cost of \$4,662.40. No roads were built to temporary grade. 38.95 miles were built to natural grade at a cost of \$5,130.63. No roads were surfaced.

The county road system was dragged an average of 20.5 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$104.69 per mile of county road. The total average expenditure per mile of county road was \$178.66.

Of the 210 miles in the county road system, all were patrolled, there being 10 districts with an average length of 21 miles.

The total township road expenditure as shown by reports from 20 of the 21 townships was \$62,246.62.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$100,461.11, of which \$65,211.83 or 65.0% was spent for permanent bridges and culverts; \$7,848.77 or 7.8% was spent for temporary bridges and culverts; \$22,825.67 or 22.7% was spent for repairs; \$3,430.84 or 3.4% was spent for culvert material for townships; \$118.83 or 0.1% was spent for equipment and unused materials; \$583.93 or 0.6% was spent for filling bridges and culverts, and \$441.24 or 0.4% was spent for special cases.

Of the total amount \$73,060.60 spent for new bridges and culverts, \$65,211.83 or 89.2% was spent for permanent work, and \$7,848.77 or 10.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 42 concrete box culverts, \$44,231.26; 2 concrete slab bridges, \$2,976.51; 2 concrete abutments, \$5,358.18; 1 retaining wall, \$47.60; 2 I-beam spans on concrete abutments, \$5,734.81; 2 pony trusses with concrete abutments, \$6,863.47; 1 concrete pipe without headwalls, \$990.73; 2 corrugated pipe without headwalls, \$78.70; 3 cast iron pipe without headwalls, \$2,351.37 and 75 wood pile bridges, \$4,427.97.

#### TAYLOR COUNTY.

##### Roads.

The total county road expenditure was \$22,135.16, of which \$1,225.00 or 5.5% was spent for temporary work; \$13,862.28 or 62.6% was spent for repairs; \$5,999.35 or 27.2% was spent for maintenance; \$1,048.53 or 4.7% was spent for equipment and unused material.

No roads were built to permanent or temporary grade. 10 miles were built to natural grade at a cost of \$1,225.00. No roads were surfaced.

The county road system was dragged an average of 47.61 times, the average cost of dragging being \$0.70 per mile one round trip. The average cost of repairs and maintenance was \$108.53 per mile of county road. The total average expenditure per mile of county road was \$120.96.

Of the 183 miles in the county road system none were patrolled.

The total township road expenditure as shown by reports from all of the 17 townships was \$33,519.09.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$46,881.80, of which \$16,595.02 or 35.5% was spent for permanent bridges and culverts; \$2,221.80 or 4.8% was spent for temporary bridges and culverts; \$10,761.47 or 22.8% was spent for repairs; \$1,018.85 or 2.2% was spent for culvert material for townships; \$8,173.61 or 17.4% was spent for equipment and unused materials; \$7,465.05 or 15.9% was spent for filling bridges and culverts and \$646.00 or 1.4% was spent for special cases.

Of the total amount, \$18,816.82 spent for new bridges and culverts, \$16,595.02 or 88.2% was spent for permanent work and \$2,221.80 or 11.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 13 concrete box culverts, \$12,081.07; 39 concrete pipe with headwalls, \$4,370.36; 2 headwalls on culverts previously constructed, \$143.59, and 21 wood pile bridges, \$2,221.80.

#### UNION COUNTY.

##### Roads.

The total country road expenditure was \$15,690.80, of which \$528.00 or 3.4% was spent for temporary work; \$8,959.37 or 57.0% was spent for repairs; \$4,937.74 or 31.4% was spent for maintenance; \$1,265.69 or 8.2% was spent for equipment and unused material.

No roads were built to permanent or temporary grade. 5.5 miles were built to natural grade at a cost of \$528.00. No roads were surfaced.

The county road system was dragged an average of 25.2 times, the average cost of dragging being \$0.80 per mile one round trip. The average cost of repairs and maintenance was \$88.52 per mile of county road. The total average expenditure per mile of county road was \$99.94.

Of the 157 miles in the county road system none were patrolled.

The total township road expenditure as shown by reports from 11 of the 12 townships was \$26,889.58.

##### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$32,644.52, of which \$15,556.60 or 47.6% was spent for permanent bridges and culverts; \$7,510.95 or 23.0% was spent for temporary bridges and culverts; \$2,699.18 or 8.3% was spent for repairs; \$5,862.73 or 18.0% was spent for culvert material for townships; \$578.85 or 1.8% was spent for equipment and unused materials; \$375.90 or 1.1% was spent for filling bridges and culverts and \$60.31 or 0.2% was spent for special cases.

Of the total amount, \$23,066.55 spent for new bridges and culverts, \$15,556.60 or 67.4% was spent for permanent work and \$7,510.95 or 32.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 4 concrete box culverts, \$3,556.68; 30 concrete pipe with headwalls, \$8,959.10; 10 corrugated pipe with headwalls, \$909.04; 1 boiler pipe with headwalls, \$189.75; 1 cast iron pipe with headwalls, \$96.64; 13 headwalls on culverts previously constructed, \$1,066.00; 8 retaining walls, \$779.39; 12 concrete pipe without headwalls, \$1,098.20; 7 corrugated pipe without headwalls, \$350.88; 2 wood pile bridges, \$156.50, and miscellaneous bridges and culverts, \$5,905.37.

## VAN BUREN COUNTY.

**Roads.**

The total county road expenditure was \$12,956.91, of which \$4,338.25 or 33.0% was spent for repairs; \$5,567.12 or 43.0% was spent for maintenance; \$1,951.83 or 14.3% was spent for equipment and unused material and \$269.71 or 1.7% was spent for special cases.

No roads were built to permanent, temporary or natural grade and none surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$6.99 per mile one round trip. The average cost of repairs and maintenance was \$74.23 per mile of county road. The total average expenditure per mile of county road was \$96.45.

Of the 123.3 miles in the county road system, none were patrolled.

The total township road expenditure as shown by reports from all of the 14 townships was \$25,753.50.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$35,869.82, of which \$9,863.28 or 27.5% was spent for permanent bridges and culverts; \$1,332.95 or 3.7% was spent for temporary bridges and culverts; \$12,495.61 or 33.2% was spent for repairs; \$4,612.66 or 12.8% was spent for culvert material for townships; \$1,063.20 or 3.5% was spent for equipment and unused materials; \$2,396.92 or 6.6% was spent for filling bridges and culverts, and \$966.99 or 2.7% was spent for special cases.

Of the total amount, \$11,195.34 spent for new bridges and culverts, \$9,863.28 or 88.9% was spent for permanent work and \$1,332.95 or 11.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 15 concrete box culverts, \$7,866.53; 1 boiler pipe culvert with headwalls, \$217.15; 1 concrete abutment, \$1,450.69; 1 I-beam span on concrete abutment, \$329.00; 2 boiler pipe without headwalls, \$28.00; 3 wood pile bridges, \$989.75 and 1 miscellaneous bridge, \$314.30.

## WAPELLO COUNTY.

**Roads.**

The total county road expenditure was \$27,829.78, of which \$2,111.11 or 7.6% was spent for permanent work; \$4,672.14 or 16.8% was spent for repairs; \$14,586.94 or 52.3% was spent for maintenance; \$5,328.79 or 19.2% was spent for equipment and unused material, and \$1,122.70 or 4.1% was spent for special cases.

No roads were built to permanent, temporary or natural grades and no roads were surfaced.

The county road system was dragged an average of 70.7 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$149.44 per mile of county road. The total average expenditure per mile of county road was \$202.87.

All of the 137.13 miles in the county road system were patrolled, there being 19 districts with an average length of 7.22 miles.

The total township road expenditure as shown by reports from all of the 14 townships was \$34,245.74.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$71,786.14, of which \$34,990.05 or 47.5% was spent for permanent bridges and culverts; \$5,374.40 or 7.5% was spent for temporary bridges and culverts; \$12,612.61 or 17.6% was spent for repairs; \$11,092.84 or 15.5% was spent for culvert material for townships; \$5,384.13 or 7.5% was spent for equipment and unused materials; \$2,306.51 or 3.5% was spent for filling bridges and culverts, and \$1,429.50 or 2.0% was spent for special cases.

Of the total amount, \$39,366.45, spent for new bridges and culverts, \$34,990.05 or 86.6% was spent for permanent work, and \$5,374.40 or 13.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 13 concrete box culverts, \$10,551.15; 37 concrete pipe with headwalls, \$10,262.76; 4 concrete slab bridges, \$12,739.34; 1 I-beam span on concrete abutments, \$245.80; 10 wood pile bridges, \$5,374.40.

## WARREN COUNTY.

**Roads.**

The total county road expenditure was \$25,775.07, of which \$185.72 or 0.7% was spent for permanent work; \$11,115.65 or 43.1% was spent for repairs; \$11,636.86 or 45.2% was spent for maintenance; \$2,392.06 or 9.3% was spent for equipment and unused material, and \$442.78 or 1.7% was spent for special cases.

No roads were built to permanent, temporary, or natural grades and no roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$6.99 per mile one round trip. The average cost of repairs and maintenance was \$134.83 per mile of county road. The total average expenditure per mile of county road was \$152.73.

Of the 168.75 miles in the county road system 136 were patrolled, there being 2 districts with an average length of 68 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was \$28,184.96.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$47,422.30, of which \$15,431.93 or 32.6% was spent for permanent bridges and culverts; \$5,871.62 or 12.4% was spent for temporary bridges and culverts; \$11,078.38 or 23.2% was spent for repairs; \$3,184.38 or 6.7% was spent for culvert material for townships; \$1,388.56 or 2.9% was spent for equipment and unused materials; \$6,131.51 or 13.0% was spent for filling bridges and culverts, and \$4,348.92 or 9.2% was spent for special cases.

Of the total amount, \$21,303.55, spent for new bridges and culverts, \$15,431.93 or 72.5% was spent for permanent work and \$5,871.62 or 27.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 9 concrete box culverts, \$9,848.59; 3 circular concrete culverts, \$97.25; 1 concrete pipe with headwalls, \$85.49; 2 cast iron pipe with headwalls, \$162.54; 1 I-beam span on concrete abutments, \$350.00; 1 pony truss with concrete abutments, \$1,137.32; 1 high steel truss on concrete abutments, \$2,209.50; 5 corrugated pipe without headwalls, \$141.73; 18 wood pile bridges, \$5,976.17; 7 miscellaneous bridges and culverts, \$623.72.

## WASHINGTON COUNTY.

**Roads.**

The total county road expenditure was \$35,227.33 of which \$7,088.62 or 19.5% was spent for temporary work; \$818.36 or 2.1% was spent for repairs; \$23,886.67 or 75.5% was spent for maintenance; \$1,295.25 or 3.4% was spent for equipment and unused material; \$138.43 or 0.6% was spent for special cases.

55.32 miles were built to natural grade at a cost of \$7,088.62. No roads were built to permanent or temporary grade, and none were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being \$6.99 per mile one round trip. The average cost of repairs and maintenance was \$154.31 per mile of county road. The total average expenditure per mile of county road was \$198.58.



Of the 192.5 miles in the county road system, all were patrolled, there being 15 districts with an average length of 12.83 miles.

The total township road expenditure as shown by reports from 9 of the 15 townships was \$32,914.91.

#### Bridges.

The total expenditures for bridge and culvert work during 1919 were \$53,176.69 of which \$40,557.53 or 76.5% was spent for permanent bridges and culverts; \$9,554.58 or 18.2% was spent for repairs; \$2,815.16 or 4.8% was spent for culvert material for townships; \$4,798.87 or 8.1% was spent for equipment and unused materials; \$900.55 or 1.5% was spent for filling bridges and culverts; \$550.90 or 0.9% was spent for special cases.

Of the total amount \$40,557.53 spent for new bridges and culverts, \$40,557.53 or 100% was spent for permanent work.

The amounts last above referred to were spent on the following construction: 37 concrete box culverts, \$37,034.99; 1 concrete slab bridge, \$3,522.54.

#### WAYNE COUNTY.

#### Roads.

The total county road expenditure was \$27,635.96 of which \$7,597.60 or 27.5% was spent for permanent work; \$2,576.95 or 9.4% was spent for temporary work; \$2,621.44 or 9.5% was spent for repairs; \$11,979.24 or 43.3% was spent for maintenance; \$2,356.13 or 8.6% was spent for equipment and unused material, and \$504.61 or 1.7% was spent for special cases.

0.5 miles were built to permanent grade at a cost of \$6,070.95. 0.13 miles were built to temporary grade at a cost of \$1,526.65; 32.25 miles were built to natural grade at a cost of \$2,576.95. No roads were surfaced.

The county road system was dragged an average of 38 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$84.40 per mile of county road. The total average expenditure per mile of county road was \$159.75.

Of the 173 miles in the county road system all were patrolled, there being 6 districts with an average length of 28.9 miles.

The total township road expenditure as shown by reports from 10 of the 16 townships was \$19,450.56.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$43,715.97, of which \$1,886.35 or 4.3% was spent for permanent bridges and culverts; \$5,491.48 or 12.6% was spent for temporary bridges and culverts; \$3,392.49 or 7.8% was spent for repairs; \$6,925.50 or 15.8% was spent for culvert material for townships; \$821.89 or 2.0% was spent for equipment and unused material; \$18,810.90 or 43.0% was spent for filling bridges and culverts; \$2,377.36 or 5.4% was spent for special cases.

Of the total amount, \$10,377.52, spent for new bridges and culverts, \$1,886.35 or 18.0% was spent for permanent work, and \$8,491.48 or 82.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 1 I-beam span on concrete abutments, \$1,886.35; 26 concrete pipe without headwalls, \$1,922.76; 1 cast iron pipe without headwalls, \$27.50; 23 wood pile bridges, \$6,541.22.

#### WEBSTER COUNTY.

#### Roads.

The total county road expenditure was \$82,095.55, of which \$53,295.90 or 64.1% was spent for permanent work; \$395.50 or 0.5% was spent for temporary work; \$4,895.95 or 5.9% was spent for repairs; \$15,006.05 or 18.1% was spent for maintenance; \$1,305.86 or 1.6% was spent for equipment and unused material and \$3,193.29 or 3.8% was spent for special cases.

3 miles were built to permanent grade at a cost of \$6,401.78. No roads were built to temporary grade. 2.61 miles were built to natural grade at a cost of \$395.50. 15.3 miles were surfaced with gravel at a cost of \$39,711.93.

The county road system was dragged an average of 48 times, the average cost of dragging being \$1.90 per mile one round trip. The average cost of repairs and maintenance was \$106.29 per mile of county road. The total average expenditure per mile of county road was \$443.77.

Of the 137.25 miles in the county road system, all were patrolled, there being 4 districts with an average length of 46.81 miles.

The total township road expenditure as shown by reports from 21 of the 23 townships was \$78,256.21.

#### Bridges.

The total expenditure for bridge and culvert work during 1919 was \$7,672.19, of which \$28,258.80 or 59.4% was spent for permanent bridges and culverts; \$1,204.32 or 2.5% was spent for temporary bridges and culverts; \$4,529.78 or 9.5% was spent for repairs; \$3,078.32 or 6.4% was spent for culvert material for townships; \$7,213.45 or 15.1% was spent for equipment and unused materials; \$3,113.45 or 6.5% was spent for filling bridges and culverts and \$274.87 or 0.6% was spent for special cases.

Of the total amount, \$29,462.32 spent for new bridges and culverts, \$28,258.80 or 95.9% was spent for permanent work; and \$1,204.32 or 4.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 17 concrete box culverts, \$11,526.12; 5 concrete pipe with headwalls, \$613.48; 1 extension to cast iron pipe with headwalls, \$380.31; 4 concrete slab bridges, \$11,121.81; 1 concrete deck girder, \$3,536.05; 1 I-beam span on concrete abutments, \$1,080.47; 40 corrugated pipe without headwalls, \$647.86; 1 wood pile bridge, \$61.97, and 3 miscellaneous bridges and culverts, \$494.49.

#### WINNEBAGO COUNTY.

#### Roads.

The total county road expenditure was \$44,227.92, of which \$29,416.95 or 66.4% was spent for permanent work; \$2,416.14 or 5.5% was spent for repairs; \$6,072.72 or 13.7% was spent for maintenance; \$2,844.44 or 6.4% was spent for equipment and unused material, and \$3,478.59 or 8.0% was spent for special cases.

12 miles were built to permanent grade at a cost of \$26,816.90. No roads were built to temporary grade and no roads were built to natural grade. No roads were surfaced.

The county road system was dragged an average of 32.5 times, the average cost of dragging being \$6.75 per mile one round trip. The average cost of repairs and maintenance was \$65.30 per mile of county road. The total average expenditure per mile of county road was \$240.21.

All of the 139 miles in the county road system were patrolled, there being 3 districts with an average length of 46.33 miles.

The total township road expenditure as shown by reports from 11 of the 12 townships was \$35,468.18.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$15,724.32, of which \$4,939.50 or 31.4% was spent for permanent bridges and culverts; \$1,200.00 or 7.6% was spent for temporary bridges and culverts; \$3,843.68 or 23.4% was spent for repairs; \$2,875.50 or 19.3% was spent for culvert material for townships; \$1,659.68 or 10.6% was spent for equipment and unused material, and \$1,206.41 or 7.7% was spent for filling bridges and culverts.

Of the total amount, \$6,139.05, spent for new bridges and culverts, \$4,939.05 or 80.5% was spent for permanent work, and \$1,200.00 or 19.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 6 concrete box culverts, \$1,670.00; 10 circular concrete culverts, \$1,439.32; 1 concrete slab bridge, \$1,829.73; 60 concrete pipe without headwalls, \$1,200.00.

## WINNESHIEK COUNTY.

**Roads.**

The total county road expenditure was \$34,987.99, of which \$1,348.37 or 3.9% was spent for permanent work; \$12,787.30 or 36.5% was spent for temporary work; \$9,978.35 or 22.8% was spent for repairs; \$9,392.74 or 26.8% was spent for maintenance; \$1,838.73 or 5.3% was spent for equipment and unused material, and \$1,642.50 or 4.7% was spent for special cases.

No roads were built to permanent grade and no roads were built to temporary grade. 19.75 miles were built to natural grade at a cost of \$12,299.70. No roads were surfaced.

The county road system was dragged an average of 32.6 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$85.78 per mile of county road. The total average expenditure per mile of county road was \$172.78.

Of the 202.5 miles in the county road system 187.25 were patrolled, there being 35 districts with an average length of 5.35 miles.

The total township road expenditure as shown by reports from 17 of the 20 townships was \$36,992.60.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$70,579.83, of which \$25,116.09 or 35.5% was spent for permanent bridges and culverts; \$7,557.45 or 10.6% was spent for temporary bridges and culverts; \$25,271.61 or 35.7% was spent for repairs; \$333.41 or 0.5% was spent for culvert material for townships; \$4,681.60 or 6.6% was spent for equipment and unused materials; \$3,145.84 or 4.7% was spent for filling bridges and culverts, and \$4,473.83 or 6.4% was spent for special cases.

Of the total amount, \$32,673.54, spent for new bridges and culverts, \$25,116.09 or 76.8% was spent for permanent work and \$7,557.45 or 23.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 48 concrete box culverts, 15,724.37; 4 concrete abutments, \$4,478.50; 1 concrete deck girder, \$2,405.65; 3 I-beam spans on concrete abutments, \$2,507.57; 36 corrugated pipe without headwalls, \$1,231.72; 7 I-beam spans on piling abutments, \$3,867.45; 7 wood pile bridges, \$1,108.37; 4 miscellaneous bridges and culverts, \$1,349.91.

## WOODBURY COUNTY.

**Roads.**

The total county road expenditures was \$36,403.93, of which \$382.24 or 1.1% was spent for permanent work; \$15,373.63 or 42.3% was spent for repairs; \$10,879.13 or 29.8% was spent for maintenance; \$4,200.55 or 11.5% was spent for equipment and unused material and \$5,568.38 or 15.3% was spent for special cases.

No roads were built to permanent, temporary, or natural grade and none were surfaced.

The county road system was dragged an average of 56 times, the average cost of dragging being \$0.90 per mile one round trip. The average cost of repairs and maintenance was \$122.10 per mile of county road. The total average expenditure per mile of county road was \$169.32.

Of the 215 miles in the county road system, none were patrolled.

The total township road expenditure as shown by reports from 21 of the 23 townships was \$60,183.25.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$77,786.94, of which \$20,742.22 or 26.6% was spent for permanent bridges and culverts; \$30,952.16 or 39.8% was spent for temporary bridges and culverts; \$12,910.72 or 16.6% was spent for repairs; \$4,401.07 or 5.7% was spent for culvert material for townships; \$6,816.17 or 8.8% was spent for equipment and unused materials; \$1,327.05 or 1.7% was spent for filling bridges and culverts and \$637.55 or 0.8% was spent for special cases.

Of the total amount, \$51,694.38 spent for new bridges and culverts, \$20,742.22 or 40.0% was spent for permanent work; \$30,952.16 or 60.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 6 concrete box culverts, \$7,939.94; 21 concrete pipe with headwalls, \$3,646.37; 1 boiler pipe culvert with headwalls, \$127.36; 2 headwalls on culverts previously constructed, \$289.42; 1 concrete abutment, \$1,891.13; 1 high steel truss, concrete abutments, \$6,848.00; 110 concrete pipe without headwalls, \$7,501.39; 2 corrugated pipe without headwalls, \$14.17; 1 boiler pipe culvert without headwalls, \$38.12; 13 I-beam spans on piling abutments, \$12,399.73; 1 pony truss on piling, wood floor, \$743.29, and 33 wood pile bridges, \$10,255.46.

## WORTH COUNTY.

**Roads.**

The total county road expenditure was \$44,908.83, of which \$9,001.53 or 20.1% was spent for permanent work; \$1,543.95 or 3.4% was spent for temporary work; \$17,644.98 or 39.3% was spent for repairs; \$3,030.17 or 6.7% was spent for maintenance; \$5,486.20 or 12.2% was spent for equipment and unused material, and \$8,202.00 or 18.3% was spent for special cases.

1.8 miles were built to permanent grade at a cost of \$6,412.48. No roads were built to temporary grade. 4.25 miles were built to natural grade at a cost of \$1,543.95. No roads were surfaced.

The county road system was dragged an average of 27 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$178.33 per mile of county road. The total average expenditure per mile of county road was \$387.34.

Of the 115.94 miles in the county road system 40 were patrolled, there being 2 districts with an average length of 20 miles.

The total township road expenditure as shown by reports from 10 of the 12 townships was \$21,659.38.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$18,780.67, of which \$14,721.83 or 78.2% was spent for permanent bridges and culverts; \$2,196.14 or 11.8% was spent for repairs; \$298.80 or 1.6% was spent for culvert material for townships; \$933.90 or 5.0% was spent for equipment and unused materials, and \$630.00 or 3.4% was spent for special cases.

Of the total amount, \$14,721.83, spent for new bridges and culverts, \$14,721.83 or 100% was spent for permanent work.

The amounts last above referred to were spent on the following construction: 56 concrete box culverts, \$12,819.96; 2 I-beam spans on concrete abutments, \$1,901.87.

## WRIGHT COUNTY.

**Road.**

The total county road expenditure was \$43,476.42, of which \$20,490.09 or 47.0% was spent for permanent work; \$644.34 or 1.5% was spent for temporary work; \$3,819.83 or 8.9% was spent for repairs; \$12,634.27 or 29.3% was spent for maintenance; \$4,562.93 or 10.2% was spent for equipment and unused material, and \$1,324.96 or 3.1% was spent for special cases.

11.25 miles were built to permanent grade at a cost of \$17,590.45. No roads were built to temporary grade. 5.5 miles were built to natural grade at a cost of \$565.15. No roads were surfaced.

The county road system was dragged an average of 32.5 times, the average cost of dragging being \$1.00 per mile one round trip. The average cost of repairs and maintenance was \$91.41 per mile of county road. The total average expenditure per mile of county road was \$241.54.

Of the 180 miles in the county road system, all were patrolled, there being 6 districts with an average length of 30 miles.

The total township road expenditure as shown by reports from all of the 16 townships was \$63,120.28.

**Bridges.**

The total expenditure for bridge and culvert work during 1919 was \$60,040.66, of which \$42,240.76 or 70.3% was spent for permanent bridges and culverts; \$571.81 or 1.0% was spent for temporary bridges and culverts; \$11,780.65 or 19.6% was spent for repairs; \$2,057.92 or 3.4% was spent for culvert material for townships; \$2,817.62 or 4.7% was spent for equipment and unused materials and \$571.90 or 1.0% was spent for filling bridges and culverts.

Of the total amount \$42,812.57 spent for new bridges and culverts, \$42,240.76 or 98.7% was spent for permanent work and \$571.81 or 1.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 49 concrete box culverts, \$22,453.06; 18 circular concrete culverts, \$3,842.20; 1 concrete pipe with headwalls, \$165.00; 3 pony trusses with concrete abutments, \$15,780.50, and 33 corrugated pipe without headwalls, \$571.81.

## SUMMARY OF ROAD AND BRIDGE EXPENDITURES BY COUNTIES.

January 1, 1919, to January 1, 1920.

## SUMMARY TABLES.

The full text of the 1919 report contains 29 summary tables covering every important phase of road and bridge construction, maintenance and financing on township, county and primary road systems. Some of these summaries are omitted from this volume. The following summaries are appended:

- Summary No. 1—Amount Spent for Bridge and Road Work—All County Funds.
- Summary No. 9—Road Construction—County Expenditures.
- Summary No. 11—Classification of Permanent Road Construction. County, State and Federal Expenditures, Federal Aid Projects.
- Summary No. 15—Amount Spent for Township Work—All Township Funds.
- Summary No. 16—Road Construction—Township Expenditures.
- Summary No. 20—Progress Report—County Road Surveys and Construction.
- Summary No. 21—Progress Report—County and Primary Road Construction—Total Work Done to January 1, 1920.
- Summary No. 24—Cost of Engineering.
- Summary No. 25—Financial Statement.
- Summary No. 26—Financial Statement.
- Summary No. 27—Bonded Indebtedness of Counties.
- Summary No. 28—Total Indebtedness of Counties for Road and Bridge Work, January 1, 1920.

The following summaries are omitted in this printed volume, but are available in complete form in the official copies of this report on file in the office of the Governor and at the Highway Commission Headquarters in Ames:

- Summary No. 2—Bridge and Culvert Construction—County Expenditures.

## Summary No. 3—Part I.

Classification of Permanent Bridge and Culvert Construction for which Warrants Were Issued in 1919—County Expenditures.

## Part II.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued In 1913—County Expenditures.

## Part III.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued In 1919—County Expenditures.

## Part IV.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued In 1919—County Expenditures

## Summary No. 4—Part I.

Classification of Temporary Bridge and Culvert Construction for Which Warrants Were Issued In 1919—County Expenditures.

## Part II.

Classification of Temporary Bridge and Culvert Construction for Which Warrants Were Issued In 1919—County Expenditures.

Summary No. 5—Repairs to Bridges and Culverts—County Expenditures.

Summary No. 6—Culvert Material Purchased for Townships—County Expenditures.

Summary No. 7—Bridge Equipment Unused Material—Filling Bridges and Culverts and Special Cases—County Expenditures.

Summary No. 8—Comparison of Bridge and Culvert Construction 1914-1915-1916-1917-1918-1919.

Summary No. 10—Classification of Permanent Road Construction—County Expenditures.

Summary No. 12—Classification of Temporary Road Construction—County Expenditures.

Summary No. 13—Road Repairs and Maintenance, County Expenditures.

Summary No. 14—Road Equipment and Material and Miscellaneous Items—County Expenditures.

Summary No. 17—Classification of Road Construction—Township Expenditures.

Summary No. 18—Road Repairs and Maintenance—Township Expenditures.

Summary No. 19—Road Equipment and Material and Miscellaneous Items—Township Expenditures.

Summary No. 22—Gravel Pits Owned by County—January 1, 1920.

Summary No. 23—Amount of Road and Bridge Work Planned or Constructed by County Engineers.

## Summary No. 29—Part I.

Inventory of Equipment and Machinery Showing Estimated Value January 1, 1920—Owned by County.

## Part II.

Inventory of Equipment and Machinery Showing Estimated Value January 1, 1920—Owned by County.

SUMMARY TABLE NO. 1.

Amount Spent for Bridge and Road Work—All County Funds—Annual Reports of County Engineers.

| County      | Bridges and Culverts |                     |            |                   | Total      | Roads                  |                     |              |                   | Total      | Total Bridge and Road Expenditures. |
|-------------|----------------------|---------------------|------------|-------------------|------------|------------------------|---------------------|--------------|-------------------|------------|-------------------------------------|
|             | Bridge Fund.         | Motor Vehicle Fund. | Road Fund. | All Other Sources |            | County Road Cash Fund. | Motor Vehicle Fund. | Bridge Fund. | All Other Sources |            |                                     |
| Adair       | 31,156.27            | 17,148.61           | 6,155.52   | 5,090.73          | 59,551.43  | 18,982.79              | 2,748.51            |              | 1,493.94          | 23,225.24  | 82,776.67                           |
| Adams       | 28,849.65            | 18,055.05           | 1,168.77   | 1,093.00          | 49,166.96  | 23,868.35              |                     |              |                   | 23,868.35  | 73,034.31                           |
| Allamakee   | 32,682.21            | 575.19              | 7,694.11   | 665.47            | 41,616.98  | 16,911.65              | 17,897.65           |              | 74.21             | 34,883.51  | 76,500.49                           |
| Appanoose   | 25,614.95            | 3,073.05            | 4,055.38   |                   | 32,743.38  | 28,966.70              |                     |              |                   | 28,966.70  | 61,740.08                           |
| Audubon     | 45,657.57            | 15,344.85           | 2,657.67   | 3,924.21          | 67,584.30  | 27,770.79              |                     |              |                   | 27,770.79  | 95,355.09                           |
| Benton      | 103,682.48           | 6,259.16            | 833.94     |                   | 110,775.58 | 48,785.15              | 10,547.14           |              | *68,988.87        | 59,332.29  | 170,107.87                          |
| Black Hawk  | 57,472.60            |                     | 95.10      |                   | 57,567.70  | 134,625.58             |                     |              |                   | 203,614.25 | 261,181.95                          |
| Boone       | 105,094.24           | 700.00              | 864.06     |                   | 110,501.77 | 82,403.07              | 14,728.00           |              | 890.88            | 97,131.07  | 207,632.84                          |
| Bremer      | 68,091.22            |                     | 2,151.08   |                   | 70,242.30  | 16,916.93              | 15,865.46           |              |                   | 33,667.27  | 103,909.57                          |
| Buchanan    | 50,809.07            | 7,261.03            | 750.79     |                   | 58,820.89  | 44,262.29              |                     |              |                   | 47,044.83  | 105,865.72                          |
| Buena Vista | 20,242.70            |                     | 48,972.03  |                   | 69,214.73  | 47,916.43              | 20,077.85           |              |                   | 67,994.28  | 88,236.08                           |
| Butler      | 46,608.63            |                     | 2,363.40   |                   | 49,214.03  | 53,427.74              | 4,898.14            |              |                   | 58,325.88  | 107,297.91                          |
| Calhoun     | 33,145.31            |                     | 701.08     |                   | 33,846.39  | 48,068.20              | 7,655.75            |              |                   | 55,723.95  | 89,236.45                           |
| Carroll     | 63,122.42            |                     | 1,738.47   |                   | 64,860.89  | 34,365.56              |                     |              |                   | 34,365.56  | 136,734.18                          |
| Cass        | 80,845.38            | 16,523.93           | 10,569.23  |                   | 107,938.51 | 28,785.67              |                     |              |                   | 28,785.67  | 106,002.36                          |
| Cedar       | 60,533.57            | 15,365.05           | 182.00     |                   | 76,080.62  | 15,426.09              | 14,495.65           |              |                   | 29,921.74  | 153,207.88                          |
| Cerro Gordo | 61,742.92            |                     |            |                   | 61,742.92  | 70,467.29              | 11,953.30           |              | *3,044.37         | 91,464.96  | 241,529.08                          |
| Cherokee    | 135,284.50           | 30,228.60           | 10,314.49  |                   | 175,827.59 | 65,701.49              |                     |              |                   | 65,701.49  | 191,529.08                          |
| Chickasaw   | 29,479.46            | 2,345.03            | 2,865.00   |                   | 34,689.49  | 23,587.42              | 3,483.43            |              | *45,386.75        | 72,457.60  | 107,146.67                          |
| Clarke      | 24,012.82            | 3,690.96            | 7,685.63   |                   | 35,399.31  | 19,222.58              | 5,333.69            | 4.90         |                   | 24,561.17  | 59,960.58                           |
| Clay        | 42,929.08            |                     | 300.04     |                   | 43,229.12  | 22,834.32              | 10,349.95           | 9.60         |                   | 33,193.87  | 76,422.99                           |
| Clayton     | 36,351.61            | 22,990.65           | 684.60     |                   | 60,026.86  | 26,221.09              | 3,250.05            |              |                   | 29,471.14  | 89,498.00                           |
| Clinton     | 85,404.31            | 1,897.95            | 2,031.98   |                   | 89,334.24  | 69,182.84              | 7,638.78            |              |                   | 76,821.62  | 166,155.86                          |
| Crawford    | 197,035.57           |                     | 5,305.60   |                   | 202,341.17 | 132,415.31             | 18,690.26           |              |                   | 151,105.57 | 353,452.74                          |
| Dallas      | 48,457.75            |                     | 3,171.12   |                   | 51,628.87  | 54,472.23              |                     |              |                   | 82,586.94  | 134,215.81                          |
| Davis       | 23,026.46            | 21,846.91           | 3,747.54   |                   | 49,620.91  | 20,369.56              |                     |              |                   | 20,369.56  | 150,699.52                          |
| Decatur     | 102,601.48           | 725.98              | 7,866.70   |                   | 111,194.16 | 24,734.27              | 9,193.09            |              | *5,578.00         | 39,505.36  | 150,699.52                          |
| Delaware    | 46,927.91            |                     | 3,698.80   |                   | 50,626.71  | 25,477.22              | 12,769.43           |              |                   | 38,246.65  | 88,873.36                           |
| Des Moines  | 24,065.00            | 4,761.58            | 855.15     |                   | 30,261.73  | 13,752.94              | 1,804.76            |              |                   | 15,557.70  | 45,819.43                           |
| Dickinson   | 16,329.70            |                     |            |                   | 16,329.70  | 28,156.52              | 12,474.42           |              |                   | 40,630.94  | 59,990.64                           |

|               |            |           |           |           |            |            |           |        |            |            |            |
|---------------|------------|-----------|-----------|-----------|------------|------------|-----------|--------|------------|------------|------------|
| Dubuque       | 50,034.33  | ***       | 399.32    |           | 50,433.65  | 55,340.58  |           |        |            | 55,340.58  | 105,774.23 |
| Emmet         | 20,414.81  |           | 542.00    |           | 20,956.81  | 78,314.32  | 6,393.94  |        |            | 84,708.26  | 105,665.07 |
| Fayette       | 67,488.87  | 5,765.41  |           | 4,428.28  | 77,682.56  | 37,682.56  | 12,691.21 |        | 300.00     | 50,484.37  | 128,166.93 |
| Floyd         | 54,871.47  |           | 2,680.45  |           | 57,551.92  | 45,845.90  | 13,268.62 |        |            | 59,114.52  | 116,666.44 |
| Franklin      | 49,309.67  |           |           |           | 49,309.67  | 39,497.45  | 10,018.80 |        |            | 50,516.25  | 99,725.92  |
| Fremont       | 53,180.90  | 8,153.22  | 3,591.00  |           | 64,925.12  | 37,351.93  | 2,744.73  |        |            | 40,096.66  | 105,021.78 |
| Greene        | 156,390.96 |           | 944.71    |           | 157,335.67 | 59,476.51  |           |        |            | 59,476.51  | 216,812.19 |
| Grundy        | 128,997.82 | 12,826.93 | 8,372.69  |           | 150,197.44 | 40,920.66  |           |        |            | 40,920.66  | 191,118.10 |
| Guthrie       | 62,315.38  | 7,152.37  | 2,291.61  |           | 71,759.36  | 27,347.15  | 18,561.32 | 525.13 |            | 46,433.60  | 118,192.96 |
| Hamilton      | 78,195.19  |           | 431.45    |           | 78,626.64  | 119,912.95 |           |        |            | 119,912.95 | 198,539.59 |
| Hancock       | 18,774.82  | 279.06    | 1,649.95  |           | 20,703.83  | 23,580.19  | 16,868.84 |        |            | 40,449.03  | 61,152.86  |
| Hardin        | 143,407.40 |           | 7,119.30  |           | 150,526.70 | 58,734.12  | 10,787.22 |        |            | 69,521.34  | 220,048.04 |
| Harrison      | 65,982.14  | 6,601.00  | 434.22    |           | 73,017.36  | 28,213.28  | 10,207.41 |        |            | 38,420.69  | 111,438.05 |
| Henry         | 36,509.83  | 3,771.25  | 2,639.56  |           | 42,920.64  | 18,417.60  | 1,889.43  |        |            | 20,307.03  | 63,227.67  |
| Howard        | 34,762.70  |           | 1,026.31  |           | 35,789.01  | 27,668.55  | 3,952.00  |        | *11,563.95 | 43,184.50  | 78,973.51  |
| Humboldt      | 19,954.88  | 7.00      | 31.90     |           | 19,993.78  | 39,761.08  | 28,696.51 |        |            | 68,457.59  | 88,451.37  |
| Ida           | 90,250.76  | 1,369.81  | 5,818.38  | 203.07    | 97,582.02  | 25,944.28  | 12,119.49 |        |            | 38,063.77  | 135,645.79 |
| Iowa          | 100,014.91 | 15,671.16 | 1,419.13  |           | 117,105.20 | 39,611.85  | 9,790.02  | 174.40 | 66.91      | 49,543.18  | 166,748.38 |
| Jackson       | 39,232.01  | 13.00     |           |           | 39,245.01  | 29,299.79  | 10,265.81 |        |            | 39,565.60  | 78,810.61  |
| Jasper        | 117,639.04 |           | 21,252.87 |           | 138,791.91 | 51,584.80  | 25,327.02 |        |            | 76,911.82  | 215,703.73 |
| Jefferson     | 76,977.76  |           | 301.30    |           | 77,279.06  | 19,535.09  | 7,182.23  |        | *47,215.00 | 73,963.83  | 151,212.89 |
| Johnson       | 62,220.00  |           | 8,402.76  |           | 70,622.76  | 38,723.96  | 30,592.89 |        |            | 69,316.85  | 139,939.61 |
| Jones         | 31,007.79  | 14,171.11 | 379.55    |           | 45,558.45  | 17,818.90  | 7,059.41  |        |            | 24,878.31  | 70,436.76  |
| Keokuk        | 48,431.44  | 18,657.94 | 4,404.65  |           | 71,494.03  | 24,182.50  |           | 8.61   | *30,456.69 | 54,647.80  | 125,141.83 |
| Kossuth       | 54,422.43  |           |           |           | 54,422.43  | 67,810.49  | 25,136.73 |        |            | 112,947.22 | 167,369.65 |
| Lee           | 39,767.98  | 10,194.98 |           |           | 49,962.96  | 18,863.35  | 7,580.93  |        |            | 26,444.28  | 76,407.24  |
| Linn          | 66,084.01  | 8,435.64  | 3,965.00  | 32,253.42 | 110,738.07 | 95,033.13  | 10,000.00 |        | *60,953.15 | 174,986.28 | 285,724.35 |
| Louis         | 43,068.18  | 44.00     | 1,329.00  |           | 44,441.18  | 16,250.93  | 5,965.89  |        |            | 22,216.82  | 66,665.00  |
| Lucas         | 72,592.27  |           | 10,859.07 |           | 83,451.34  | 18,236.40  | 13,368.00 |        |            | 31,604.40  | 115,055.74 |
| Lyon          | 39,622.23  | 10,576.63 | 2,886.94  |           | 53,085.80  | 24,921.60  | 4,603.85  | 50.93  |            | 29,576.38  | 82,662.18  |
| Madison       | 45,515.99  | 14,437.92 | 3,446.70  |           | 63,400.61  | 26,728.09  | 2,892.85  |        |            | 29,620.94  | 93,021.55  |
| Mahaska       | 41,755.55  | 19,052.32 | 1,392.55  |           | 62,200.42  | 31,944.23  | 710.00    |        |            | 32,654.23  | 94,854.65  |
| Marion        | 40,102.49  |           | 2,463.85  |           | 42,566.34  | 72,577.86  |           |        | *9,600.68  | 82,138.54  | 124,704.88 |
| Marshall      | 118,709.10 | 2,068.14  | 11,784.15 | 88.02     | 132,649.41 | 77,800.16  | 12,233.27 | 221.60 | 4.50       | 90,259.53  | 222,908.94 |
| Mills         | 68,383.49  | 12,874.60 | 6,945.74  |           | 88,203.83  | 44,271.61  | 1,075.62  |        |            | 45,347.23  | 133,551.06 |
| Mitchell      | 68,537.32  |           | 3,215.85  |           | 71,753.17  | 44,115.97  | 3,356.26  |        |            | 47,472.23  | 119,225.40 |
| Monona        | 33,472.18  | 21,985.56 | 4,415.32  |           | 59,873.06  | 22,618.67  |           |        |            | 22,618.67  | 82,491.73  |
| Monroe        | 27,858.12  | 6,904.61  | 25,913.27 | 7,000.00  | 67,676.00  | 30,245.49  |           |        | *34,528.32 | 64,773.81  | 132,449.81 |
| Montgomery    | 164,858.85 |           | 3,838.52  | 19,937.79 | 188,635.16 | 34,761.98  | 8,470.45  |        | *50,474.65 | 93,707.08  | 282,342.24 |
| Muscataine    | 42,569.19  |           | 8.30      |           | 42,577.49  | 21,785.42  | 15,204.13 |        |            | 36,988.55  | 79,566.04  |
| O'Brien       | 71,609.79  |           | 2,049.61  |           | 73,659.40  | 35,058.49  | 1,817.40  |        |            | 36,875.89  | 110,535.29 |
| Osceola       | 68,075.73  |           |           |           | 68,075.73  | 19,604.50  | 3,957.67  |        |            | 23,562.17  | 91,637.90  |
| Page          | 60,231.56  | 14,094.28 | 6,790.49  | 46.97     | 81,163.30  | 35,445.02  | 3,492.51  |        |            | 38,937.53  | 120,100.83 |
| Palo Alto     | 76,400.50  | 3,732.50  | 6,990.75  |           | 87,123.75  | 30,355.17  |           |        |            | 30,355.17  | 117,478.92 |
| Plymouth      | 42,755.09  | 1,130.92  | 2,855.56  |           | 46,741.57  | 37,597.76  | 1,612.38  | 721.52 |            | 39,931.66  | 86,673.23  |
| Pocahontas    | 24,813.10  |           | 579.90    |           | 25,393.00  | 79,792.86  |           |        |            | 79,792.86  | 105,185.86 |
| Polk          | 88,269.54  | 18,388.95 | 6,199.44  |           | 112,857.93 | 176,605.72 | 484.12    |        |            | 177,089.84 | 289,947.77 |
| Pottawattamie | 114,788.90 | 33,120.10 | 8,414.67  |           | 156,323.67 | 55,715.00  | 9,500.10  |        | 614.99     | 65,890.09  | 222,213.76 |
| Poweshiek     | 42,076.28  | 6,852.83  | 2,998.48  |           | 51,927.59  | 24,213.31  | 8,036.63  |        | 12.10      | 32,262.04  | 84,189.63  |
| Ringgold      | 85,425.61  | 6,530.97  | 4,816.66  |           | 96,773.24  | 22,006.45  | 4,297.77  |        |            | 26,304.22  | 123,077.46 |

SUMMARY TABLE NO. 1—Continued.

|              | Bridges and Culverts |                     |                     |                     | Total                  | Roads                  |                     |                   |                     | Total                 | Total Bridge and Road Expenditures. |
|--------------|----------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------|-------------------|---------------------|-----------------------|-------------------------------------|
|              | Bridge Fund.         | Motor Vehicle Fund. | Road Fund.          | All Other Sources   |                        | County Road Cash Fund. | Motor Vehicle Fund. | Bridge Fund.      | All Other Sources   |                       |                                     |
| Sac          | 54,457.87            |                     | 18.70               |                     | 54,476.57              | 20,983.68              | 10,897.57           |                   |                     | 31,881.25             | 86,357.82                           |
| Scott        | 68,986.41            |                     | 754.15              |                     | 69,740.56              | 36,858.30              | 15,784.10           |                   | 7,423.30            | 60,065.70             | 129,806.26                          |
| Shelby       | 65,819.58            | 2,618.32            | 11,320.11           |                     | 79,758.01              | 15,952.54              |                     |                   |                     | 15,352.54             | 95,110.55                           |
| Sioux        | 42,658.10            | 2,344.14            | 656.24              |                     | 45,658.48              | 40,193.62              | 3,297.33            |                   |                     | 43,490.95             | 88,549.43                           |
| Story        | 51,427.12            | 7,157.56            | 1,365.90            |                     | 59,950.48              | 76,662.09              | 14,185.69           |                   |                     | 90,848.68             | 150,799.16                          |
| Tama         | 79,774.67            | 20,686.44           |                     |                     | 100,461.11             | 31,507.73              | 10.00               |                   |                     | 37,517.73             | 137,978.84                          |
| Taylor       | 36,297.86            | 3,118.90            | 7,465.05            |                     | 46,881.80              | 13,469.76              | 8,665.46            |                   |                     | 22,135.16             | 69,016.96                           |
| Union        | 24,079.77            | 8,519.22            | 45.53               |                     | 32,644.52              | 9,581.65               | 6,109.75            |                   |                     | 15,690.80             | 48,335.32                           |
| Van Buren    | 24,567.76            | 9,918.69            | 1,383.47            |                     | 35,869.92              | 12,050.91              |                     |                   |                     | 12,050.91             | 47,926.73                           |
| Wapello      | 51,846.97            | 17,458.36           | 2,480.81            |                     | 71,786.14              | 27,820.78              |                     |                   |                     | 27,820.78             | 99,606.92                           |
| Warren       | 37,818.18            | 3,196.36            | 6,417.76            |                     | 47,432.30              | 25,773.07              |                     |                   |                     | 25,773.07             | 73,205.37                           |
| Washington   | 58,998.12            |                     | 178.57              |                     | 59,176.69              | 22,813.05              | 15,414.28           |                   |                     | 38,227.33             | 97,404.02                           |
| Wayne        | 24,905.07            |                     | 18,810.90           |                     | 43,715.97              | 20,934.63              | 6,751.33            |                   |                     | 27,685.96             | 71,351.93                           |
| Webster      | 47,410.24            |                     | 261.95              |                     | 47,672.19              | 60,153.16              | 22,942.39           |                   |                     | 83,095.55             | 130,767.14                          |
| Winneshiek   |                      | 15,724.32           |                     |                     | 15,724.32              | 40,289.21              | 3,958.72            |                   |                     | 44,242.93             | 59,952.25                           |
| Winneshiek   | 48,798.45            | 19,949.48           | 1,831.90            |                     | 70,579.83              | 30,419.44              | 4,568.55            |                   |                     | 34,987.99             | 105,567.82                          |
| Woodbury     | 61,442.77            | 14,624.25           | 1,715.92            | 4.00                | 77,786.94              | 73,334.08              | 76.74               | 733.21            | *39,287.38          | 113,431.41            | 191,218.35                          |
| Worth        | 11,812.95            | 6,967.72            |                     |                     | 18,780.67              | 34,908.83              | 20,000.00           |                   |                     | 44,908.83             | 63,689.50                           |
| Wright       | 60,040.66            |                     |                     |                     | 60,040.66              | 43,376.92              | 99.50               |                   |                     | 43,476.42             | 103,517.08                          |
| <b>Total</b> | <b>55,827,432.14</b> | <b>\$605,881.44</b> | <b>\$342,830.33</b> | <b>\$ 78,578.52</b> | <b>\$ 6,854,722.43</b> | <b>\$4,075,457.79</b>  | <b>\$724,502.66</b> | <b>\$2,449.90</b> | <b>\$465,073.95</b> | <b>\$5,257,484.30</b> | <b>\$ 12,112,206.73</b>             |

\*Primary Road Fund.

SUMMARY TABLE NO. 9.

Road Construction—County Expenditures—Annual Reports of County Engineers.

| County      | Permanent Work (County). | Permanent Work (Fed. Aid). | Temporary Work | Repairs.    | Maintenance. | Equipment and Unused Material | Special Cases, Railway Crossings, Gravel Pits, etc. | Total.       |
|-------------|--------------------------|----------------------------|----------------|-------------|--------------|-------------------------------|---|--------------|
| Adair       | \$ 2,849.20              |                            | \$ 5,456.66    | \$ 1,314.73 | \$ 11,869.75 | \$ 1,402.40                   | \$ 332.50   | \$ 23,225.24 |
| Adams       | 5,518.39                 |                            | 2,198.20       | 5,954.01    | 5,523.86     | 3,307.39                      | 1,366.50  | 23,868.35    |
| Allamakee   | 100.00                   |                            | 21,205.35      | 6,836.21    | 3,566.92     | 1,253.03                      | 1,922.00  | 34,883.51    |
| Appanoose   | 1,560.35                 | \$ 889.05                  | 1,186.00       | 9,414.72    | 9,946.21     | 1,652.22                      | 4,917.25  | 28,966.70    |
| Audubon     | 29.85                    |                            | 9,045.00       | 9,045.00    | 10,887.50    | 3,519.58                      | 4,288.66  | 27,770.79    |
| Benton      | 1,044.31                 |                            | 4,042.64       | 15,361.07   | 12,663.67    | 25,291.45                     | 929.15  | 59,332.29    |
| Black Hawk  | 5,161.70                 | 146,792.02                 | 5,124.39       | 17,964.17   | 16,141.54    | 10,645.43                     | 1,785.00  | 203,614.25   |
| Boone       | 57,491.61                |                            | 2,849.81       | 14,484.14   | 15,386.16    | 3,421.69                      | 3,497.66  | 97,131.07    |
| Bremer      | 16,074.14                |                            | 4,703.61       | 4,278.53    | 6,309.44     | 1,921.55                      | 380.00  | 33,667.27    |
| Buchanan    | 8,676.57                 |                            | 6,440.26       | 16,012.03   | 10,101.06    | 3,787.88                      | 2,027.03  | 47,044.83    |
| Buena Vista | 41,037.64                |                            | 5,381.84       | 11,036.22   | 2,369.78     | 8,168.80                      | 67,994.28   | 67,994.28    |
| Butler      | 244.50                   |                            | 12,531.38      | 14,713.96   | 17,274.62    | 13,250.86                     | 310.56  | 58,325.88    |
| Calhoun     | 19,439.08                | 1,749.95                   | 588.07         | 6,544.22    | 8,170.27     | 11,198.05                     | 8,034.31  | 55,723.95    |
| Carroll     | 8,840.35                 |                            | 7,865.06       | 6,173.07    | 9,207.49     | 2,063.99                      | 185.60  | 34,365.56    |
| Cass        |                          |                            | 13,586.71      | 10,296.25   | 2,951.41     | 1,951.39                      | 28,785.07   | 28,785.07    |
| Cedar       | 3,764.33                 |                            | 8,619.74       | 2,597.25    | 8,444.81     | 2,131.51                      | 4,364.10  | 29,921.74    |
| Cerro Gordo | 58,844.01                | 3,044.37                   | 8,491.00       | 10,614.71   | 10,692.59    | 3,938.18                      | 840.10  | 91,464.96    |
| Cherokee    | 39,208.44                |                            | 3,231.31       | 7,130.39    | 11,958.33    | 2,006.86                      | 2,166.16  | 65,701.49    |
| Chickasaw   | 8,891.81                 | 45,386.75                  | 4,414.73       | 2,232.96    | 6,972.26     | 2,844.11                      | 1,714.98  | 72,457.60    |
| Clark       |                          |                            | 6,000.00       | 1,399.18    | 11,783.58    | 3,898.21                      | 1,480.20  | 24,561.17    |
| Clay        | 16,570.76                |                            | 3,821.31       | 6,937.03    | 6,937.03     | 3,543.33                      | 2,321.44  | 33,193.87    |
| Clayton     | 1,060.10                 |                            | 3,161.92       | 18,497.85   | 6,342.97     | 408.30                        | 29,471.14   | 29,471.14    |
| Clinton     | 35,961.18                |                            | 7,508.20       | 12,513.34   | 7,903.98     | 10,519.97                     | 2,414.95  | 76,821.62    |
| Crawford    | 109,395.77               |                            | 24,203.89      | 24,203.89   | 12,779.54    | 839.77                        | 3,886.60  | 151,105.57   |
| Dallas      | 20,091.59                | 24,386.07                  | 2,575.30       | 7,197.79    | 11,221.00    | 3,705.30                      | 13,409.89   | 82,586.94    |
| Davis       |                          |                            | 5,824.60       | 6,472.08    | 6,808.85     | 1,264.03                      | 20,369.56   | 20,369.56    |
| Decatur     |                          | 5,578.00                   | 2,136.19       | 2,326.72    | 18,371.23    | 6,514.72                      | 4,578.50  | 39,505.36    |
| Delaware    | 10,832.59                |                            | 3,291.75       | 1,501.45    | 17,421.16    | 4,247.10                      | 952.60  | 38,246.65    |
| Des Moines  | 169.53                   |                            | 80.11          | 1,753.44    | 11,651.19    | 1,591.21                      | 312.22  | 15,557.70    |
| Dickinson   | 1,430.74                 |                            | 3,488.06       | 13,380.59   | 14,799.50    | 1,529.50                      | 6,002.25  | 40,630.94    |
| Dubuque     | 15,080.41                | 1,818.36                   | 4,556.72       | 2,743.32    | 19,602.47    | 11,469.30                     | 70.00   | 55,340.58    |
| Emmet       | 65,740.20                |                            | 103.50         | 4,717.91    | 12,173.75    | 1,474.05                      | 498.25  | 84,708.26    |

SUMMARY TABLE NO. 9—Continued.

| County        | Permanent Work | Permanent Work (Fed. Aid) | Temporary Work | Repairs      | Maintenance    | Equipment and Material | Special Cases, Railway Crossings, Etc. | Total          |
|---------------|----------------|---------------------------|----------------|--------------|----------------|------------------------|--|----------------|
| Fayette       | 207.95         |                           | 20,812.27      | 12,492.86    | 9,770.41       | 2,772.76               | 4,410.12                               | 50,488.37      |
| Floyd         | 39,291.86      |                           | 1,041.18       | 9,742.21     | 6,070.41       | 9,706.77               | 1,029.00                               | 59,114.22      |
| Franklin      | 5,176.07       |                           | 4,863.41       | 18,081.41    | 11,227.91      | 1,487.24               | 8,894.00                               | 60,659.06      |
| Greene        | 23,289.32      |                           | 2,181.50       | 8,569.56     | 12,981.33      | 5,422.37               | 6,355.33                               | 50,476.31      |
| Grundy        | 15,671.03      |                           | 77.76          | 13,351.78    | 14,438.14      | 4,560.00               | 439.81                                 | 46,433.00      |
| Hamilton      | 87,776.08      |                           | 1,545.62       | 9,108.95     | 11,850.53      | 6,994.87               | 4,771.62                               | 119,912.05     |
| Hancock       | 38,695.02      |                           | 2,825.56       | 5,314.59     | 10,038.99      | 6,246.13               | 13,523.47                              | 69,531.34      |
| Harrison      | 15,844.01      |                           | 10,733.62      | 2,459.25     | 14,669.24      | 1,868.14               | 9,729.14                               | 38,420.69      |
| Henry         | 55,812.07      |                           | 4,523.26       | 2,900.64     | 5,527.41       | 1,848.04               | 1,015.42                               | 83,184.50      |
| Humboldt      | 83,812.07      |                           | 10,225.05      | 10,949.01    | 10,949.01      | 7,190.55               | 2,160.55                               | 124,286.14     |
| Ia            | 7,489.71       |                           | 6,841.90       | 8,201.22     | 11,428.52      | 7,197.20               | 750.85                                 | 39,565.69      |
| Jackson       | 28,652.53      |                           | 4,158.32       | 8,158.32     | 18,553.75      | 3,265.47               | 8,119.29                               | 75,911.82      |
| Jasper        | 11,194.57      |                           | 6,621.91       | 15,782.29    | 18,553.75      | 3,265.47               | 1,421.16                               | 69,316.86      |
| Johnson       | 29,252.50      |                           | 7,821.24       | 9,087.04     | 1,039.71       | 4,995.25               | 24,879.31                              | 77,076.24      |
| Jones         | 4,144.05       |                           | 1,187.41       | 16,704.50    | 15,861.00      | 3,340.22               | 2,658.28                               | 44,547.96      |
| Keokuk        | 67,023.48      |                           | 7,510.65       | 10,704.50    | 15,861.00      | 3,340.22               | 112,947.23                             | 194,486.08     |
| Lee           | 49,228.71      |                           | 5,864.48       | 2,257.47     | 10,469.45      | 2,812.84               | 25,444.28                              | 101,216.23     |
| Linn          | 2,800.02       |                           | 12,800.02      | 1,326.88     | 12,863.89      | 6,365.94               | 2,314.11                               | 32,216.82      |
| Lucas         | 9,230.05       |                           | 2,000.00       | 12,559.40    | 10,670.87      | 1,887.43               | 9,555.70                               | 31,904.40      |
| Lyon          | 2,201.05       |                           | 6,748.70       | 7,849.61     | 7,282.17       | 3,000.41               | 4,278.31                               | 20,620.94      |
| Mahaska       | 4,697.96       |                           | 1,451.00       | 3,427.43     | 14,340.63      | 8,204.61               | 6,023.00                               | 32,054.23      |
| Marion        | 52,094.25      |                           | 2,250.05       | 6,941.87     | 14,162.79      | 3,742.87               | 6,265.84                               | 80,289.53      |
| Miss          |                |                           | 5,134.65       | 16,000.31    | 18,787.44      | 5,193.76               | 8,150.77                               | 45,347.37      |
| Mitchell      | 13,899.25      |                           | 4,059.28       | 6,864.93     | 8,026.93       | 12,626.22              | 1,505.12                               | 47,472.63      |
| Monroe        |                |                           | 6,648.80       | 6,648.80     | 14,314.34      | 1,022.26               | 1,372.25                               | 29,018.47      |
| Montgomery    | 5,129.29       |                           | 9,172.70       | 8,749.76     | 11,405.00      | 2,131.54               | 4,190.54                               | 50,707.68      |
| Osage         | 19,247.85      |                           | 2,498.29       | 8,601.97     | 13,369.60      | 3,883.71               | 917.13                                 | 36,498.55      |
| Oswego        | 8,741.56       |                           | 8,828.23       | 8,550.59     | 9,305.85       | 1,127.02               | 1,181.42                               | 33,502.17      |
| Pack          | 1,211.54       |                           | 1,313.60       | 6,102.67     | 7,890.27       | 1,641.14               | 4,622.31                               | 28,537.53      |
| Plymouth      | 6,637.37       |                           | 4,992.70       | 21,545.34    | 11,195.17      | 1,308.13               | 7,722.00                               | 39,031.60      |
| Pocahontas    | 29,288.50      |                           | 6,482.63       | 6,482.63     | 10,997.69      | 12,562.83              | 4,176.81                               | 79,722.80      |
| Pottawattamie | 105,499.75     |                           | 24,025.01      | 19,703.02    | 17,157.19      | 2,826.67               | 3,881.19                               | 232,202.04     |
| Pottawattamie | 1,681.97       |                           | 14,799.61      | 9,146.74     | 11,026.26      | 7,419.58               | 4,800.80                               | 105,800.09     |
| Scott         | 7,827.77       |                           | 18,378.41      | 6,442.95     | 11,697.18      | 5,890.99               | 60.00                                  | 60,005.70      |
| Shellsburg    | 19,664.87      |                           | 7,423.20       | 4,002.02     | 10,048.78      | 10,077.17              | 1,089.30                               | 43,022.04      |
| Shoer         | 8,185.61       |                           | 10,937.35      | 5,002.02     | 16,884.63      | 5,137.35               | 7,094.20                               | 40,048.08      |
| Story         | 57,742.85      |                           | 1,715.05       | 1,992.29     | 14,996.96      | 1,992.29               | 2,425.56                               | 37,517.11      |
| Taylor        | 5,097.66       |                           | 3,233.00       | 8,009.37     | 4,837.74       | 1,265.69               | 2,459.71                               | 12,656.91      |
| Union         |                |                           | 528.00         | 4,072.15     | 3,562.02       | 5,931.25               | 1,269.71                               | 12,656.91      |
| Wapello       | 2,131.11       |                           | 1,857.72       | 11,116.65    | 11,026.86      | 9,202.04               | 442.78                                 | 25,773.07      |
| Warren        | 189.72         |                           | 2,000.02       | 1,116.65     | 10,889.97      | 1,265.25               | 1,265.25                               | 23,424.33      |
| Washington    | 7,697.60       |                           | 2,908.56       | 4,002.02     | 15,066.95      | 1,265.25               | 8,193.20                               | 32,029.55      |
| Webster       | 53,268.90      |                           | 286.50         | 4,496.95     | 6,072.72       | 2,844.44               | 3,478.28                               | 64,237.55      |
| Wells         | 2,416.05       |                           | 1,265.25       | 10,879.63    | 10,879.63      | 4,200.15               | 5,568.38                               | 31,431.41      |
| Winnebago     | 1,282.24       |                           | 77,077.48      | 15,442.98    | 8,026.17       | 6,486.29               | 1,202.00                               | 44,008.53      |
| Worth         | 9,001.53       |                           | 1,543.08       | 9,919.83     | 12,031.27      | 4,563.95               | 3,224.96                               | 43,470.14      |
| Wright        | 29,480.09      |                           | 644.34         | 5,919.83     | 12,031.27      | 4,563.95               | 3,224.96                               | 43,470.14      |
| Total         | \$1,600,256.69 | \$74,008.96               | \$849,069.04   | \$822,405.60 | \$1,177,928.15 | \$446,843.22           | \$286,942.94                           | \$9,257,484.30 |

SUMMARY TABLE NO. 11.

Classification of Permanent Road Construction, County, State and Federal Expenditures—Federal Aid Projects—Annual Reports of County Engineers.

| County       | Proj. No. | Built to Finished Grade |                     | Hard Surfaced |                     | Graveled    |                     | Tile Drainage     |                     | Petage. Compltd. | Total                |
|--------------|-----------|-------------------------|---------------------|---------------|---------------------|-------------|---------------------|-------------------|---------------------|------------------|----------------------|
|              |           | Miles                   | Cost                | Miles         | Cost                | Miles       | Cost                | Lin. feet         | Cost                |                  |                      |
| Appanoose    |           | .25                     | \$ 880.05           |               |                     |             |                     |                   |                     |                  | \$ 880.05            |
| Black Hawk   | 25        | 4.05                    | 8,988.52            | 3.3           | \$135,356.38        |             |                     | 21,542.40         | \$ 2,447.12         | 94%              | 146,792.02           |
| Calhoun      | 10        |                         |                     |               |                     | 2.2         | \$ 1,749.95         |                   |                     | 13%              | 1,749.95             |
| Cerro Gordo  | 61        |                         |                     |               |                     |             |                     | 14,700.00         | 3,044.37            | 78%              | 3,044.37             |
| Chickasaw    | 35        | 9.98                    | 22,542.27           |               |                     | .8          | 14,658.32           | 32,656.00         | 8,186.16            | 73%              | 45,386.75            |
| Dallas       | 12        | 8.54                    | 19,774.57           |               |                     |             |                     | 29,030.50         | 4,611.50            | 75%              | 24,386.07            |
| Decatur      | 8         | .88                     | 5,578.00            |               |                     |             |                     |                   |                     | 9%               | 5,578.00             |
| Dubuque      |           |                         | 1,112.30            |               |                     |             | 706.00              |                   |                     |                  | 1,818.36             |
| Howard       | 31        | 3.07                    | 6,496.21            |               |                     | 1.87        | 5,067.74            | 11,416.00         | 3,114.16            | 74%              | 14,678.11            |
| Jefferson    | 3         | 14.92                   | 42,944.20           |               |                     |             |                     | 170.27            | 4,271.40            | 83%              | 47,215.60            |
| Keokuk       | 34        | 5.17                    | 30,456.69           |               |                     |             |                     |                   | 3,957.63            | 42%              | 30,456.69            |
| Linn         | 22        | 2.33                    | 17,001.45           | .8            | 35,846.29           |             |                     |                   |                     | 80%              | 56,865.37            |
| Marion       | 7         | 16.75                   | 28,812.92           |               |                     |             |                     |                   | 45.13               | 100%             | 28,812.92            |
| Monroe       | 20        | 3.06                    | 31,455.14           |               |                     |             |                     |                   |                     | 37%              | 31,500.27            |
| Montgomery   | 16        | 6.00                    | 50,474.65           |               |                     |             |                     |                   |                     | 35%              | 50,474.65            |
| Scott        | 54        | 2.24                    | 6,563.35            |               |                     |             |                     | 3,900.00          | 859.95              | 27%              | 7,423.30             |
| Woodbury     | 2         | 53.30                   | 77,027.48           |               |                     |             |                     |                   |                     | 97%              | 77,027.48            |
| <b>Total</b> |           | <b>130.54</b>           | <b>\$350,116.86</b> | <b>4.1</b>    | <b>\$171,202.67</b> | <b>4.87</b> | <b>\$ 22,182.01</b> | <b>113,415.17</b> | <b>\$ 30,537.42</b> |                  | <b>\$ 574,038.96</b> |

IOWA STATE HIGHWAY COMMISSION

SUMMARY TABLE NO. 15.

Amount Spent for Township Work—All Township Funds—Annual Reports of County Engineers.

| County      | No. Twp. in Co. | No. Twp. Report'g | Road Fund    | Drag Fund   | Drainage Fund | All Other Sources | Total        |
|-------------|-----------------|-------------------|--------------|-------------|---------------|-------------------|--------------|
| Adair       | 16              | 16                | \$ 25,714.06 | \$ 7,975.27 | \$ 2,181.04   |                   | \$ 35,870.37 |
| Adams       | 12              | 12                | 18,865.65    | 6,593.92    |               |                   | 25,459.57    |
| Allamakee   | 18              | 16                | 29,219.68    |             |               |                   | 29,219.68    |
| Appanoose   | 17              | 15                | 19,773.11    | 5,792.89    | 910.60        |                   | 26,476.60    |
| Audubon     | 12              | 12                | 24,719.39    | 9,343.65    |               |                   | 34,063.04    |
| Benton      | 20              | 15                | 44,533.79    | 9,653.52    | 277.55        |                   | 54,464.86    |
| Black Hawk  | 18              | 18                | 27,677.19    | 10,070.68   | 1,077.47      |                   | 38,825.34    |
| Boone       | 17              | 15                | 33,313.45    | 10,483.92   | 5,791.22      | 1,804.20          | 51,392.79    |
| Bremer      | 14              | 11                | 20,825.00    | 5,133.68    | 81.34         |                   | 26,040.08    |
| Buchanan    | 16              | 16                | 34,929.74    | 5,999.96    | 462.76        |                   | 41,392.46    |
| Buena Vista | 17              | 15                | 22,181.31    | 9,303.18    | 10,760.98     | 1,615.01          | 43,860.48    |
| Butler      | 16              | 16                | 33,838.88    | 7,944.90    |               | 4,150.32          | 45,934.10    |
| Calhoun     | 16              | 16                | 21,619.19    | 15,801.76   | 11,733.97     |                   | 49,154.92    |
| Carroll     | 16              | 15                | 31,063.06    | 10,804.31   | 1,816.83      |                   | 43,684.20    |
| Cass        | 16              | 16                | 27,838.63    | 13,833.47   | 18.00         |                   | 41,690.10    |
| Cedar       | 17              | 9                 | 30,380.77    | 8,314.87    | 87.89         |                   | 38,783.53    |
| Cerro Gordo | 16              | 16                | 39,990.16    | 8,483.19    | 17,071.21     |                   | 65,544.56    |
| Cherokee    | 16              | 15                | 28,361.03    | 8,221.14    |               |                   | 36,582.17    |
| Chickasaw   | 12              | 12                | 31,513.36    | 5,320.41    |               |                   | 36,833.77    |
| Clarke      | 12              | 12                | 16,441.69    | 4,384.33    |               |                   | 21,333.37    |
| Clay        | 16              | 10                | 19,043.36    | 5,452.93    | 10,828.70     | 507.35            | 35,324.99    |
| Clayton     | 22              | 22                | 40,857.40    | 10,128.27   |               | 6,304.56          | 57,290.23    |
| Clinton     | 20              | 19                | 49,700.79    | 10,383.23   |               |                   | 60,084.02    |
| Crawford    | 20              | 20                | 49,437.03    | 13,075.29   | 3,787.52      |                   | 66,299.84    |
| Dallas      | 16              | 16                | 33,552.72    | 10,289.19   | 10,174.21     | 329.20            | 54,345.32    |
| Davis       | 15              | 15                | 18,419.98    | 5,660.16    | 81.50         |                   | 24,161.64    |
| Decatur     | 16              | 11                | 14,116.89    | 3,438.57    |               |                   | 17,555.46    |
| Delaware    | 16              | 15                | 34,544.12    | 8,011.31    |               |                   | 42,555.43    |
| Des Moines  | 13              | 13                | 24,019.62    | 7,127.45    |               |                   | 31,147.07    |
| Dickinson   | 12              | 9                 | 11,695.94    | 4,584.45    | 9,397.27      |                   | 25,677.66    |
| Dubuque     | 17              | 8                 | 13,594.78    | 3,315.10    |               |                   | 16,909.88    |
| Emmet       | 12              | 12                | 21,967.15    | 6,106.97    | 13,170.05     | 222.69            | 41,466.86    |
| Fayette     | 20              | 20                | 41,826.64    | 10,699.63   |               |                   | 52,526.27    |
| Floyd       | 12              | 11                | 29,317.66    | 4,480.36    | 1,980.31      |                   | 35,778.33    |
| Franklin    | 16              | 14                | 32,249.27    | 8,497.32    | 16,143.10     |                   | 56,889.69    |
| Fremont     | 13              | 11                | 20,659.59    | 5,733.33    | 202.01        | 3,132.77          | 29,727.70    |
| Greene      | 15              | 14                | 33,620.67    | 9,970.03    | 12,148.40     |                   | 55,739.10    |
| Grundy      | 14              | 12                | 39,007.38    | 7,707.37    | 501.68        |                   | 47,216.43    |

ANNUAL REPORTS OF COUNTY ENGINEERS



SUMMARY TABLE NO. 15—Continued.

| County        | No. Twp. in Co. | No. Twp. Report | Road Fund | Drag Fund | Drainage Fund | All Other Sources | Total     |
|---------------|-----------------|-----------------|-----------|-----------|---------------|-------------------|-----------|
| Guthrie       | 17              | 12              | 17,530.00 | 6,840.51  | 2,416.64      | .....             | 26,787.21 |
| Hamilton      | 16              | 14              | 25,502.56 | 9,308.08  | 21,827.11     | .....             | 54,237.77 |
| Hancock       | 16              | 12              | 24,289.01 | 6,033.26  | 12,961.25     | .....             | 43,283.52 |
| Harrison      | 20              | 20              | 40,405.00 | 32,016.05 | 2,607.90      | 3,124.37          | 86,050.54 |
| Henry         | 11              | 11              | 22,469.02 | 7,081.44  | 800.00        | .....             | 30,350.46 |
| Humboldt      | 12              | 11              | 21,862.53 | 9,254.24  | 9,038.68      | .....             | 40,255.25 |
| Ia.           | 12              | 19              | 24,343.56 | 6,196.27  | 89.36         | 901.84            | 30,630.85 |
| Jackson       | 16              | 16              | 25,670.81 | 6,023.74  | .....         | .....             | 35,454.00 |
| Jasper        | 19              | 15              | 47,066.00 | 9,237.61  | .....         | .....             | 56,303.61 |
| Johnson       | 21              | 18              | 38,139.47 | 10,490.90 | 689.63        | .....             | 49,310.00 |
| Jones         | 16              | 13              | 39,714.82 | 6,414.52  | .....         | .....             | 37,139.35 |
| Kossuth       | 22              | 16              | 32,190.56 | 9,473.70  | .....         | 370.70            | 42,035.03 |
| Lee           | 15              | 14              | 22,510.97 | 9,648.80  | 28,901.03     | .....             | 52,831.27 |
| Linn          | 19              | 20              | 22,508.94 | 10,005.74 | 1,100.20      | .....             | 38,122.04 |
| Linn          | 12              | 12              | 22,284.26 | 4,588.26  | .....         | 302.56            | 29,852.62 |
| Lucas         | 18              | 15              | 22,008.90 | 7,045.94  | .....         | .....             | 31,554.14 |
| Lyon          | 18              | 18              | 44,174.94 | 11,741.24 | .....         | .....             | 55,916.18 |
| Mahaska       | 15              | 15              | 39,627.80 | 10,413.75 | 2,221.21      | 1,561.44          | 44,854.20 |
| Marion        | 15              | 11              | 21,842.60 | 6,450.20  | 1,726.41      | 2,097.38          | 30,119.20 |
| Mills         | 16              | 16              | 28,254.74 | 4,078.84  | .....         | .....             | 34,852.25 |
| Mitchell      | 15              | 12              | 15,271.40 | 1,206.39  | 1,931.67      | .....             | 18,409.46 |
| Monroe        | 12              | 12              | 32,227.87 | 7,871.99  | 2,228.51      | .....             | 39,197.21 |
| Montgomery    | 12              | 12              | 32,227.87 | 7,871.99  | .....         | .....             | 33,899.96 |
| Muscatine     | 14              | 14              | 32,227.87 | 7,871.99  | .....         | 3,877.63          | 44,070.50 |
| Oceola        | 11              | 11              | 38,250.01 | 6,810.48  | 6,281.43      | .....             | 51,411.91 |
| Page          | 16              | 16              | 30,070.93 | 9,409.35  | 1,033.33      | .....             | 39,514.01 |
| Polk          | 23              | 23              | 44,140.17 | 18,794.30 | 6,.....       | 487.07            | 69,474.53 |
| Pottawattamie | 18              | 18              | 49,401.65 | 11,000.34 | 19,340.84     | .....             | 80,142.83 |
| Pottawattamie | 18              | 18              | 35,208.02 | 6,740.32  | 1,578.63      | .....             | 43,526.97 |
| Pottawattamie | 18              | 18              | 37,700.00 | 11,800.00 | 2,070.00      | .....             | 51,570.00 |

|            |      |      |                 |               |               |              |                 |
|------------|------|------|-----------------|---------------|---------------|--------------|-----------------|
| Ringgold   | 16   | 11   | 12,225.75       | 2,408.05      | .....         | .....        | 16,163.80       |
| Scott      | 15   | 15   | 39,237.56       | 9,563.84      | 2,238.23      | .....        | 50,239.63       |
| Shoemaker  | 16   | 16   | 38,725.08       | 12,016.40     | 1,407.83      | 434.11       | 54,154.32       |
| Sioux      | 16   | 14   | 31,103.01       | 9,293.82      | 7,070.30      | .....        | 52,627.07       |
| Taylor     | 16   | 20   | 49,891.97       | 9,886.15      | 2,498.50      | .....        | 62,246.02       |
| Union      | 12   | 11   | 20,015.87       | 9,211.92      | .....         | .....        | 33,210.69       |
| Wapello    | 14   | 14   | 21,228.40       | 4,225.40      | 401.00        | 995.76       | 26,820.96       |
| Warren     | 16   | 11   | 27,013.00       | 7,128.29      | .....         | .....        | 34,241.74       |
| Washington | 16   | 9    | 24,714.20       | 7,146.71      | .....         | .....        | 32,184.00       |
| Webster    | 20   | 20   | 42,198.53       | 4,782.74      | 675.89        | .....        | 47,657.16       |
| Wells      | 21   | 21   | 21,105.52       | 6,137.86      | 28,184.89     | .....        | 55,428.27       |
| Wimpehsk   | 12   | 11   | 20,058.17       | 6,034.43      | .....         | .....        | 26,092.60       |
| Woodbury   | 22   | 22   | 15,045.89       | 4,128.02      | 3,417.07      | 185.01       | 22,715.99       |
| Wright     | 16   | 16   | 25,053.16       | 9,859.19      | 17,826.03     | .....        | 62,138.38       |
| Total      | 1000 | 1431 | \$ 2,287,209.70 | \$ 812,084.94 | \$ 233,456.91 | \$ 33,120.17 | \$ 4,041,871.72 |



SUMMARY TABLE NO. 16—Continued.

| County     | No. of townships each county. | No. of townships reporting. | Permanent Construction | Temporary Construction | Repairs        | Maintenance   | Equipment and Unused Material | Spec'l. Classes | Total           |
|------------|-------------------------------|-----------------------------|------------------------|------------------------|----------------|---------------|-------------------------------|-----------------|-----------------|
| Shelby     | 16                            | 16                          | 3,084.80               | 192.55                 | 84,060.82      | 13,516.40     | 1,377.81                      | 1,861.94        | 54,104.32       |
| Sioux      | 23                            | 23                          | 926.50                 | 14,083.36              | 12,559.94      | 17,047.64     | 3,559.62                      | 3,850.01        | 52,027.07       |
| Story      | 16                            | 14                          | 10,267.12              | 9,429.67               | 11,582.57      | 10,506.24     | 3,349.72                      | 2,958.78        | 48,094.10       |
| Tama       | 21                            | 20                          | 9,971.78               | 17,024.34              | 11,086.94      | 9,886.15      | 8,398.15                      | 5,279.26        | 62,246.62       |
| Taylor     | 17                            | 17                          | 1,836.30               | 400.95                 | 18,111.32      | 9,241.92      | 2,801.15                      | 1,127.45        | 33,519.09       |
| Union      | 12                            | 11                          | 3,018.87               | 3,702.57               | 21,069.63      | 5,879.95      | 2,697.18                      | 136.60          | 26,889.58       |
| Van Buren  | 14                            | 14                          | 2,472.01               | 1,152.69               | 11,673.18      | 4,525.40      | 4,801.77                      | 3,276.25        | 25,753.80       |
| Wapello    | 14                            | 14                          | 4,083.44               | 701.47                 | 11,580.90      | 7,172.87      | 3,821.20                      | 825.08          | 34,245.74       |
| Warren     | 15                            | 9                           | 3,967.76               | 40.00                  | 7,540.71       | 7,540.71      | 2,489.98                      | 1,843.76        | 32,314.91       |
| Washington | 16                            | 10                          | 9,103.85               | 21,181.56              | 6,730.87       | 4,378.19      | 4,962.94                      | 21,107.34       | 79,450.56       |
| Wayne      | 23                            | 21                          | 453.83                 | 1,178.92               | 6,293.68       | 16,666.84     | 2,108.29                      | 8,144.80        | 35,408.18       |
| Webster    | 12                            | 11                          | 1,881.35               | 8,865.51               | 18,364.48      | 6,157.85      | 5,234.60                      | 4,822.95        | 36,992.60       |
| Winnebago  | 20                            | 17                          | 962.60                 | 26,372.78              | 9,133.67       | 6,934.43      | 5,825.42                      | 6,557.35        | 60,183.25       |
| Woodbury   | 23                            | 21                          | 11,028.05              | 5,657.02               | 7,169.23       | 14,397.62     | 1,677.59                      | 3,483.74        | 21,659.38       |
| Worth      | 12                            | 10                          | 962.60                 | 18,816.90              | 5,810.68       | 4,128.05      | 2,542.66                      | 16,061.60       | 63,130.28       |
| Wright     | 16                            | 16                          | 459,917.84             | 815,743.57             | \$1,121,223.77 | \$ 838,357.66 | \$ 378,571.92                 | \$ 428,656.96   | \$ 4,041,871.72 |
| Total      | 1606                          | 1431                        | \$ 459,917.84          | \$ 815,743.57          | \$1,121,223.77 | \$ 838,357.66 | \$ 378,571.92                 | \$ 428,656.96   | \$ 4,041,871.72 |

SUMMARY TABLE NO. 20.

Progress Report—County Road Surveys and Construction During 1919—Annual Reports of County Engineers.

| County      | Surveys and Profiles |                   |   |   | Construction                            |   |   |           |
|-------------|----------------------|-------------------|---|---|---|---|---|-----------|
|             | No. miles surveyed.  | No. miles platted | No. miles grade line approved by Dist. Engrs. | No. miles profile approved by Commission. | Built to natural grade, standard width. | Built to temporary grade, standard width. | Built to permanent grade, standard width. | Surfaced. |
| Adair       |                      |                   |   |   | 64.00                                   |   |   |           |
| Adams       |                      |                   |   |   | 24.50                                   | 5.50                                      |   |           |
| Allamakee   | 3.50                 |                   |   |   | 28.50                                   |   |   |           |
| Appanoose   | .50                  |                   |   |   | 7.00                                    | .58                                       | .25                                       |           |
| Audubon     |                      |                   | 1.50  | 1.50                                      |   |   |   |           |
| Benton      | 18.00                |                   |   |   | 48.00                                   |   |   |           |
| Black Hawk  | 30.50                | 6.00              | 6.00  | 6.00                                      | 15.00                                   |   | 4.08                                      | 3.50      |
| Boone       | 5.75                 | 5.75              | 14.25   | 14.25                                     | 12.75                                   | 1.40                                      | 5.50                                      | 11.00     |
| Bremer      | 27.50                | 4.50              | 2.50  | 1.50                                      | 21.25                                   | 1.15                                      | 2.50                                      | 1.50      |
| Buchanan    |                      |                   |   |   | 28.55                                   |   |   |           |
| Buena Vista |                      |                   |   |   |   |   |   | 38.85     |
| Butler      | 24.25                | 4.00              |   |   | 22.00                                   |   |   |           |
| Calhoun     | 16.00                | 19.00             | 19.00   | 19.00                                     | 12.00                                   | 50.00                                     | 11.50                                     | 21.00     |
| Carroll     | 9.00                 |                   |   |   | 18.00                                   |   | .50                                       | 1.12      |
| Cass        |                      |                   |   |   |   |   |   |           |
| Cedar       |                      |                   |   |   |   |   |   |           |
| Cerro Gordo | 1.032                | 1.032             | 0.667   | 0.667                                     | 82.95                                   |   |   |           |
| Cherokee    | 7.80                 | 7.80              | 7.80  | 7.80                                      | 13.00                                   |   |   | 1.80      |
| Chickasaw   | 6.00                 | 6.00              |   |   | 13.50                                   |   | 11.25                                     |           |
| Clarke      | 11.00                | 11.00             | 11.00   | 11.00                                     | 20.50                                   | 15.80                                     | 15.80                                     | 9.50      |
| Clay        | 10.00                | 10.00             |   |   |   |   |   |           |
| Clayton     | 7.50                 |                   |   |   |   |   | .50                                       | 10.00     |
| Clinton     | 3.50                 | 1.00              |   |   |   |   |   |           |
| Crawford    | 5.50                 | 5.50              |   | 5.00                                      |   |   | 10.85                                     | .40       |
| Dallas      | 30.80                | 24.55             | 11.07   | 13.55                                     |   |   | 14.54                                     |           |
| Davis       | 18.25                | 6.00              | 6.00  | 6.00                                      | 25.75                                   |   | 16.68                                     | 7.18      |
| Decatur     | 10.25                |                   |   |   |   |   |   |           |
| Delaware    | 18.75                |                   |   |   | 3.50                                    | .50                                       |   |           |
| Des Moines  | 18.00                | 18.00             | 7.50  | 7.50                                      | 13.50                                   |   | 3.00                                      | 4.00      |
| Dickinson   |                      |                   |   |   |   |   |   |           |
| Dubuque     | 5.00                 |                   |   |   |   |   |   |           |
| Emmet       |                      |                   |   |   | 23.00                                   | 6.00                                      |   | 6.00      |
| Fayette     | 1.00                 | 1.00              | 13.25   |   | 3.00                                    |   | 14.95                                     | 38.50     |
| Floyd       | 40.00                | 35.00             |   |   | 13.00                                   | 20.88                                     |   | 2.50      |
| Franklin    | 14.17                | 2.00              | 2.00  | 2.00                                      | 1.00                                    | 1.25                                      | 4.63                                      | 11.04     |
| Fremont     | 13.00                | 13.00             | 17.00   | 17.00                                     | 22.00                                   |   | 10.00                                     | 3.50      |
| Greene      | 18.00                |                   |   |   |   |   |   |           |
| Grundy      | 17.50                | 11.50             | 11.50   | 10.50                                     | 9.50                                    |   | 7.50                                      | 2.575     |
| Guthrie     | 9.25                 | 6.00              |   | 6.00                                      | 10.00                                   |   | 7.00                                      |           |
| Hamilton    |                      |                   |   | 1.75                                      |   | 4.90                                      | .76                                       | 1.25      |
| Hancock     | 21.25                | 15.75             |   |   |   |   |   | 24.69     |
| Hardin      | 11.00                | 15.00             | 15.00   | 15.00                                     | 5.85                                    |   | 6.20                                      | 6.15      |
| Harrison    | 14.25                | 24.75             | 7.36  | 13.36                                     | 17.50                                   |   | 12.61                                     | 37.26     |
| Henry       | 15.60                | 15.60             |   | 15.60                                     |   | 21.50                                     |   |           |
| Howard      |                      |                   |   |   | 16.00                                   |   |   |           |
| Humboldt    | 1.00                 | 1.00              | 1.00  |   | 16.00                                   |   | 2.25                                      | 4.35      |
| Ida         | 49.50                | 15.00             | 2.50  | 2.50                                      |   |   | 14.60                                     | 12.25     |
| Iowa        |                      |                   |   |   |   |   |   |           |
| Jackson     |                      |                   |   |   | 13.00                                   |   | .85                                       |           |
| Jasper      |                      |                   |   |   |   |   | 1.50                                      | 1.25      |
| Jefferson   | 4.00                 | 2.00              | 1.00  |   | 15.75                                   | 1.00                                      | 3.75                                      | 4.12      |
| Johnson     |                      |                   |   |   | 5.00                                    |   | 11.50                                     |           |
| Jones       | 21.00                | 9.00              |   |   | 3.50                                    |   | 5.00                                      |           |
| Keokuk      |                      |                   |   |   |   |   |   |           |
| Kossuth     | 1.50                 |                   |   |   |   |   | 3.50                                      |           |
| Lee         | 45.00                | 23.00             | 19.50   | 19.50                                     | 28.00                                   |   | 22.05                                     | 2.40      |
| Linn        |                      |                   |   |   |   |   |   |           |
| Louis       | 13.00                |                   |   |   | 73.00                                   |   | 2.00                                      | 4.80      |
| Lucas       | 1.00                 | 1.00              | 1.00  | 1.00                                      |   |   |   |           |
| Lyon        |                      |                   |   |   | 20.00                                   |   |   |           |
| Total       | 16.29                | 13.61             | 4.00  | 4.00                                      | 34.50                                   | .10                                       |   | 1.00      |

SUMMARY TABLE NO. 20—Continued.

| County        | Surveys and Profiles |                   |  |   | Construction                           |  |  |           |
|---------------|----------------------|-------------------|--|---|--|--|--|-----------|
|               | No. miles surveyed.  | No. miles platted | No. miles grade improved by Dist. Engrs. | No. miles profile approved by Commission. | Built to natural grade standard width. | Built to temporary grade standard width. | Built to permanent grade standard width. | Surfaced. |
| Madison       | 14.75                |                   |  |   | 22.25                                  |  |  |           |
| Mahaska       | 5.00                 |                   |  |   | 12.00                                  |  |  |           |
| Marion        | 21.75                |                   |  |   | 38.00                                  |  |  |           |
| Marshall      | 20.50                |                   |  |   | 32.00                                  |  |  |           |
| Mills         | 14.00                |                   |  |   | 11.50                                  |  |  |           |
| Mitchell      | 15.75                |                   |  |   | 15.50                                  |  |  |           |
| Monona        | 11.10                |                   |  |   |  |  |  |           |
| Monroe        | 22.50                |                   |  |   | 84.85                                  |  |  |           |
| Montgomery    | 21.40                |                   |  |   | 19.00                                  |  |  |           |
| Muscataine    | 15.50                |                   |  |   | 21.50                                  |  |  |           |
| O'Brien       | 9.00                 |                   |  |   | 7.50                                   |  |  |           |
| Oscola        | 1.50                 |                   |  |   | 11.95                                  |  |  |           |
| Page          | 10.75                |                   |  |   | 17.00                                  |  |  |           |
| Palo Alto     | 13.00                |                   |  |   | 12.00                                  |  |  |           |
| Plymouth      | 30.50                |                   |  |   | 28.00                                  |  |  |           |
| Pocahontas    | 55.75                |                   |  |   | 48.75                                  |  |  |           |
| Polk          | 18.00                |                   |  |   | 2.00                                   |  |  |           |
| Pottawattamie |                      |                   |  |   | 1.00                                   |  |  |           |
| Poweshiek     |                      |                   |  |   | 10.50                                  |  |  |           |
| Ringgold      | 12.00                |                   |  |   | 10                                     |  |  |           |
| Sac           |                      |                   |  |   | 12.00                                  |  |  |           |
| Scott         | 53.83                |                   |  |   | 39.00                                  |  |  |           |
| Shelby        |                      |                   |  |   | 4.00                                   |  |  |           |
| Sioux         | 13.50                |                   |  |   | 53.00                                  |  |  |           |
| Story         | 7.00                 |                   |  |   |  |  |  |           |
| Tama          |                      |                   |  |   | 10.00                                  |  |  |           |
| Taylor        |                      |                   |  |   | 5.50                                   |  |  |           |
| Union         | 3.00                 |                   |  |   | 14.00                                  |  |  |           |
| Van Buren     |                      |                   |  |   |  |  |  |           |
| Wapello       |                      |                   |  |   |  |  |  |           |
| Warren        |                      |                   |  |   |  |  |  |           |
| Washington    | .50                  |                   |  |   |  |  |  |           |
| Wayne         |                      |                   |  |   |  |  |  |           |
| Webster       | 22.50                |                   |  |   | 35.32                                  |  |  |           |
| Winneshago    | 30.00                |                   |  |   | 18.00                                  |  |  |           |
| Winneshiek    | 1.00                 |                   |  |   | 1.00                                   |  |  |           |
| Woodbury      | 11.00                |                   |  |   |  |  |  |           |
| Worth         | 4.00                 |                   |  |   |  |  |  |           |
| Wright        | 31.25                |                   |  |   | 31.25                                  |  |  |           |
| Total         | 1,099.29             | 633.71            | 375.85                                   | 380.58                                    | 1,407.89                               | 141.64                                   | 372.83                                   | 938.93    |

SUMMARY TABLE NO. 21.  
Progress Report—County and Primary Road Construction—Total Work Done to Jan. 1, 1920—Annual Reports by County Engineers.

| County      | County Road System      |  |  |          | Primary Road System     |                                     |  |  |  |          |                         |                                      |
|-------------|-------------------------|--|--|----------|-------------------------|-------------------------------------|--|--|--|----------|-------------------------|--------------------------------------|
|             | Built to natural width. | Built to temporary grade standard width. | Built to permanent grade standard width. | Surfaced | Maintenance and repairs | Total No. of miles in county system | Built to natural grade standard width. | Built to temporary grade standard width. | Built to permanent grade standard width. | Surfaced | Maintenance and repairs | Total No. of miles in primary system |
| Adair       | 115.70                  |  |  |          | 89.25                   | 109.25                              | 115.70                                 |  |  |          |                         | 96.30                                |
| Adams       | 30.50                   |  |  |          | 30.50                   | 30.50                               | 30.50                                  |  |  |          |                         | 30.50                                |
| Adair       | 54.00                   |  |  |          | 54.00                   | 54.00                               | 54.00                                  |  |  |          |                         | 54.00                                |
| Appanoose   | 196.81                  |  |  |          | 196.81                  | 196.81                              | 196.81                                 |  |  |          |                         | 196.81                               |
| Audubon     | 7.00                    |  |  |          | 7.00                    | 7.00                                | 7.00                                   |  |  |          |                         | 7.00                                 |
| Black Hawk  | 65.75                   |  |  |          | 65.75                   | 65.75                               | 65.75                                  |  |  |          |                         | 65.75                                |
| Boone       | 125.75                  |  |  |          | 125.75                  | 125.75                              | 125.75                                 |  |  |          |                         | 125.75                               |
| Buchanan    | 114.00                  |  |  |          | 114.00                  | 114.00                              | 114.00                                 |  |  |          |                         | 114.00                               |
| Bumma Vheta | 38.50                   |  |  |          | 38.50                   | 38.50                               | 38.50                                  |  |  |          |                         | 38.50                                |
| Calhoun     | 58.00                   |  |  |          | 58.00                   | 58.00                               | 58.00                                  |  |  |          |                         | 58.00                                |
| Carroll     | 86.71                   |  |  |          | 86.71                   | 86.71                               | 86.71                                  |  |  |          |                         | 86.71                                |
| Cedar       | 72.00                   |  |  |          | 72.00                   | 72.00                               | 72.00                                  |  |  |          |                         | 72.00                                |
| Cerro Gordo | 57.31                   |  |  |          | 57.31                   | 57.31                               | 57.31                                  |  |  |          |                         | 57.31                                |
| Chickasaw   | 33.50                   |  |  |          | 33.50                   | 33.50                               | 33.50                                  |  |  |          |                         | 33.50                                |
| Clatsop     | 73.19                   |  |  |          | 73.19                   | 73.19                               | 73.19                                  |  |  |          |                         | 73.19                                |
| Clinton     | 55.75                   |  |  |          | 55.75                   | 55.75                               | 55.75                                  |  |  |          |                         | 55.75                                |
| Clinton     | 57.31                   |  |  |          | 57.31                   | 57.31                               | 57.31                                  |  |  |          |                         | 57.31                                |
| Dallas      | 30.50                   |  |  |          | 30.50                   | 30.50                               | 30.50                                  |  |  |          |                         | 30.50                                |
| Davis       | 90.30                   |  |  |          | 90.30                   | 90.30                               | 90.30                                  |  |  |          |                         | 90.30                                |
| Delaware    | 34.25                   |  |  |          | 34.25                   | 34.25                               | 34.25                                  |  |  |          |                         | 34.25                                |
| Des Moines  | 43.00                   |  |  |          | 43.00                   | 43.00                               | 43.00                                  |  |  |          |                         | 43.00                                |

SUMMARY TABLE No. 21—Continued.

| County        | County Road System                      |  |  |          |                         |                                      | Primary Road System                     |  |  |          |                         |                                      |
|---------------|---|--|--|----------|-------------------------|--------------------------------------|---|--|--|----------|-------------------------|--------------------------------------|
|               | Built to natural grade, standard width. | Built to temporary grade, standard width | Built to permanent grade, standard width | Surfaced | Maintenance and repairs | Total No. of miles in primary system | Built to natural grade, standard width. | Built to temporary grade, standard width | Built to permanent grade, standard width | Surfaced | Maintenance and repairs | Total No. of miles in primary system |
| Dickinson     | 14.00                                   | 9.00                                     | 12.00                                    | 22.00    | 14.00                   | 71.00                                |   | 2.00                                     |  |          | 39.00                   | 41.00                                |
| Dubuque       | 19.00                                   | 6.00                                     |  |          | 71.65                   | 91.65                                | 21.50                                   |  |  |          | 23.40                   | 80.00                                |
| Emmet         | 2.00                                    |  | 13.50                                    | 52.25    | 1.25                    | 69.00                                | 3.00                                    |  |  |          | 34.00                   | 37.00                                |
| Fayette       | 106.21                                  |  |  | 2.50     |                         | 108.71                               | 63.41                                   | 21.88                                    |  |          | 6.00                    | 94.29                                |
| Floyd         | 81.77                                   | 1.25                                     |  | 6.60     | 6.14                    | 95.82                                | 41.58                                   |  |  |          | 11.02                   | 52.60                                |
| Franklin      | 112.13                                  |  | 11.00                                    | 20.50    | 15.12                   | 158.75                               | 15.00                                   |  |  |          | 2.00                    | 41.00                                |
| Fremont       | 139.00                                  |  |  |          |                         | 139.00                               |   |  |  |          | 1.00                    | 51.00                                |
| Greene        | 29.75                                   |  | 9.30                                     | 17.75    | 14.45                   | 71.25                                |   |  |  |          | 1.50                    | 67.63                                |
| Grundy        | 111.50                                  |  | 8.00                                     |          |                         | 119.50                               | 32.75                                   |  |  |          | 1.50                    | 59.50                                |
| Guthrie       | 61.55                                   | .19                                      | .40                                      |          | 64.31                   | 126.45                               | 30.69                                   | .13                                      |  |          | 1.39                    | 64.50                                |
| Hamilton      | 47.43                                   | 4.90                                     | 23.99                                    | 59.28    | 1.50                    | 136.70                               | 16.30                                   |  |  | 13.43    | 15.07                   | 69.50                                |
| Hancock       | 49.43                                   | 9.25                                     | 10.00                                    | 8.00     | 41.74                   | 118.59                               |   |  |  |          | 29.10                   | 51.00                                |
| Hardin        | 80.37                                   |  | 15.90                                    | 25.90    |                         | 121.77                               | 7.50                                    |  |  | 5.00     |                         | 78.00                                |
| Harrison      | 35.00                                   | 1.40                                     |  | 9.75     | 43.25                   | 50.00                                | 73.00                                   |  |  |          | 1.00                    | 50.50                                |
| Henry         | 76.00                                   |  | .50                                      |          | 15.30                   | 91.80                                | 49.00                                   | .50                                      |  |          | 10.00                   | 50.77                                |
| Howard        | 60.18                                   | 3.00                                     | 7.00                                     | 5.60     | 1.50                    | 76.68                                | 32.77                                   |  |  |          | 15.80                   | 40.80                                |
| Humboldt      | 41.65                                   |  | 16.30                                    | 37.25    |                         | 94.60                                | 7.00                                    |  |  |          | 3.00                    | 52.00                                |
| Ia            | 64.00                                   | 1.25                                     |  |          | 14.75                   | 80.00                                | 20.00                                   |  |  |          |                         | 70.00                                |
| Iowa          | 45.00                                   | 23.72                                    | 5.35                                     |          | 22.00                   | 106.07                               | 18.00                                   |  |  |          | 2.50                    | 46.30                                |
| Jackson       | 35.00                                   | 52.20                                    |  |          | 30.00                   | 118.20                               |   |  |  |          | 19.00                   | 88.40                                |
| Jasper        | 111.40                                  |  |  |          | 5.00                    | 116.40                               | 19.78                                   | 45.50                                    |  |          | 4.12                    | 47.55                                |
| Jefferson     | 79.75                                   |  |  |          | 14.00                   | 93.75                                | 36.05                                   |  |  |          | 11.50                   | 71.50                                |
| Johnson       | 103.00                                  |  |  |          |                         | 103.00                               | 51.00                                   | 2.00                                     | 14.50                                    |          | 4.00                    | 51.55                                |
| Jones         |   | 10.00                                    | 6.00                                     | 3.50     | 115.90                  | 135.40                               |   |  |  | 4.00     | 3.50                    | 79.30                                |
| Kearney       | 31.00                                   |  | 4.09                                     |          | 70.91                   | 106.00                               | 56.80                                   |  |  | 25.50    | 20.80                   | 89.00                                |
| Kossuth       | 139.20                                  | .50                                      | 22.80                                    | 11.50    | 17.00                   | 191.00                               | 39.33                                   |  |  |          | 6.00                    | 78.00                                |
| Lee           | 87.00                                   | 1.50                                     |  |          | 96.50                   | 62.00                                |   |  |  |          | 2.00                    | 100.00                               |
| Linn          | 60.00                                   | 12.00                                    |  | 8.00     | 60.00                   | 115.00                               | 72.00                                   | 5.00                                     |  |          | 7.97                    | 59.00                                |
| Louis         | 44.44                                   |  |  |          | 22.46                   | 66.90                                | 39.46                                   |  |  |          |                         | 83.00                                |
| Lucas         | 30.00                                   |  |  |          | 72.00                   | 102.00                               |   |  |  |          |                         | 64.64                                |
| Lyon          | 107.74                                  |  | 9.00                                     | 1.00     | 6.50                    | 123.74                               | 39.70                                   |  | 1.35                                     |          | 2.50                    |                                      |
| Madison       | 80.40                                   |  | .75                                      |          | 26.35                   | 107.50                               | 46.50                                   | .00                                      |  | .75      | 9.33                    | 57.50                                |
| Mahaska       | 59.25                                   | 13.00                                    | 3.75                                     |          |                         | 76.00                                | 44.00                                   | 32.25                                    |  | 5.75     | 5.00                    | 87.00                                |
| Marion        | 92.04                                   | 1.02                                     |  |          |                         | 98.00                                | 75.25                                   |  |  | 16.75    |                         | 92.00                                |
| Marshall      | 125.54                                  |  | 13.25                                    | 4.30     |                         | 143.15                               | 33.53                                   |  |  | 16.75    |                         | 50.30                                |
| Mills         | 62.00                                   |  |  |          | 13.70                   | 75.70                                | 27.50                                   | 21.50                                    |  |          |                         | 49.00                                |
| Mitchell      | 44.00                                   |  |  | 2.00     | 34.40                   | 80.40                                | 17.50                                   |  |  | 4.50     | 4.50                    | 52.30                                |
| Monona        | 72.00                                   | 5.50                                     | 9.25                                     |          | 11.25                   | 98.63                                | 38.40                                   |  |  | 5.00     | 3.87                    | 67.87                                |
| Monroe        | 114.75                                  | .50                                      |  |          |                         | 115.25                               | 53.75                                   |  |  | 3.00     |                         | 56.75                                |
| Montgomery    | 52.90                                   |  |  |          | 28.00                   | 80.90                                | 45.30                                   | 3.00                                     |  | 2.00     |                         | 50.30                                |
| Muscatine     | 44.83                                   |  | 26.70                                    | 2.02     |                         | 73.55                                | 63.39                                   |  |  | 5.47     | 2.39                    | 81.75                                |
| O'Brien       | 59.17                                   | 4.44                                     | 53.39                                    |          |                         | 117.00                               | 71.00                                   | 2.00                                     |  |          |                         | 73.00                                |
| Osceola       | 90.00                                   |  |  | 1.00     |                         | 91.00                                | 4.50                                    |  | 6.50                                     | 30.00    |                         | 41.00                                |
| Page          | 63.30                                   | 45.00                                    | 3.00                                     | 8.30     |                         | 120.00                               | 60.00                                   |  |  |          |                         | 60.00                                |
| Palo Alto     | 7.30                                    | .10                                      | 93.24                                    | 1.05     |                         | 146.74                               | 108.38                                  | 10.24                                    |  | 40.12    | 1.78                    | 50.40                                |
| Plymouth      | 7.00                                    | 3.00                                     |  |          | 118.00                  | 128.00                               | 5.00                                    | 1.00                                     |  |          |                         | 112.00                               |
| Pocahontas    | 33.45                                   |  | 20.45                                    | 50.50    | 15.60                   | 120.00                               | 4.10                                    |  |  | 20.15    | 26.83                   | 90.10                                |
| Polk          | 97.67                                   |  | 1.00                                     | 10.58    |                         | 109.25                               | 34.25                                   |  |  | 19.25    | 34.75                   | 88.25                                |
| Pottawattamie | 144.24                                  |  | 2.25                                     | .25      |                         | 146.74                               | 108.38                                  | 10.24                                    |  | 3.96     | 1.75                    | 124.33                               |
| Poweshiek     | 71.20                                   |  |  |          | 4.00                    | 75.20                                | 54.50                                   |  | 11.60                                    |          |                         | 66.10                                |
| Ringgold      |   |  |  |          | 182.85                  | 182.85                               |   |  |  | .75      |                         | 51.25                                |
| Sac           |   | 4.21                                     | 40.35                                    | 13.87    | .29                     | 58.72                                |   |  |  | 62.14    | 29.99                   | 92.13                                |
| Scott         | 33.00                                   | 3.60                                     | 8.33                                     | 12.23    | 23.67                   | 80.88                                | 35.00                                   |  |  | 9.23     | 25.37                   | 72.29                                |
| Shelby        | 67.00                                   |  |  |          | 42.30                   | 109.30                               | 32.00                                   | .40                                      |  | .30      |                         | 15.75                                |
| Sioux         | 113.50                                  |  | 7.00                                     |          | 61.50                   | 182.00                               | 46.00                                   |  |  | 3.00     |                         | 67.00                                |
| Story         |   |  | 52.50                                    | 20.00    |                         | 3.00                                 | 75.50                                   |  |  | 13.00    | 50.00                   | 63.00                                |
| Tama          | 133.40                                  | 9.00                                     |  |          |                         | 140.00                               | 39.10                                   |  |  | 28.70    | 2.30                    | 70.00                                |
| Taylor        | 75.00                                   |  |  |          | 46.13                   | 121.13                               | 45.00                                   |  |  |          |                         | 6.50                                 |
| Union         | 4.50                                    |  |  |          | 99.25                   | 103.75                               | 1.00                                    |  |  |          |                         | 53.25                                |
| Van Buren     | 91.44                                   |  |  |          | 91.44                   | 91.44                                | 42.36                                   |  |  | 4.00     |                         | 46.36                                |
| Wapello       | 88.13                                   | 4.00                                     | 1.00                                     |          |                         | 93.13                                | 26.00                                   |  |  | 4.00     |                         | 44.00                                |
| Warren        | 88.45                                   |  |  |          |                         | 88.45                                | 76.30                                   | .25                                      |  | 3.75     |                         | 55.85                                |
| Washington    | 110.30                                  |  | .50                                      |          | 7.00                    | 117.80                               | 66.30                                   |  |  | 8.40     |                         | 74.70                                |
| Wayne         | 102.00                                  | .12                                      | .50                                      |          | 10.00                   | 112.62                               | 61.50                                   |  |  |          |                         | 61.50                                |
| Webster       | 66.50                                   |  | 4.00                                     | 2.50     | 31.95                   | 104.95                               | 54.00                                   |  |  | 8.00     | 30.30                   | 82.30                                |
| Winnabago     | 58.00                                   |  |  |          | 25.00                   | 83.00                                | 41.00                                   |  |  |          |                         | 47.00                                |
| Winneshiek    | 97.10                                   |  | .75                                      |          | 21.85                   | 119.70                               | 73.83                                   |  |  |          |                         | 82.83                                |
| Woodbury      |   | 9.35                                     |  | .17      | 79.27                   | 88.80                                |   |  |  | 70.24    |                         | 125.20                               |
| Worth         | 73.94                                   |  |  | 1.00     | 3.50                    | 80.24                                | 30.20                                   |  |  | 6.50     |                         | 36.70                                |
| Wright        | 45.50                                   |  | 14.25                                    |          | 63.25                   | 120.00                               | 40.00                                   |  |  |          |                         | 60.00                                |
| Total         | 6,378.41                                | 284.81                                   | 963.12                                   | 552.60   | 2,363.76                | 10,442.70                            | 3,248.97                                | 257.47                                   | 879.00                                   | 708.63   | 1,336.95                | 6,421.02                             |

SUMMARY TABLE NO. 24.

Cost of Engineering—Annual Reports of County Engineers.

| County      | Roads           |           |                    |          | Total     | Bridges         |           |                    |          | Total       | Total Cost of Engineering |
|-------------|-----------------|-----------|--------------------|----------|-----------|-----------------|-----------|--------------------|----------|-------------|---------------------------|
|             | County Engineer |           | Assistant Engineer |          |           | County Engineer |           | Assistant Engineer |          |             |                           |
|             | Salary          | Expenses  | Salary             | Expenses |           | Salary          | Expenses  | Salary             | Expenses |             |                           |
| Adair       | \$ 426.00       | \$ 182.00 | \$ 211.73          |          | \$ 819.73 | \$ 1,374.00     | \$ 512.54 | \$ 649.81          |          | \$ 2,536.35 | \$ 33,560.08              |
| Adams       | 561.00          | 351.20    | 73.99              |          | 986.10    | 1,124.00        | 703.68    | 73.90              |          | 1,901.58    | 2,887.68                  |
| Allamakee   | 800.00          | 400.00    | 211.68             | \$ 31.68 | 1,443.36  | 880.00          | 437.31    | 565.91             | 21.00    | 1,904.22    | 3,347.58                  |
| Appanoose   | 856.00          | 19.26     |                    |          | 875.26    | 944.00          | 21.32     |                    |          | 965.32      | 1,840.58                  |
| Audubon     | 800.00          | 66.39     | 286.95             |          | 1,153.34  | 1,600.00        | 66.40     | 286.95             |          | 1,953.35    | 3,106.69                  |
| Benton      | 564.98          | 235.54    |                    |          | 800.52    | 2,240.00        | 943.00    | 89.00              |          | 3,272.00    | 4,072.52                  |
| Black Hawk  | 1,037.43        | 284.50    | 2,393.28           | 447.98   | 4,163.19  | 1,637.43        | 284.50    |                    |          | 1,321.93    | 5,485.12                  |
| Boone       | 752.00          | 491.12    | 2,249.05           | 494.20   | 3,986.37  | 1,128.00        | 736.70    | 794.75             | 268.75   | 2,928.20    | 6,914.57                  |
| Bremer      | 430.56          | 327.02    | 1,028.60           | 91.09    | 1,877.27  | 914.94          | 694.89    | 484.05             | 42.87    | 2,136.75    | 4,014.02                  |
| Buchanan    | 966.50          | 405.00    | 125.00             |          | 1,496.50  | 966.50          | 405.00    |                    |          | 1,371.50    | 2,868.00                  |
| Buena Vista | 1,239.25        | 462.31    | 626.08             | 424.50   | 2,752.14  | 741.75          | 347.09    | 307.49             | 78.50    | 1,474.83    | 4,226.97                  |
| Butler      | 966.72          | 926.58    | 857.19             | 41.70    | 2,822.19  | 653.28          | 325.37    | 202.91             |          | 1,181.56    | 4,003.75                  |
| Calhoun     | 1,499.15        | 706.08    | 506.27             |          | 2,711.50  | 349.79          | 143.07    | 155.52             |          | 648.38      | 3,359.88                  |
| Carrroll    | 888.22          | 482.00    | 902.01             |          | 2,272.23  | 1,086.78        | 673.60    | 863.24             |          | 2,623.62    | 4,895.85                  |
| Cass        |                 |           |                    |          |           | 2,199.96        | 689.62    | 537.47             | 7.07     | 3,434.12    | 3,434.12                  |
| Cedar       | 656.36          | 141.32    | 250.86             | 46.44    | 1,103.98  | 1,454.62        | 532.66    | 1,415.19           | 631.17   | 4,063.64    | 5,137.62                  |
| Cerro Gordo | 1,130.00        | 400.00    | 900.00             | 325.00   | 2,755.00  | 1,000.00        | 370.09    | 754.00             | 264.72   | 2,388.72    | 5,143.72                  |
| Cherokee    | 957.31          | 227.16    | 2,020.25           | 195.42   | 3,400.14  | 1,307.50        | 310.17    | 1,792.43           | 173.41   | 3,583.51    | 6,983.65                  |
| Chickasaw   | 488.20          | 429.72    | 210.55             | 26.38    | 1,154.85  | 488.20          | 429.72    | 210.55             | 26.39    | 1,154.86    | 2,309.71                  |
| Clarke      | 900.00          | 510.76    |                    |          | 1,410.76  | 900.00          | 510.76    |                    |          | 1,410.76    | 2,821.52                  |
| Clay        | 1,293.95        | 339.22    | 1,190.85           |          | 2,824.02  | 971.75          | 58.70     | 183.90             |          | 814.35      | 3,638.37                  |
| Clayton     | 100.00          | 65.05     |                    |          | 165.05    | 1,660.00        | 567.85    |                    |          | 2,227.85    | 2,392.90                  |
| Clinton     | 1,080.90        | 430.00    | 1,498.26           | 142.62   | 3,151.78  | 885.78          | 369.04    | 1,280.99           |          | 2,535.81    | 5,687.59                  |
| Crawford    | 1,124.98        | 441.98    | 4,163.72           | 1,012.20 | 6,742.88  | 1,395.02        | 241.22    | 2,013.93           | 578.77   | 4,228.94    | 10,971.82                 |
| Dallas      | 1,256.00        | 372.33    | 1,328.89           | 356.06   | 3,313.28  | 930.00          | 280.86    | 488.72             | 149.90   | 1,849.56    | 5,162.84                  |
| Davis       | 795.00          |           |                    |          | 795.00    | 795.00          |           |                    |          | 795.00      | 1,590.00                  |
| Decatur     | 1,462.77        | 179.23    | 1,064.50           |          | 2,706.50  | 792.81          | 156.89    | 1,107.80           |          | 2,067.50    | 4,764.00                  |
| Delaware    | 900.00          | 231.54    | 658.97             |          | 1,790.51  | 900.00          | 345.50    | 135.00             |          | 1,380.50    | 3,171.01                  |
| Des Moines  | 892.36          |           | 545.27             |          | 1,437.63  | 987.18          |           | 451.64             |          | 1,448.82    | 2,886.45                  |

|               |          |          |           |        |           |          |          |          |        |          |           |
|---------------|----------|----------|-----------|--------|-----------|----------|----------|----------|--------|----------|-----------|
| Dickinson     | 991.88   | 350.56   | 569.50    | 17.25  | 1,929.19  | 779.12   | 350.56   | 297.27   | 17.25  | 1,444.20 | 3,373.39  |
| Dubuque       | 1,375.00 | 1,147.76 | 600.00    |        | 3,122.76  | 1,375.00 | 1,147.76 | 611.20   |        | 3,133.96 | 6,256.72  |
| Emmet         | 1,339.96 | 232.56   | 1,958.00  | 465.12 | 3,995.70  | 462.62   | 86.50    | 723.79   | 173.01 | 1,445.92 | 5,441.62  |
| Fayette       | 610.00   | 103.40   | 75.00     |        | 778.40    | 1,200.00 | 204.00   | 600.00   |        | 2,004.00 | 2,282.40  |
| Floyd         | 1,056.00 | 962.72   | 651.49    |        | 2,670.21  | 744.00   | 400.00   | 300.00   |        | 1,444.00 | 4,114.21  |
| Franklin      | 1,092.00 | 335.82   | 2,013.83  | 815.78 | 4,257.43  | 858.00   | 263.88   | 1,037.43 | 420.24 | 2,579.55 | 6,836.98  |
| Franklin      | 900.00   | 306.00   | 400.00    |        | 1,600.00  | 970.23   | 336.49   | 479.19   |        | 1,785.91 | 3,385.91  |
| Greene        | 742.31   | 551.45   | 2,228.59  | 841.28 | 4,363.63  | 1,057.69 | 785.87   | 882.60   | 207.57 | 2,933.73 | 7,297.36  |
| Grundy        | 600.00   | 192.00   | 1,566.35  | 319.79 | 2,678.14  | 1,400.00 | 447.58   | 1,566.36 | 319.79 | 3,733.73 | 6,411.87  |
| Guthrie       | 914.15   | 243.46   | 424.30    | 36.80  | 1,618.71  | 1,173.35 | 376.82   | 507.75   | 133.35 | 2,191.27 | 3,809.98  |
| Hamilton      | 937.62   | 268.54   | 1,440.60  | 370.01 | 3,016.77  | 1,062.38 | 371.05   | 427.00   | 34.90  | 1,895.33 | 4,912.10  |
| Hancock       | 1,180.53 | 390.26   | 1,413.60  | 88.12  | 3,070.51  | 559.72   | 256.01   | 171.75   | 20.60  | 1,008.08 | 4,078.59  |
| Hardin        | 1,569.44 | 467.27   | 1,725.52  | 178.78 | 3,941.01  | 1,793.50 | 719.53   | 918.50   | 259.76 | 3,691.29 | 7,632.30  |
| Harrison      | 916.30   | 274.33   | 24.00     |        | 1,215.23  | 1,021.30 | 406.00   | 40.00    |        | 1,467.30 | 2,682.53  |
| Henry         | 1,000.00 | 100.00   |           |        | 1,100.00  | 700.00   | 31.10    |          |        | 731.10   | 1,831.10  |
| Howard        | 889.74   | 147.91   | 441.75    | 21.85  | 1,501.25  | 683.70   | 324.20   | 348.20   |        | 1,356.10 | 2,857.35  |
| Humboldt      | 2,470.00 |          | 1,901.33  |        | 4,371.33  | 580.00   |          | 175.00   |        | 755.00   | 5,126.33  |
| Iowa          | 300.00   | 100.00   | 110.00    |        | 500.00    | 1,700.00 | 454.91   | 80.75    |        | 2,235.66 | 2,735.66  |
| Iowa          | 584.24   | 410.00   | 413.47    |        | 1,407.71  | 1,232.07 | 822.33   | 819.15   | 11.31  | 2,884.86 | 4,292.57  |
| Jackson       | 750.00   | 464.78   | 152.10    |        | 1,366.88  | 750.00   | 500.00   | 40.00    |        | 1,290.00 | 2,656.88  |
| Jasper        | 1,050.00 | 186.64   | 504.70    | 22.09  | 1,763.43  | 1,150.00 | 325.55   | 545.00   | 28.95  | 2,050.10 | 3,813.53  |
| Jefferson     | 1,030.00 | 521.70   | 1,804.85  |        | 3,356.55  | 770.00   | 390.00   | 327.37   |        | 1,487.37 | 4,843.92  |
| Johnson       | 1,500.00 | 300.00   | 5,330.00  |        | 7,130.00  | 1,500.00 | 528.04   | 150.00   |        | 2,178.04 | 9,308.04  |
| Jones         | 500.00   | 11.00    | 50.00     |        | 561.00    | 1,055.00 | 6.13     | 29.50    |        | 1,090.63 | 1,651.63  |
| Keokuk        | 958.00   | 148.25   | 355.50    |        | 1,461.75  | 958.02   | 446.09   | 515.44   |        | 1,919.55 | 3,381.30  |
| Kossuth       | 720.00   | 1,229.23 | 4,751.73  | 305.60 | 7,006.65  | 1,080.00 | 1,229.23 | 527.97   | 33.97  | 2,871.17 | 9,877.82  |
| Lee           | 425.00   | 110.00   | 145.00    |        | 680.00    | 1,525.00 | 370.00   | 515.00   |        | 2,410.00 | 3,090.00  |
| Linn          | 1,218.75 | 609.36   | 944.36    | 310.96 | 3,083.43  | 1,218.75 | 609.36   | 944.36   | 310.96 | 3,083.43 | 6,166.86  |
| Louisa        | 635.00   | 146.04   | 599.09    |        | 1,380.13  | 900.00   | 146.05   | 1,198.18 |        | 2,244.23 | 3,124.36  |
| Lucas         | 600.00   |          |           |        | 600.00    | 1,200.00 |          |          |        | 1,200.00 | 1,800.00  |
| Lyon          | 1,400.00 | 226.95   | 1,160.95  | 257.67 | 3,045.57  | 60.00    | 113.50   | 419.76   | 43.32  | 1,176.58 | 4,222.15  |
| Madison       | 796.00   | 245.94   | 930.00    |        | 1,971.94  | 796.00   | 245.95   | 930.00   |        | 1,971.95 | 3,943.89  |
| Mahaska       | 835.00   | 415.10   | 828.00    | 16.22  | 2,094.32  | 965.00   | 476.11   | 490.00   | 20.00  | 1,951.11 | 4,045.43  |
| Marion        | 1,567.00 | 199.10   | 566.96    | 24.70  | 2,357.76  | 1,106.33 | 109.70   | 914.64   | 395.10 | 2,525.77 | 4,883.53  |
| Marshall      | 1,518.00 | 33.26    | 2,355.26  | 5.80   | 3,912.32  | 1,137.00 |          | 1,978.52 |        | 3,115.52 | 7,027.84  |
| Mills         | 690.00   | 333.90   | 65.50     |        | 999.40    | 1,200.00 | 667.60   | 321.95   |        | 2,189.55 | 3,188.95  |
| Mitchell      | 600.00   | 300.00   | 1,197.87  | 114.50 | 2,212.37  | 1,200.00 | 474.82   |          |        | 1,674.82 | 3,887.19  |
| Monona        | 600.00   | 15.00    |           |        | 615.00    | 2,024.07 | 18.42    | 362.40   |        | 2,404.89 | 3,019.89  |
| Monroe        | 720.00   | 72.20    | 873.06    |        | 1,665.26  | 1,080.00 | 82.38    | 165.00   |        | 1,327.38 | 2,992.64  |
| Montgomery    | 1,050.00 | 15.70    | 195.72    | 404.70 | 1,666.12  | 2,000.00 | 15.70    | 275.00   | 800.00 | 3,060.70 | 4,756.82  |
| Muscatine     | 1,100.00 | 14.00    | 1,100.00  | 60.00  | 2,274.00  | 1,361.61 | 13.75    | 1,020.39 | 61.69  | 2,412.44 | 4,686.41  |
| O'Brien       | 1,183.32 |          | 1,072.23  | 926.96 | 3,182.51  | 1,183.32 |          | 500.00   | 485.00 | 2,168.32 | 5,350.83  |
| Osceola       | 708.00   | 212.39   | 1,360.00  | 135.00 | 2,415.39  | 1,480.00 | 412.50   | 1,025.00 | 102.58 | 3,090.08 | 5,435.47  |
| Page          | 1,000.00 | 183.89   | 325.00    |        | 1,508.89  | 1,250.00 | 200.00   | 494.60   |        | 1,944.60 | 3,453.49  |
| Palo Alto     | 984.15   | 260.38   | 384.15    | 262.50 | 1,891.18  | 1,035.85 | 379.28   | 49.75    | 9.74   | 1,474.62 | 3,365.80  |
| Plymouth      | 1,200.00 | 439.24   | 1,282.69  |        | 2,921.93  | 699.99   | 300.00   |          |        | 999.99   | 3,921.92  |
| Pocahontas    | 1,507.50 | 356.10   | 3,929.00  | 604.24 | 6,396.84  | 1,038.70 | 92.26    | 337.64   | 116.94 | 1,585.54 | 7,982.38  |
| Polk          | 1,558.38 | 470.85   | 12,138.54 | 230.22 | 14,397.99 | 1,360.37 | 470.85   | 2,930.10 | 623.56 | 5,884.88 | 19,772.87 |
| Pottawattamie | 844.63   | 222.05   | 1,085.74  | 442.05 | 2,593.87  | 1,688.06 | 618.10   | 2,171.50 | 710.10 | 5,187.76 | 7,781.63  |
| Poweshiek     | 920.00   | 202.64   |           |        | 1,122.64  | 920.00   | 370.00   |          |        | 1,290.00 | 2,412.64  |

SUMMARY TABLE NO. 24—Continued.

| County            | Roads               |                     |                      |                     | Total                | Bridges              |                     |                     |                    | Total                | Total Cost of Eng'ering |
|-------------------|---------------------|---------------------|----------------------|---------------------|----------------------|----------------------|---------------------|---------------------|--------------------|----------------------|-------------------------|
|                   | County Engineer     |                     | Assistant Engineer   |                     |                      | County Engineer      |                     | Assistant Engineer  |                    |                      |                         |
|                   | Salary              | Expenses            | Salary               | Expenses            |                      | Salary               | Expenses            | Salary              | Expenses           |                      |                         |
| Ringgold.....     | 527.95              | 300.00              | 132.70               | .....               | 960.65               | 1,400.00             | 779.24              | 435.30              | .....              | 2,614.54             | 3,575.19                |
| Sac.....          | 812.00              | 134.70              | 452.63               | 50.50               | 1,449.83             | 1,408.48             | 340.25              | 442.63              | 17.00              | 2,293.36             | 3,743.19                |
| Scott.....        | 1,116.66            | .....               | 2,333.70             | .....               | 3,450.36             | 2,233.32             | .....               | 1,166.85            | .....              | 3,400.17             | 6,850.53                |
| Shelby.....       | 475.50              | 316.23              | 20.00                | .....               | 811.73               | 1,834.50             | 736.25              | 17.80               | .....              | 2,138.55             | 2,950.28                |
| Sioux.....        | 800.00              | 300.00              | 1,558.61             | 280.00              | 2,938.61             | 1,800.00             | 400.00              | 500.00              | 25.37              | 2,725.37             | 5,663.98                |
| Story.....        | 1,600.00            | 505.11              | 506.48               | 39.90               | 2,712.49             | 800.00               | 374.35              | 4.95                | .....              | 1,179.30             | 3,891.79                |
| Tama.....         | 694.07              | 341.27              | 374.95               | 6.00                | 1,416.29             | 1,888.12             | 682.53              | 749.89              | 12.00              | 2,832.54             | 4,248.83                |
| Taylor.....       | 522.60              | 225.51              | 270.00               | .....               | 1,018.11             | 1,097.40             | 472.90              | 270.00              | .....              | 1,840.30             | 2,558.41                |
| Union.....        | 641.00              | 49.35               | .....                | .....               | 690.35               | 1,284.00             | 98.50               | .....               | .....              | 1,382.50             | 2,072.86                |
| Van Buren.....    | 681.75              | 504.84              | 9.00                 | .....               | 1,195.59             | 681.75               | 504.83              | 3.00                | .....              | 1,189.59             | 2,355.18                |
| Wapello.....      | 787.50              | 50.00               | 435.00               | 11.12               | 1,283.62             | 1,000.00             | 60.00               | 500.00              | 20.00              | 1,580.00             | 2,863.62                |
| Warren.....       | 601.58              | 123.82              | 350.53               | .....               | 1,075.93             | 1,550.50             | 288.93              | 901.35              | 32.80              | 2,773.59             | 3,849.53                |
| Washington.....   | 846.20              | 50.00               | 99.45                | .....               | 995.65               | 846.21               | 50.33               | 60.00               | .....              | 956.54               | 1,952.19                |
| Wayne.....        | 1,083.33            | 565.30              | .....                | .....               | 1,648.63             | 1,083.33             | 557.70              | .....               | .....              | 1,641.03             | 3,289.66                |
| Webster.....      | 1,682.29            | 474.05              | 2,444.90             | 146.23              | 4,749.47             | 596.57               | 237.88              | 771.50              | 282.79             | 1,888.74             | 6,638.21                |
| Winnebago.....    | 400.00              | 100.00              | 2,000.00             | 800.00              | 3,300.00             | 100.00               | 100.00              | 200.00              | 200.00             | 600.00               | 3,900.00                |
| Winneshlak.....   | 406.00              | 80.00               | 1,315.62             | .....               | 1,801.62             | 1,219.00             | 739.75              | 50.00               | .....              | 2,008.75             | 3,810.87                |
| Woodbury.....     | 1,064.14            | 297.05              | 5,619.16             | 2,990.34            | 9,970.69             | 1,064.14             | 297.04              | 295.75              | 419.34             | 2,076.27             | 12,046.96               |
| Worth.....        | 80.00               | 314.41              | 150.50               | .....               | 1,264.91             | 820.00               | 300.00              | 50.00               | .....              | 1,117.00             | 2,434.91                |
| Wright.....       | 1,630.97            | 1,000.29            | 3,199.42             | .....               | 5,830.68             | 459.37               | 490.00              | 575.93              | .....              | 1,525.30             | 7,355.98                |
| <b>Total.....</b> | <b>\$ 91,575.48</b> | <b>\$ 29,426.58</b> | <b>\$ 108,011.90</b> | <b>\$ 15,225.44</b> | <b>\$ 244,239.40</b> | <b>\$ 109,160.82</b> | <b>\$ 36,063.90</b> | <b>\$ 51,005.72</b> | <b>\$ 8,591.54</b> | <b>\$ 204,821.98</b> | <b>\$ 449,061.38</b>    |

SUMMARY TABLE NO. 25.

Financial Statement—Annual Report of County Engineers.

| County           | County Bridge Fund                   |                |              |                     |                                      | County Motor Vehicle Fund            |                |              |                     |                                      |
|------------------|--------------------------------------|----------------|--------------|---------------------|--------------------------------------|--------------------------------------|----------------|--------------|---------------------|--------------------------------------|
|                  | Balance or over-draft, Jan. 1, 1919. | Receipts 1919. | Total.       | Disbursements 1919. | Balance or over-draft, Jan. 1, 1920. | Balance or over-draft, Jan. 1, 1919. | Receipts 1919. | Total.       | Disbursements 1919. | Balance or over-draft, Jan. 1, 1920. |
| Adair.....       | \$ 28,538.93*                        | \$ 81,106.73   | \$ 52,567.80 | \$ 51,850.78        | \$ 717.02                            | \$ 894.95                            | \$ 20,575.28   | \$ 21,470.23 | \$ 19,897.12        | \$ 1,573.11                          |
| Adams.....       | 3,491.53                             | 40,386.01      | 43,877.54    | 40,033.69           | 3,843.85                             | 4,687.05                             | 13,368.00      | 18,055.05    | 18,055.05           | .....                                |
| Allamakee.....   | 104.25                               | 52,218.12      | 52,322.37    | 49,756.64           | 2,565.73                             | 62.08*                               | 18,961.23      | 18,809.15    | 18,472.78           | 426.37                               |
| Appanoose.....   | 1,979.96                             | 34,719.58      | 36,699.54    | 25,613.66           | 11,085.88                            | 4,087.77                             | 18,233.57      | 22,321.34    | 3,073.05            | 19,248.29                            |
| Audubon.....     | 119.23                               | 39,503.86      | 39,623.09    | 37,864.13           | 1,758.96                             | 2,524.41                             | 12,820.44      | 15,344.55    | 15,344.55           | .....                                |
| Benton.....      | 3,817.79                             | 91,176.74      | 94,994.53    | 94,601.79           | 392.74                               | 2,739.52                             | 20,768.02      | 23,507.54    | 16,916.65           | 6,590.89                             |
| Black Hawk.....  | 8,057.45*                            | 50,354.46      | 42,297.01    | 36,324.98           | 5,972.03                             | 14,960.52                            | 15,598.03      | 30,548.55    | 30,548.55           | .....                                |
| Boone.....       | 6,379.68                             | 135,960.14     | 142,339.82   | 145,344.84          | 3,005.02*                            | 12,961.24                            | 17,044.20      | 30,005.44    | 15,376.72           | 14,628.72                            |
| Bremer.....      | 541.86*                              | 42,020.19      | 41,478.33    | 38,647.15           | 2,831.18                             | 6,120.06                             | 12,565.21      | 18,685.27    | 15,805.46           | 2,819.81                             |
| Buchanan.....    | 3,182.57*                            | 52,046.60      | 48,864.03    | 50,809.07           | 1,945.04*                            | 372.27                               | 16,679.11      | 17,051.38    | 17,031.13           | 20.25                                |
| Buena Vista..... | 11,331.64*                           | 25,910.05      | 14,578.41    | 13,198.62           | 1,379.79                             | 1,395.89                             | 18,592.52      | 19,988.41    | 20,046.90           | *58.49                               |
| Butler.....      | 593.75*                              | 82,151.03      | 81,557.28    | 73,091.87           | 8,465.41                             | 7,135.77                             | 16,348.05      | 23,483.82    | 5,117.98            | 18,365.84                            |
| Calhoun.....     | 40,254.75                            | 49,114.44      | 89,369.19    | 54,502.87           | 34,866.32                            | 216.07                               | 17,044.20      | 17,260.27    | 9,850.81            | 7,379.46                             |
| Carroll.....     | 13,055.89*                           | 55,585.21      | 42,529.32    | 43,785.69           | 1,256.37*                            | 5,588.36                             | 16,516.37      | 22,104.73    | 22,104.73           | .....                                |
| Cass.....        | 2,490.23*                            | 80,461.66      | 77,971.43    | 76,923.16           | 1,048.27                             | 155.63*                              | 16,974.28      | 16,818.65    | 16,523.93           | 294.72                               |
| Cedar.....       | 23,184.71                            | 62,096.98      | 85,281.69    | 62,824.89           | 22,456.80                            | 11,086.20                            | 18,918.50      | 30,004.70    | 30,004.70           | *3.43                                |
| Cerro Gordo..... | 21,932.96*                           | 47,250.43      | 25,317.47    | 18,443.11           | 6,874.36                             | 2,050.34*                            | 18,066.58      | 16,006.24    | 11,979.26           | 4,026.98                             |
| Cherokee.....    | 3,604.42                             | 78,413.54      | 82,017.96    | 77,289.30           | 4,728.66                             | 17,545.52                            | 16,823.00      | 34,368.52    | 30,722.73           | 3,645.79                             |
| Chickasaw.....   | 5.34                                 | 37,029.48      | 37,034.82    | 37,422.62           | 387.80*                              | 1,587.84                             | 13,368.00      | 14,955.84    | 10,685.83           | 4,270.01                             |
| Clarke.....      | 1,232.58                             | 24,723.12      | 25,955.70    | 25,192.50           | 763.20                               | 5,722.32                             | 13,141.35      | 18,863.67    | 8,511.95            | 10,351.72                            |
| Clay.....        | 470.10*                              | 40,694.65      | 40,224.55    | 49,482.07           | 9,257.52*                            | 9,284.72                             | 17,087.43      | 20,372.15    | 26,372.15           | .....                                |
| Clayton.....     | 1,528.14                             | 54,737.20      | 56,265.34    | 46,412.11           | 9,853.23                             | 11,064.47                            | 23,066.46      | 34,130.93    | 26,188.05           | 7,942.88                             |
| Clinton.....     | 16,348.56                            | 58,830.84      | 75,179.40    | 85,408.38           | 10,228.98*                           | 12,302.25                            | 20,052.00      | 32,354.25    | 9,536.73            | 22,817.52                            |
| Crawford.....    | 139.88                               | 161,713.40     | 161,853.28   | 158,750.74          | 3,102.54                             | 17,788.81                            | 23,394.00      | 41,182.81    | 41,182.81           | .....                                |
| Dallas.....      | 2,341.62                             | 86,553.03      | 88,894.65    | 79,206.47           | 9,688.18                             | .....                                | .....          | .....        | .....               | .....                                |
| Davis.....       | 848.49                               | 27,877.91      | 28,726.40    | 29,792.96           | 1,066.56*                            | 6,170.81                             | 16,720.00      | 22,890.81    | 22,016.22           | 874.59                               |
| Decatur.....     | 787.30*                              | 59,474.86      | 58,687.56    | 53,063.17           | 5,624.39                             | 4,125.08                             | 16,435.66      | 20,560.69    | 10,209.77           | 10,350.92                            |
| Delaware.....    | 2,032.81                             | 44,629.17      | 46,661.98    | 46,498.16           | 163.82                               | 6,529.28                             | 16,923.59      | 23,452.87    | 12,897.68           | 10,555.19                            |

SUMMARY TABLE NO. 25—Continued.

Table with columns for County, County Bridge Fund (Balance of over-draft, Receipts, Total, Disbursements), and County Motor Vehicle Fund (Balance of over-draft, Receipts, Total, Disbursements). Rows list counties from Des Moines to Wright, with a Grand Total at the bottom.

(\*)Overdraft.



SUMMARY TABLE NO. 26.

Financial Statement—Annual Reports of County Engineers.

Table with columns for County, County Road Cash Fund, and Township Road, Drag and Drainage Fund. Rows include counties like Adair, Adams, Allamakee, Appanoose, Audubon, Benton, Black Hawk, Boone, Bremer, Buchanan, Buena Vista, Butler, Calhoun, Carroll, Cass, Cedar, Cerro Gordo, Cherokee, Chickasaw, Clarke, Clay, Clayton, Clinton, Crawford, Dallas, Davis, Decatur, Delaware, Des Moines, Dickinson, Dubuque, Emmett, Fayette, Franklin, Fremont, Greene, Grundy, Guthrie, Hamilton, Hancock, Hardin, Harrison, Henry, Howard, Humboldt, Ida, Iowa, Jackson, Jasper, Jefferson, Johnson, Jones, Keokuk, Kosuth, Lee, Linn, Louisa, Lucas, Lyon, Madison, Mahaska, Marion, Marshall, Mills, Mitchell, Monona, Monroe, Montgomery, Muscatine, O'Brien, Osceola, Page, Palo Alto, Plymouth, Pocahontas, Polk.

IOWA STATE HIGHWAY COMMISSION

ANNUAL REPORTS OF COUNTY ENGINEERS

SUMMARY TABLE NO. 26—Continued.

| County        | County Road Cash Fund                |                |                |                     |                                      | Township Road, Drag and Drainage Fund |                |                |                     |                                      |
|---------------|--------------------------------------|----------------|----------------|---------------------|--------------------------------------|---------------------------------------|----------------|----------------|---------------------|--------------------------------------|
|               | Balance or over-draft, Jan. 1, 1919. | Receipts 1919. | Total.         | Disbursements 1919. | Balance or over-draft, Jan. 1, 1920. | Balance or over-draft, Jan. 1, 1919.  | Receipts 1919. | Total.         | Disbursements 1919. | Balance or over-draft, Jan. 1, 1920. |
| Pottawattamie | 2,041.30                             | 76,066.08      | 78,107.38      | 79,898.88           | 1,791.50*                            | 9,302.91                              | 26,759.27      | 36,062.18      | 27,769.00           | 8,293.00                             |
| Poweshiek     | 696.37                               | 31,348.39      | 32,044.76      | 32,379.90           | 335.14*                              | 4,918.62                              | 53,345.35      | 58,263.97      | 53,049.04           | 5,214.93                             |
| Ringgold      | 1,077.82*                            | 20,852.71      | 19,774.89      | 19,518.50           | 256.39                               | 5,880.54                              | 17,532.29      | 23,412.83      | 16,163.80           | 7,249.03                             |
| Sac           | 918.63*                              | 74,681.23      | 73,762.60      | 56,013.70           | 17,748.90                            | 16,247.56                             | 55,008.41      | 71,255.97      | 51,592.09           | 19,663.88                            |
| Scott         | 555.67*                              | 25,258.57      | 24,702.90      | 37,566.03           | 12,863.13*                           | 12,098.10                             | 40,135.28      | 52,233.38      | 37,617.80           | 14,615.58                            |
| Shelby        | 342.19                               | 28,282.46      | 28,624.65      | 28,311.62           | 313.03                               | 15,669.09                             | 51,180.03      | 66,849.12      | 53,650.21           | 13,198.91                            |
| Sioux         | 4,153.53                             | 27,481.47      | 31,635.00      | 40,849.86           | 9,214.86*                            | 25,123.29                             | 51,860.15      | 76,983.44      | 52,040.97           | 24,942.47                            |
| Story         | 9,194.51                             | 33,895.15      | 43,089.66      | 41,915.95           | 1,173.71                             | 16,320.44                             | 48,393.95      | 64,714.39      | 45,094.10           | 16,620.29                            |
| Tama          | 6,707.44*                            | 57,164.98      | 50,457.54      | 51,890.92           | 1,373.38*                            | 8,563.33                              | 60,361.58      | 68,924.01      | 63,161.84           | 5,763.07                             |
| Taylor        | 457.28*                              | 25,386.27      | 24,928.99      | 20,677.87           | 4,321.12                             | 15,655.18                             | 35,265.75      | 50,920.93      | 33,919.09           | 17,001.84                            |
| Union         | 4,692.55                             | 15,921.63      | 11,829.08      | 9,913.26            | 1,915.82                             | 4,112.93                              | 21,780.89      | 25,893.82      | 23,309.28           | 2,584.54                             |
| Van Buren     | 1,364.01                             | 15,616.93      | 16,980.94      | 13,710.71           | 3,270.23                             | 3,036.31                              | 29,216.12      | 32,252.43      | 25,928.38           | 6,324.05                             |
| Wapello       | 2,414.11*                            | 31,963.59      | 29,549.48      | 36,748.78           | 7,199.30*                            | 3,734.96                              | 34,408.99      | 38,143.95      | 34,398.74           | 3,745.21                             |
| Warren        | 2,331.27                             | 76,593.85      | 78,925.12      | 38,922.87           | 40,002.25                            | 6,308.81                              | 29,483.29      | 35,792.10      | 28,184.96           | 7,607.14                             |
| Washington    | 16,752.62*                           | 50,272.76      | 33,520.14      | 28,379.30           | 5,140.75                             | 2,282.85                              | 33,312.83      | 35,595.68      | 32,314.91           | 3,280.77                             |
| Wayne         | 2,892.13*                            | 27,304.11      | 24,411.98      | 23,068.49           | 1,343.49                             | 2,066.97                              | 18,135.16      | 20,202.13      | 19,450.56           | 751.57                               |
| Webster       | 6,395.32                             | 40,967.74      | 47,363.06      | 51,145.30           | 3,782.24*                            | 31,943.41                             | 75,517.33      | 107,460.74     | 82,286.27           | 25,174.47                            |
| Winnebago     | 2,974.47*                            | 26,660.02      | 23,685.55      | 26,814.85           | 3,129.30*                            | 10,586.53                             | 34,470.82      | 45,057.40      | 35,408.18           | 9,649.22                             |
| Winneshiek    | 1,665.91*                            | 31,797.57      | 30,131.66      | 32,458.38           | 2,326.72*                            | 3,741.38                              | 36,538.79      | 40,280.17      | 38,191.66           | 2,088.51                             |
| Woodbury      | 7,445.54*                            | 71,171.62      | 63,726.08      | 72,247.37           | 8,521.28*                            | 34,374.21                             | 56,456.37      | 90,830.58      | 60,183.25           | 30,647.33                            |
| Worth         | 16,496.77*                           | 40,701.71      | 24,204.94      | 44,908.83           | 20,703.89*                           | 4,913.11                              | 22,141.29      | 27,054.40      | 21,474.37           | 5,580.03                             |
| Wright        | 933.62*                              | 35,337.90      | 34,404.28      | 40,884.65           | 6,480.37*                            | 27,124.73                             | 62,460.59      | 89,585.32      | 63,120.28           | 26,465.04                            |
| Total         | \$138,900.35                         | \$3,979,183.68 | \$4,118,084.03 | \$4,041,354.66      | \$76,729.37                          | \$1,054,067.51                        | \$3,989,513.09 | \$5,043,580.60 | \$4,075,104.95      | \$968,475.65                         |

SUMMARY TABLE NO. 27.

Bonded Indebtedness of Counties—Annual Reports of County Engineers.

| County      | Road Funds                       |                       |                     |                                  | Bridge Funds                     |                       |                     |                                  | Total road and bridge bonds outstanding, Jan. 1, 1920. |
|-------------|----------------------------------|-----------------------|---------------------|----------------------------------|----------------------------------|-----------------------|---------------------|----------------------------------|--|
|             | Bonds outstanding, Jan. 1, 1919. | Bonds issued in 1919. | Bonds paid in 1919. | Bonds outstanding, Jan. 1, 1920. | Bonds outstanding, Jan. 1, 1919. | Bonds issued in 1919. | Bonds paid in 1919. | Bonds outstanding, Jan. 1, 1920. |  |
| Adair       |                                  |                       |                     |                                  |                                  | 25,000.00             |                     | 25,000.00                        | 25,000.00  |
| Adams       |                                  |                       |                     |                                  |                                  |                       |                     |                                  |  |
| Allamakee   |                                  | 16,000.00             |                     | 16,000.00                        | 121,000.00                       | 16,000.00             | 5,000.00            | 132,000.00                       | 148,000.00   |
| Appanoose   | 26,520.00                        |                       |                     | 26,520.00                        | 43,339.52                        |                       |                     | 43,339.52                        | 69,859.52  |
| Audubon     |                                  |                       |                     |                                  | 129,000.00                       |                       | 6,500.00            | 122,500.00                       | 122,500.00   |
| Benton      | 9,400.00                         |                       |                     | 9,400.00                         | 112,000.00                       | 25,000.00             | 1,500.00            | 136,100.00                       | 145,500.00   |
| Black Hawk  |                                  |                       |                     |                                  | 37,000.00                        |                       |                     | 37,000.00                        | 37,000.00  |
| Boone       |                                  | 10,928.50             |                     | 10,928.50                        | 29,450.00                        | 80,704.11             |                     | 110,154.11                       | 121,082.61   |
| Bremer      |                                  |                       |                     |                                  |                                  |                       |                     |                                  |  |
| Buchanan    | 27,377.70                        |                       |                     | 27,377.70                        | 34,093.61                        |                       |                     | 34,093.61                        | 61,471.31  |
| Buena Vista | 193,500.00                       |                       |                     | 193,500.00                       | 316,000.00                       |                       | 6,500.00            | 309,500.00                       | 503,000.00   |
| Butler      | 17,000.00                        |                       |                     | 17,000.00                        | 53,000.00                        | 27,500.00             |                     | 80,500.00                        | 97,500.00  |
| Calhoun     | 72,000.00                        |                       | 5,500.00            | 66,500.00                        | 88,125.00                        |                       | 14,500.00           | 73,625.00                        | 140,125.00   |
| Carroll     |                                  |                       |                     |                                  | 135,000.00                       |                       |                     | 135,000.00                       | 135,000.00   |
| Cass        |                                  |                       |                     |                                  | 68,000.00                        | 29,000.00             | 15,000.00           | 82,000.00                        | 82,000.00  |
| Cedar       |                                  |                       |                     |                                  |                                  |                       |                     |                                  |  |
| Cerro Gordo | 57,037.27                        |                       |                     | 57,037.27                        | 45,000.00                        |                       |                     | 45,000.00                        | 102,037.27   |
| Cherokee    | 19,511.92                        |                       |                     | 19,511.92                        | 240,488.08                       | 25,000.00             |                     | 265,488.08                       | 285,000.00   |
| Chickasaw   |                                  |                       |                     |                                  | 75,500.00                        |                       |                     | 75,500.00                        | 75,500.00  |
| Clarke      | 10,000.00                        |                       |                     | 10,000.00                        | 32,000.00                        |                       |                     | 32,000.00                        | 42,000.00  |
| Clay        | 117,529.57                       | 33,000.00             |                     | 150,529.57                       | 266,470.43                       |                       |                     | 266,470.43                       | 417,000.00   |
| Clayton     | 17,000.00                        |                       | 17,000.00           |                                  | 62,000.00                        |                       | 13,000.00           | 49,000.00                        | 49,000.00  |
| Clinton     |                                  |                       |                     |                                  | 102,000.00                       |                       | 5,000.00            | 97,000.00                        | 97,000.00  |
| Crawford    | 179,000.00                       | 12,000.00             |                     | 191,000.00                       | 262,000.00                       | 88,000.00             | 8,000.00            | 342,000.00                       | 533,000.00   |
| Dallas      |                                  |                       |                     |                                  | 96,000.00                        | 31,000.00             |                     | 127,000.00                       | 127,000.00   |
| Davis       |                                  |                       |                     |                                  | 54,500.00                        |                       | 7,000.00            | 47,500.00                        | 47,500.00  |
| Decatur     | 22,919.32                        | 11,401.52             |                     | 34,321.14                        | 46,585.99                        | 26,940.58             | 0.00                | 68,526.57                        | 102,847.71   |

## IOWA STATE HIGHWAY COMMISSION

SUMMARY TABLE NO. 27—Continued.

| County          | Road Funds                               |                          |                        |  | Bridge Funds             |                        |  |  |
|-----------------|--|--------------------------|------------------------|--|--------------------------|------------------------|--|--|
|                 | Bonds outstanding-<br>Inr. Jan. 1, 1919. | Bonds issued in<br>1919. | Bonds paid in<br>1919. | Bonds outstanding-<br>Inr. Jan. 1, 1920. | Bonds issued in<br>1919. | Bonds paid in<br>1919. | Bonds outstanding-<br>Inr. Jan. 1, 1920. | Tentative bonds<br>outstanding,<br>Jan. 1, 1920. |
| Delaware.....   | 12,500.00                                |                          |                        | 12,500.00                                |                          | 7,000.00               | 8,500.00                                 | 21,000.00  |
| Des Moines..... | 17,300.00                                |                          |                        | 17,300.00                                |                          |                        | 270,000.00                               | 553,300.00                                       |
| Dubuque.....    | 110,500.00                               |                          |                        | 110,500.00                               |                          |                        | 117,000.00                               | 110,500.00                                       |
| Emmet.....      | 17,485.49                                |                          |                        | 17,485.49                                |                          |                        | 118,294.14                               | 117,000.00                                       |
| Fayette.....    |  |                          |                        |  |                          |                        |  | 135,720.63                                       |
| Floyd.....      |  |                          |                        |  |                          |                        |  |  |
| Franklin.....   |  |                          |                        |  |                          |                        |  |  |
| Greene.....     |  |                          |                        |  |                          |                        |  |  |
| Grundy.....     |  |                          |                        |  |                          |                        |  |  |
| Guthrie.....    | 84,330.82                                | 122,547.82               |                        | 76,119.13                                | 27,175.50                |                        |  | 69,000.00  |
| Hamilton.....   | 29,294.10                                | 62,000.00                |                        | 168,031.60                               | 43,000.00                |                        |  | 75,000.00  |
| Hancock.....    |  | 6,133.53                 |                        | 61,394.10                                |                          |                        |  | 146,000.00                                       |
| Harrison.....   |  |                          |                        | 6,133.53                                 |                          |                        |  | 103,294.68                                       |
| Henry.....      | 17,300.00                                |                          |                        | 17,300.00                                |                          |                        |  | 114,993.32                                       |
| Howard.....     |  |                          |                        |  |                          |                        |  | 224,281.90                                       |
| Humboldt.....   |  |                          |                        |  |                          |                        |  |  |
| Ia.....         | 19,185.00                                |                          |                        | 19,185.00                                |                          |                        |  | 73,500.00  |
| Iowa.....       | 59,000.00                                | 25,000.00                | 8,900.00               | 30,000.00                                | 88,300.00                | 5,000.00               |  | 47,000.00  |
| Jasper.....     | 52,668.00                                |                          |                        | 168,000.00                               |                          |                        |  | 20,000.00  |
| Jefferson.....  |  |                          |                        | 92,000.00                                |                          |                        |  | 191,000.00                                       |
| Johnson.....    |  |                          |                        | 43,898.00                                |                          |                        |  | 255,000.00                                       |
| Jones.....      |  |                          |                        |  |                          |                        |  | 99,500.00  |
| Keokuk.....     |  |                          |                        |  |                          |                        |  | 30,000.00  |
| Keosauqua.....  |  |                          |                        |  |                          |                        |  |  |
| Lee.....        |  |                          |                        |  |                          |                        |  |  |
| Linn.....       |  | 8,013.16                 |                        | 194,500.00                               |                          |                        |  | 187,500.00                                       |
| Louisia.....    |  |                          |                        | 10,000.00                                |                          |                        |  | 5,000.00   |
|                 |  |                          |                        | 8,013.15                                 |                          |                        |  | 282,652.60                                       |
|                 |  |                          |                        |  |                          |                        |  | 282,650.00                                       |

## ANNUAL REPORTS OF COUNTY ENGINEERS

|                 |               |              |              |               |               |               |  |            |                |
|-----------------|---------------|--------------|--------------|---------------|---------------|---------------|--|------------|----------------|
| Lucas.....      | 7,000.00      |              |              | 7,000.00      | 14,000.00     |               |  | 106,100.00 | 112,100.00     |
| Lyon.....       |               |              |              |               |               |               |  |            |                |
| Mahaska.....    | 30,000.00     |              |              | 30,000.00     |               |               |  | 2,000.00   | 53,000.00      |
| Marion.....     | 30,623.81     |              |              | 28,023.81     | 108,373.77    |               |  | 101,872.22 | 120,800.38     |
| Marshall.....   | 25,442.29     |              |              | 25,442.29     | 350,448.88    |               |  | 310,000.00 | 829,801.27     |
| Mason.....      | 46,000.00     |              |              | 282,000.00    |               |               |  | 313,000.00 | 281,000.00     |
| Mauck.....      | 42,000.00     |              |              | 42,000.00     |               |               |  | 109,000.00 | 21,000.00      |
| McCook.....     | 6,567.00      |              |              | 22,494.00     |               |               |  | 29,000.00  | 65,000.00      |
| Monroe.....     | 35,000.00     |              |              | 35,000.00     |               |               |  | 39,000.00  | 65,000.00      |
| Monroe.....     | 27,500.00     |              |              | 23,500.00     | 10,000.00     |               |  | 13,000.00  | 39,000.00      |
| Montgomery..... | 40,545.71     |              |              | 64,238.71     | 30,409.29     |               |  | 96,104.67  | 157,431.28     |
| Muscatine.....  |               |              |              |               |               |               |  |            |                |
| O'Brien.....    |               |              |              |               |               |               |  |            |                |
| Osceola.....    |               |              |              |               |               |               |  |            |                |
| Palo Alto.....  | 25,000.00     | 14,000.00    |              | 30,000.00     |               |               |  | 18,775.00  | 30,000.00      |
| Plymouth.....   | 32,000.00     | 45,000.00    |              | 77,000.00     |               |               |  | 102,300.00 | 141,300.00     |
| Pocahontas..... |               |              |              |               |               |               |  |            |                |
| Polk.....       | 298,000.00    | 105,000.00   | 3,000.00     | 57,000.00     | 108,000.00    |               |  | 4,000.00   | 161,000.00     |
| Polk.....       | 11,500.00     |              |              | 401,000.00    | 623,000.00    |               |  | 20,000.00  | 800,000.00     |
| Portsmouth..... | 11,500.00     |              |              | 11,500.00     | 113,000.00    |               |  | 113,000.00 | 127,000.00     |
| Ringgold.....   |               |              |              | 3,058.06      | 12,100.00     |               |  | 1,920.00   | 21,000.00      |
| Sac.....        | 38,800.00     | 35,000.00    |              | 74,800.00     | 46,786.25     |               |  | 57,026.25  | 60,984.31      |
| Scott.....      |               |              |              |               | 70,300.00     |               |  | 129,200.00 | 294,000.00     |
| Shelby.....     |               |              |              |               |               |               |  |            |                |
| Story.....      |               |              |              |               |               |               |  |            |                |
| Tama.....       | 20,031.40     |              |              | 20,031.40     | 184,500.00    |               |  | 250,500.00 | 270,531.40     |
| Taylor.....     | 30,002.50     |              |              | 29,902.50     | 50,077.11     |               |  | 80,007.11  | 80,000.00      |
| Union.....      |               |              |              |               | 100,000.00    |               |  | 96,000.00  | 96,000.00      |
| Van Buren.....  |               |              |              |               |               |               |  |            |                |
| Warren.....     | 49,000.00     | 17,000.00    |              | 66,000.00     | 156,500.00    |               |  | 210,500.00 | 282,800.00     |
| Washington..... |               |              |              |               |               |               |  |            |                |
| Wayne.....      | 920.20        |              |              | 20,000.00     | 65,000.00     |               |  | 65,000.00  | 85,000.00      |
| Weber.....      |               |              |              |               | 18,388.40     |               |  | 18,388.40  | 19,213.60      |
| Winneshiek..... | 50,000.00     |              |              | 50,000.00     |               |               |  | 237,000.00 | 50,000.00      |
| Worth.....      |               |              |              |               |               |               |  | 5,000.00   | 237,000.00     |
| Wright.....     |               |              |              |               |               |               |  |            | 28,000.00      |
| Total.....      | 82,002,031.19 | \$760,744.55 | \$170,847.32 | 82,541,827.02 | 37,504,829.53 | 31,581,575.89 |  | 199,500.00 | 111,394,704.66 |

SUMMARY TABLE NO. 28.

Total Indebtedness of Counties for Road and Bridge Work, Jan. 1, 1920—Annual Reports of County Engineers

Table with columns for County, Road Funds (Outstanding bills, Warrants issued and stamped by Treasurer, Bonds outstanding, Total), Bridge Funds (Outstanding bills, Warrants issued and stamped by Treasurer, Bonds outstanding, Total), and Total indebtedness of County.

IOWA STATE HIGHWAY COMMISSION

ANNUAL REPORTS OF COUNTY ENGINEERS

## SUMMARY TABLE NO. 28—Continued.

| County       | Road Funds           |   |  |                         | Bridge Funds    |                      |   |  | Total           | Total<br>Indebted-<br>ness of County. |                         |
|--------------|----------------------|---|--|-------------------------|-----------------|----------------------|---|--|-----------------|---------------------------------------|-------------------------|
|              | Outstanding<br>Bills | Warrants Issued<br>and stamped by<br>Treasurer. | Warrants Issued<br>and not pre-<br>settled for pay-<br>ment. | Bonds outstand-<br>ing. | Total           | Outstanding<br>Bills | Warrants Issued<br>and stamped by<br>Treasurer. | Warrants Issued<br>and not pre-<br>settled for pay-<br>ment. |                 |                                       | Bonds outstand-<br>ing. |
| Polk         | 400.00               | 11,606.65                                       | 5,041.10   | 98,600.00               | 197,668.65      | 2,000.00             | 31,659.75                                       | 112,000.00   | 112,000.00      | 438,659.75                            | 526,018.50              |
| Fowebank     |                      | 5,041.10  | 3,008.00   | 11,000.00               | 11,841.10       |                      | 15,800.75                                       | 112,000.00   | 112,000.00      | 138,800.75                            | 148,346.83              |
| Hingwood     |                      | 8,074.38  |  | 3,008.00                | 11,072.44       |                      | 38,886.24                                       | 157,000.00   | 157,000.00      | 168,415.49                            | 196,484.03              |
| Scott        |                      |   |  | 74,800.00               | 75,754.47       |                      |   | 129,300.00   | 129,300.00      | 130,304.45                            | 141,500.00              |
| Shelby       |                      | 313.87  |  |                         | 313.87          |                      | 1,913.40  |  |                 | 20,786.06                             | 21,009.37               |
| Story        | 4,970.00             | 43,663.80                                       |  |                         | 47,663.80       | 1,000.00             | 20,786.05                                       |  |                 | 1,000.00                              | 48,663.80               |
| Tama         | 1,647.51             | 8,815.84  |  | 30,081.49               | 39,494.34       | 3,040.25             | 7,459.91  | 259,000.00   | 259,000.00      | 270,000.26                            | 301,394.00              |
| Taylor       | 478.23               | 2,670.53  |  | 32,601.40               | 32,601.40       | 2,812.00             |   | 50,000.00  | 50,000.00       | 102,603.77                            | 103,861.43              |
| Van Buren    | 977.40               |   | 484.71   | 30,002.89               | 30,002.89       |                      | 308.37  | 20,000.00  | 20,000.00       | 101,800.60                            | 122,375.15              |
| Wapello      | 400.00               |   | 410.15   |                         | 410.15          | 432.85               | 3,207.70  | 216,500.00   | 216,500.00      | 254,144.70                            | 290,690.88              |
| Wayne        | 358.00               |   |  | 69,000.00               | 69,000.00       | 780.00               | 37,154.70                                       |  |                 | 65,000.00                             | 80,000.00               |
| Washington   |                      | 1,311.71  |  | 20,000.00               | 21,382.00       |                      | 29.50   |  |                 | 65,041.91                             | 86,000.00               |
| Webster      |                      | 19,045.26                                       |  | 800.20                  | 19,875.46       |                      | 5,469.20  |  |                 | 23,857.00                             | 44,733.06               |
| Winnebago    |                      | 41,300.74                                       |  | 50,000.00               | 91,300.74       | 300.00               | 1,692.00  |  |                 | 1,000.00                              | 93,002.74               |
| Winnebury    | 150.00               |   |  | 1,175.64                | 1,325.64        | 2,760.28             | 41,699.00                                       | 237,000.00   | 237,000.00      | 270,296.00                            | 290,043.13              |
| Wright       | 500.00               | 2,687.86  |  |                         | 3,187.86        | 100.00               | 32,173.18                                       | 38,000.00  | 38,000.00       | 73,274.44                             | 90,418.75               |
| Grand Total. | 881,914.03           | \$ 1,962,442.79                                 | \$ 105,096.52  | \$ 2,665,051.05         | \$ 4,115,066.15 | \$ 128,968.05        | \$ 1,890,534.77                                 | \$ 103,738.68  | \$ 9,101,876.74 | \$ 11,225,158.94                      | \$ 12,340,124.30        |

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