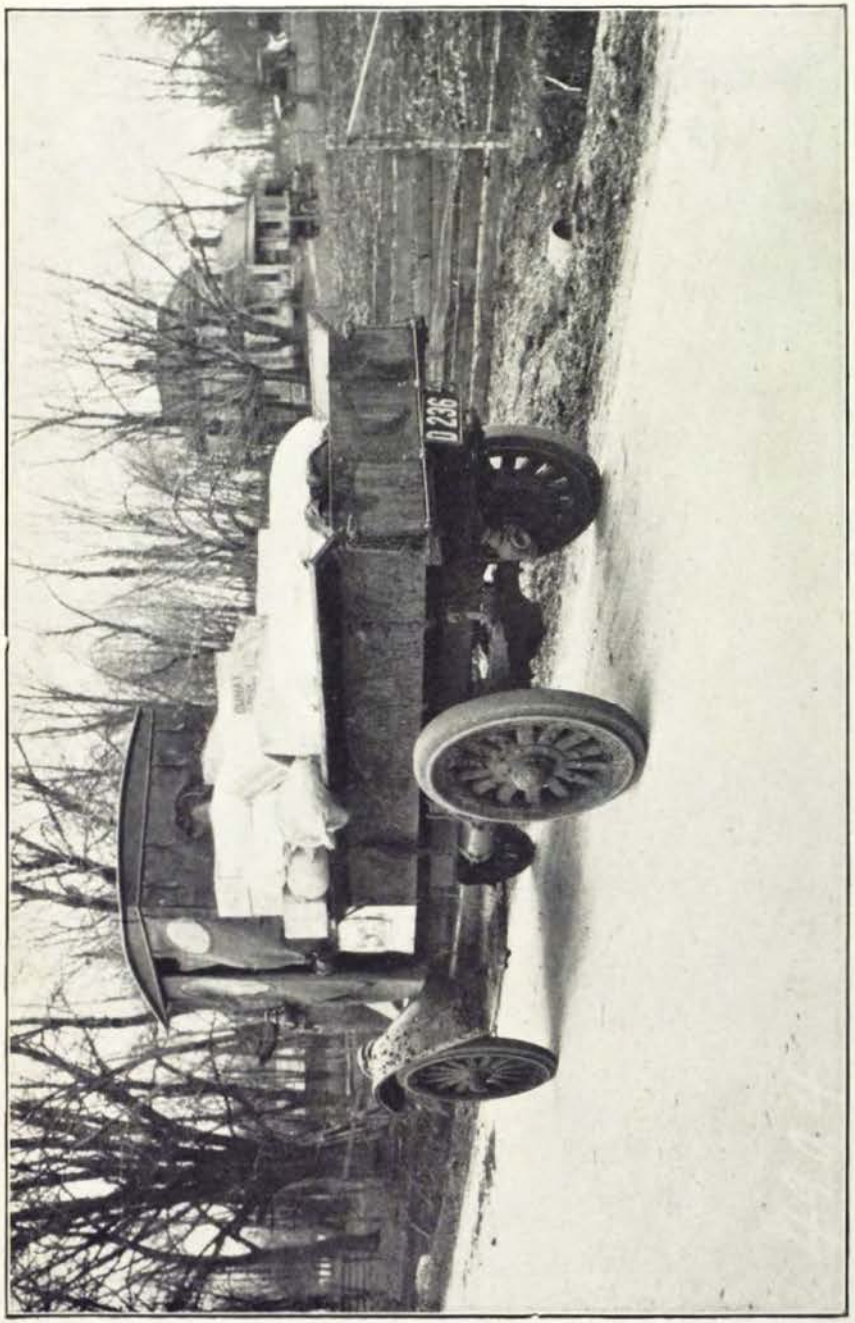


Cerro Gordo county completed and dedicated Iowa Federal Aid Project No. 1 during 1918. The federal aid portion was 4⅝ miles long and was the final link in the twelve-mile concrete road which now connects Mason City, the county seat, with Clear Lake, the famous summer resort town to the west. Freight hauling by motor truck has received a wonderful impetus since the completion of the road. The view shows a truck hauling a load of general merchandise to Clear Lake from Mason City jobbing houses. Cerro Gordo county was the first to apply for federal aid, the first to complete a federal aid project, has let a contract for two additional miles of paving on another road and has applied for a second allotment of federal aid for still additional hard surfacing.

State of Iowa

1918

REPORT OF THE

State Highway Commission

FOR THE

Year Ended December 1, 1918

ISSUED BY THE
STATE HIGHWAY COMMISSION
AMES, IOWA

H. C. BEARD, Chairman
J. W. HOLDEN
S. W. BEYER
State Highway Commissioners

THOS. H. MACDONALD
CHIEF ENGINEER

Published by
THE STATE OF IOWA
Des Moines

LETTER OF TRANSMITTAL.

Hon. W. L. Harding, Governor:

Pursuant to the provisions of the Iowa road law, the State Highway Commission presents this, its Fifth Annual Report, for the year December 1, 1917, to December 1, 1918.

H. C. Beard, Chairman.
J. W. Holden,
S. W. Beyer,
Commissioners.

Ames, Iowa, December 30, 1918.

PART I

FIFTH ANNUAL REPORT

Chapter I. Summary of Work for 1918.

This Fifth Annual Report of the State Highway Commission is divided into two parts. Part One contains a resume of the chief activities of the Commission for the year ended December 1, 1918. It will be noted by comparing Part One of this Report with former annual reports, that the work handled by the Highway Commission has greatly increased in volume during the past several years. This is due to new duties imposed by law and to the increasing amount of assistance rendered other state departments and the several counties.

Part Two contains a summary of the annual reports of the ninety-nine county engineers for the year ending December 31, 1918, with comparison with expenditures for past years.

The Year 1918.

It is not possible to relate here, nor would it be of any profit to describe all of the difficulties which confronted the road builder in 1918.

During the year 1918, the whole thought of the people of the state and nation became centered on one great activity, that of winning the war. Not only was highway work necessarily curtailed by advancing prices of labor and materials but the actual shortage of labor made it difficult to perform even the necessary maintenance work and the restrictions placed on the use of materials, particularly steel, and on the use of rail transportation, towards the close of 1918, had practically brought road and bridge construction to a close. These conditions, of course, were not peculiar to highway work, but applied to all industries as well.

While laboring under the restrictions of the Federal Government relative to construction work not essential to the winning of the war, an effort was made by the Highway Commission to influence local highway officials to center their efforts on road maintenance not only to preserve what improvements had been made, but to facilitate the marketing of farm products.

Damage by Floods.

In June a storm of unusual severity swept the central portion of the state and did untold damage to roads and bridges in a number of counties. This flood, reliably reported to have been the greatest in this section in the past forty years, particularly affected the Skunk and Iowa rivers.

A number of large bridges supposed to have been of permanent construction, though built before the State Highway Commission standards, were generally adopted, were destroyed by this flood.

In August another flood almost as severe but more local in its extent, occurred in Dubuque county. The damage done in that county alone, to bridges and culverts was estimated to be in excess of $100,000.00.

The counties affected by these floods were, under the prevailing conditions, unable to replace any great number of their structures with permanent construction, but in order to keep highways open for traffic, were forced to build temporary structures. Aside from the loss sustained in the destruction of bridges and culverts, great damage was done to road grades.

1918 Prices.

While the prices of materials continued to advance as in 1917, the most notable advance in the cost of construction was in the price of efficient labor. Few counties were fortunate enough to have any great amount of material left over from the preceding year as buying had already become restricted.

The average price of earth excavation for the year was $0.3421 per cubic yard as compared with $0.2469 in 1917, and $0.2143 per cubic yard in 1916. It will be noted that the average price for earth work in 1918 was 60% higher than in 1916 and 38.5% higher than in 1917.

The average price paid for standard sawed Douglas fir 3"x12" in car lots F. O. B. county in 1918, was $37.00 per M as compared with an average of $26.70 per M in 1917. This was an increase of 38.6%. The average price of standard sawed white oak, 3"x12", in 1918 was $38.00 per M as compared with an average of $32.00 per M in 1917, or 18.8% higher.

The average price paid for 16 feet red cedar piling in car lots F. O. B. county in 1918 was $0.183 per foot as compared with an average of $0.153 in 1917. This is an increase of approximately 20%. The average price paid for Class A corrugated pipe increased 7.8% over the average price paid in 1917. The average price paid for Class B corrugated pipe was 6.7% higher than that paid in 1917.

The average price paid for reinforcing steel in car lots, stock length, F. O. B. county was $3.66 per cwt. for one-half (½) inch bars and $3.62 per cwt. for three-quarter (¾) inch bars. The average price paid in 1917 was $3.52 for one-half (½) inch bars and $3.60 for three-quarter (¾) inch bars. In almost all cases, the three-quarter (¾) inch bars were purchased in small lots, the one-half (½) inch bars being used in large quantities.

The average price paid for steel trusses F. O. B. county in 1918 was $6.50 per cwt., as compared with $5.90 per cwt. in 1917. This was an increase of 10% over 1917 prices. The average price paid for I-beams F. O. B. county in 1918 was $5.25 per cwt. as compared with $5.15 per cwt. in 1917.

The dealers' average net price of cement F. O. B. Cedar Rapids, Iowa, was $2.18 per bbl. in 1918 as compared with $1.98 per bbl. in 1917. The cost to counties was in excess of these prices as these quotations represent prices to dealers and do not include dealers profits nor the cost of local transportation. During the year, the price of cloth sacks was increased from 10 cents to 25 cents each.

Co-operation of Local Officials and Contractors.

The Commission wishes to take this opportunity to express to the general public its appreciation of the co-operation of and the splendid assistance rendered by county engineers, county supervisors, township officials, city engineers, members of city and town councils and the contractors engaged on road, bridge and street improvements.

All of the federal restrictions which the Highway Commission was called upon to assist in interpreting and enforcing, were cheerfully met by all, as it became apparent that such restrictions were a vital element in bringing the war to a speedy and successful conclusion.

With the freight rates and prices of material rapidly advancing, some controversies naturally arose between contractors and officials over the adjustment of existing contracts. However, all differences of this character were almost universally approached by the various parties in a spirit of absolute fair mindedness.

While many contracting organizations finally brought their activities almost to a close before the end of the year, the Commission feels that in many instances the contractors rendered the public a very great service through their efforts to secure materials, transportation facilities and necessary labor in order to complete essential improvements, and thus assist in keeping the highways open for traffic.

On the other hand, the Commission gladly rendered contractors whatever assistance it properly could in securing materials and the use of transportation facilities, not only to aid in the prosecution of improvements already under way, but to enable contractors to retain, at least the nucleus of their organizations in order that these organizations could quickly be rebuilt when it became possible to prosecute highway improvements more vigorously.

Work of U. S. Highway Council.

In order to bring about some uniformity in the consideration of highway projects by the War Industries Board, the State Highway Departments, the Federal Bureau of Public Roads and the Highway Industries brought about the appointment of a committee known as the U. S. Highways Council to assist the War Industries Board, the Capital Issues Committee and other government boards in regulating street and highway improvement.

Orders were issued that all projects involving the use of materials required by the government or involving rail transportation or the issuing of bonds should be submitted to the U. S. Highways Council for approval. It was intended that no work on highways and streets not absolutely essential, should be allowed to proceed.

A few weeks before the signing of the armistice, it was ordered that each state should submit for approval, a program of all construction and maintenance work contemplated for 1919 by counties, cities and towns, and townships. The huge task of collecting this information was well underway by the Commission when actual hostilities ceased and the requirement was cancelled.

Men In Military Service.

During 1917 and 1918, twenty-two men in the employ of the Highway Commission entered military service. New men were employed to do the essential work which the remaining force could not accomplish. This involved the hiring of an almost entirely new force of draftsmen.

The Commission expects that most of the men who entered Federal service will return within a short time.

Bridge Plans.

Detailed plans were prepared for 236 bridges in 58 counties, estimated to cost $1,298,000.00. Designs were checked or approved for 163 bridges submitted from 36 counties, the estimated cost of which was $634,000.00.

Bridge and Material Contracts.

During the year, the Commission checked for approval, 173 bridge contracts totalling $1,760,797.85 which were submitted from 68 counties. The total amount of bridge contracts approved in 1917 was $2,179,000.00 and in 1916 was $2,070,800.00.

Railroad Crossings.

During 1918 very little was accomplished in the improvement of railroad crossings. However, the work of making surveys and plans for the elimination or improvement of some of the more dangerous crossings was continued in anticipation of being able to give more attention to this class of improvement when conditions become more nearly normal.

During the year thirty (30) crossing projects were listed for improvement, bringing the number thus listed for improvement or elimination up to 305. Eleven (11) projects were surveyed; plans and estimates were prepared for six (6); conferences held on thirteen (13) and eighteen (18) projects were successfully adjusted. This subject is treated more fully in Chapter V of this report.

Road Profiles Approved.

During the year, profiles for the improvement of 321.1 miles of road were checked and approved.

The following table shows the mileage of road profiles approved during past years:

Year.	Profiles Approved.
1913	29 miles
1914	445 miles
1915	549 miles
1916	880 miles
1917	899.5 miles
1918	321.1 miles

Federal Aid Road Projects.

Thirty-nine federal aid road projects involving the improvement of 555.5 miles of road, have been outlined by the Commission. Thirty-three of these projects have been submitted to the Federal Government and 27 of these projects have been approved by that department. Surveys have been made for 27 projects and detailed plans have been completed for 16 projects.

During the year Project No. 1 located in Cerro Gordo County was completed and contracts were let for Project No. 2 in Woodbury County and Project No. 7 in Marion County. The two latter named projects consisted in building roads to finished grade and were incomplete when construction work for the season closed.

Bids were asked for on Projects in Buchanan and Delaware counties, but the prices received were so high that it was deemed advisable to postpone construction until conditions became more normal. Bids will be asked on a number of these projects early in 1919 with the thought of starting construction work as soon as the season opens.

A detailed report on the status of the various projects appears in Chapter VII.

Roads at State Institutions.

The Board of Control of State Institutions directed the Supervisor of State Roads to limit the road work during 1918 at the various state institutions to that which was essential or of particular importance. Consequently, road construction was carried on only where the work had been previously begun, or was necessary to maintain the roads in usable condition.

The grading of three and one-half (3½) miles of road at the State Hospital at Cherokee was completed and all but three-quarters (¾) of a mile of this road was surfaced with gravel. This work will be completed early in 1919.

The gravelling of the five miles of road through or adjacent to state lands at the Colony for Epileptics at Woodward was completed in 1918 with the exception of about three-quarters (¾) of a mile.

Surveys and plans were made for the improvement of one and one-half (1½) miles of road at the Iowa Soldiers' Orphans Home at Davenport and contract was awarded for this improvement but the contractor was unable to do the work.

The Thirty-seventh General Assembly appropriated $11,000.00 for paving at the State Hospital for Inebriates at Knoxville. This work was done under the direction of the Commission in 1918.

Maintenance and repair work was done on the roads at state institutions including the two first above named, the Iowa State College at Ames, the State Hospital at Mt. Pleasant, the State Penitentiary at Ft. Madison and several others.

Capitol Grounds Improvement.

Engineering services were furnished the Executive Council in making detailed plans for and in supervising the improvement of the State Capitol grounds at Des Moines. This involved the placing of sheet asphalt pavement and the preparation of detailed plans and specifications for a retaining wall, to be built along the south boundary of the grounds and for a heating tunnel to extend southeast from the State House to a point near the railroad tracks.

Selection of Inter-County Road System.

The Commission has selected a "comprehensive system" of intercounty highways, containing approximately 6,000 miles, in accordance with the provisions of an act of the Thirty-seventh General Assembly. While the full details of this system have not been determined, the system as a whole is complete.

Survey at Spirit Lake.

The executive Council requested the assistance of the Highway Commission in determining the level at which the water in Spirit Lake and the two Okoboji Lakes should be held. Several miles of levels were run, tying up the different high and low lake stages of past years. A study was made of the drainage areas tributary to these lakes and of the effect which drainage projects in this area will have on the run-off.

Designs for Dams at Lakes.

At the request of the State Fish and Game Department, plans were prepared for reinforced concrete dams at the outlets of six of the state lakes. The construction work was in charge of Mr. Paul Graham, engineer for the Fish and Game Department.

Survey of Keokuk and Odessa Lakes.

At the request of the State Executive Council, the Commission has caused the above named lakes, which lie in a joint drainage district in Louisa and Muscatine counties, to be surveyed and maps and descriptions of each forty acre tract prepared, so that state lands can be disposed of as required by law. The surveys and office work have been performed by the Central States Engineering Company of Muscatine, under the general direction of this department.

Standard Specifications.

During the year, the following standard specifications and plans were revised and published:

Bridge Lumber and Piling,
Corrugated Metal Culverts,
Bridge Paints.

The following new standard plans and specifications were issued:

Thru Riveted Truss Spans, "T" Series,
Low Riveted Truss Spans with Joints, "Y" Series,
Reinforced Concrete Abutments,
Standard Specifications for Federal Aid Projects.

District Engineers.

The six district engineers spent 1,222 days in the various counties assisting in the county and township work. They attended 28 road lettings, 104 bridge lettings, and 75 lettings for road and bridge materials. Eighteen federal aid road projects, involving the improvement of 206 miles of road were examined in detail.

Testing Materials.

During the year, 67 samples of materials were tested and reported. This was a little more than half the number of tests that were made during 1917.

The Year 1919.

The conditions confronting the road builder and the prospects for highway work are far different from what they were in the beginning of 1918. With government restrictions almost entirely removed, with all classes of materials released for general use and with a plentiful supply of labor, no reason appears why road and bridge building should not be pushed during 1919, to the full extent that funds are available.

There are two important factors which lend their influence toward an active program of road construction. Out of the experiences arising from the war, the people have seen the necessity for more adequate facilities for local transportation, and secondly the vest army of men being released from military service not only provides the labor necessary for such work, but places before the public, the necessity of providing these men with employment and it is quite generally felt that no better means of furnishing employment can be found than by inaugurating an extensive program of road improvement.

In addition to the usual local funds available for highway and bridge work, there is available for Federal Aid Projects in 1919, an accumulation of federal and state funds which have not been expended on account of the high prices and general restrictions prevailing.

The estimated funds available for 1919 are as follows:

Federal Aid Funds	**$ 1,372,000.00**
State Aid Funds	**1,372,000.00**
Levies:	
County	**7,208,000.00**
Township	**3,526,000.00**
Auto Fee Distribution to Counties	**1,600,000.00**
	$15,078,000.00

Organization of Commission.

The present organization of the Commission by Departments, is as follows:

COMMISSIONERS.

H. C. Beard ..... **Mt. Ayr, Iowa, Chairman.**
J. W. Holden ..... **Scranton, Iowa.**
S. W. Beyer ..... **Ames, Iowa.**

ADMINISTRATIVE DEPARTMENT.

T. H. MacDonald ..... **Chief Engineer.**
F. W. Parrott ..... **Auditor.**
J. W. Eichinger ..... **Bulletin Editor.**

ADMINISTRATIVE DEPARTMENT.—Continued.

Velda Rowland ..... Stenographer.
May Vanderlinden ..... Stenographer.
Edith Voorhees ..... File Clerk.
Ruth Haggin ..... Bookkeeper.
Luella Devereaux ..... Stenographer.

ROAD DEPARTMENT.

F. R. White ..... Road Engineer.
Anne Vanderlinden ..... Stenographer.

PLANS.

W. E. Jones ..... Assistant Road Engineer.
H. S. Leicht ..... Assistant Engineer.
J. W. Brandt ..... Assistant Engineer.
E. L. Kaser ..... Assistant Engineer.
W. M. MacGibbon ..... Assistant Engineer.
M. H. Bryant ..... Draftsman.
B. E. Brevik ..... Draftsman.
F. C. Schneider ..... Draftsman.
E. H. Irwin ..... Draftsman.
Oscar Trueblood ..... Draftsman.
U. Bozzi ..... Draftsman.

CONSTRUCTION.

F. H. Mann ..... Construction Engineer.
G. S. Foster ..... Assistant Engineer.
Perry J. Preston ..... Assistant Engineer.
E. A. Zack ..... Assistant Engineer.
Leroy Brown ..... Assistant Engineer.
Bert Meyers ..... Assistant Engineer.
A. A. Baustin ..... Assistant Engineer.

SURVEYS.

Raymond R. Zack ..... Chief of Party.
Geo. H. Craig ..... Chief of Party.
M. E. Johnson ..... Chief of Party.
W. J. Smith ..... Chief of Party.

BRIDGE DEPARTMENT.

J. H. Ames ..... Bridge Engineer.
E. F. Kelley ..... Assistant Bridge Engineer.
E. W. Blumenschein ..... Structural Engineer.
J. A. Paulsen ..... Construction Engineer.
S. J. Bell ..... Designer.
W. N. Adams ..... Designer.
Harry Bowman ..... R. R. Crossing Engineer.
J. E. Kirkham ..... Consulting Engineer.

BRIDGE DEPARTMENT.—Continued.

H. B. Collins ..... Draftsman.
R. E. Braun ..... Draftsman.
H. A. Hanson ..... Clerk.
Mrs. M. F. Stigers ..... Clerk.
Mrs. J. A. Paulsen ..... Stenographer.

DRAINAGE DEPARTMENT.

R. W. Clyde ..... Drainage Engineer.

WOMENS' DRAFTING DEPARTMENT.

Alda Wilson ..... Superintendent.
Jennie Coventry ..... Draftswoman.
Doris Ambrose ..... Draftswoman.
Carita McCarroll ..... Draftswoman.
Jessie Brooks ..... Draftswoman.
Hazel Brandt ..... Draftswoman.
Dorothy Twitchell ..... Draftswoman.
Frances McCall ..... Draftswoman.
Violet Roberson ..... Draftswoman.
Belle Courtney ..... Draftswoman.

DISTRICT ENGINEERS.

W. F. Beard ..... District No. 1.
W. H. Root ..... District No. 2.
E. W. Dunn ..... District No. 3.
L. M. Martin ..... District No. 4.
J. S. Morrison ..... District No. 5.
W. M. Lee ..... District No. 6.

Chapter II. Recommended Highway Legislation.

Iowa has come to the opening of a new period in highway development, a period in the life of the state that is quite distinctly shut off from the preceding years by the span of our participation in the war. For nearly two years, the whole thought of the people of the state has been on this one great activity. During this time, particularly during the past year, we have advanced materially but little in the development of our roads, but the loss is more than compensated, for during this period we have been building more certainly and securely than ever, a pride of citizenship and a loyalty to Iowa, with all its potential promise of united thought and effort to build a finer and more powerful commonwealth.

It is just now an interval when careful, constructive thought is possible. The turmoil and confusion of war demands and war activities is rapidly decreasing. We realize, perhaps only vaguely as yet, that years must follow years of constructive effort, to overcome the waste and destruction of the past four years. It is well that we should take thought of the future, before our constructive activity is fairly begun, that we may select with care the lines of endeavor that will bring about most surely and completely the ideal expressed when we speak of our state as a commonwealth. It must be remembered that the same character of people, the same loyalty and the same enthusiasm, will actuate those of other states in their reorganization and reconstruction problems which are the aftermath of the war, and in order that this state may hold her place, that she may hold a great place in the union of states, we must incorporate into our common activities and interests the things which are fundamental to the growth and development of every constituent part of the state. There are many lines of activity whose call is insistent, but none of more importance than the proper development of our transportation and communication system. The war has been a wonderful exposition of the fundamental relationship of food and transportation to any great effort of the race, and has emphasized the fact that our ability to produce exceeds our ability to transport. This point cannot be too well understood. An intelligent and substantial program of agricultural

education and agricultural development has constantly increased our ability to produce, and a far less intelligent policy adopted towards our transportation systems has prevented our facilities from keeping pace with our transportation demands. In our hour of need, the weaknesses and delays which have handicapped the individual in times of peace, jeopardized and greatly limited the effort of the whole nation.

Our highways and our railways cannot be considered separately. They are both parts of a transportation system and each should be developed as supplementary and not competitive units. No matter to what extremes of thought enthusiasm for motor vehicle transportation leads, it is not within the realms of probability that the motor vehicle will supplant the railway as a freight carrier from this state to the eastern markets. It is apparent, however, that the motor vehicle, particularly the motor truck, is rapidly becoming an established agency for collection and distribution between the farms and the local markets. This fact alone is not sufficient to produce a close relation between consumer and producer, but it does become an essential part in the unity of production, transportation, and efficient marketing. That we are now faced with the necessity of bringing about a condition that will eliminate the waste and encourage the production of food stuffs, particularly the food stuffs such as eggs, milk and garden produce, which must be transported quickly and efficiently and at the same time provide a direct connection between producer and consumer, it is apparent to every student of economic and agricultural conditions. In this plan, the building of roads that will be continually serviceable under motor traffic is one of the essential requirements. Yet, the economic advantage of improved roads should not be emphasized to the detriment of their necessity from the social standpoint. It has yet to be proven that the value of improved roads is greater from a commercial standpoint than from that of the social service they will render. It is not necessary, however, to differentiate the two services. The same system that will give adequate commercial service to the state will likewise provide for the social uses, and it may be added, that any system of roads which gives adequate service to a community in times of peace will in times of war, with few modifications, serve the military demands.

The Development of Highway Systems within the State.

The process of the development of highway systems in this state has been logical and the basis sound. Prior to 1913, the one hun-

dred four thousand miles of public highway in the state were administered by the sixteen hundred odd townships. In 1913, the total mileage was divided into two systems; i. e., a township system of approximately eighty-eight thousand miles, and a county road system of approximately sixteen thousand miles. In 1917 the Highway Commission was authorized, in co-operation with the county boards of supervisors, to plan a third system; i. e., an inter-county system of from two thousand to six thousand miles. It has been found that an adequate primary system of roads, which will connect all of the large market places and county seat towns, and cover the principal traveled roads of each county, will require the maximum mileage stipulated. With the development of this system, our roads are now divided into the following classes:

Township road system, approximately 88.000 miles.
County road system, approximately 10,000 miles.
Inter-county road system, approximately 6,000 miles.

The exact details of the latter system have not been worked out, but the system as a whole is completed. The classification has not been based upon arbitrary methods, but by the natural selection of the main routes by the population in each community. The selection of the inter-county road system was made necessary by the requirements of the Federal Aid Road Act, which required the state to propose for improvement a system of roads on which would be expended the appropriations by the Federal Government.

Highway Traffic Census.

The division of the highways of the state into continuous systems has produced a curious condition. While the amount of traffic has been increasing enormously, the amount of traffic on some of the roads of the township system has decreased and has concentrated on the roads of the county system. The concentration of the greatest portion of traffic on a limited mileage of roads has conclusively demonstrated the possibility of giving service to the public by improving a comparatively small percentage of the highways, which in general constitute the direct lines of communication between, or radiating from, population centers. In connection with the Federal Aid road projects during the past two years, accurate counts have been made of the travel over the roads proposed for improvement, with the following results:

In 1917, traffic counts were made at forty-seven stations located in seventeen different counties, widely distributed in the state. These counts were all taken on the roads of the inter-county system.

Local traffic, made up of the town to town, town to farm, and traffic originating in the towns, constituted forty-six per cent of total.

Inter-urban, and inter-county traffic, made up of traffic between towns in the same county, or between towns in adjoining counties constituted forty-seven per cent of the total.

Tourist, or inter-state traffic, constituted six and five-tenths per cent of the total.

The average daily traffic per station for the seventeen counties, was three hundred thirty-nine vehicles.

The daily average number of passengers carried was nine hundred ninety-six.

Of the average number of vehicles, three hundred thirty-nine, carried per day, two hundred ninety-two were motor driven and forty-seven horse drawn.

In 1918, traffic counts were made in nineteen counties at forty stations, with the following results:

Grand total units of traffic	57,886
Loaded freight vehicles	2,554
Total passengers carried	150,959
Average total units per station	1,808
Average daily traffic	260

This total traffic was divided as follows:
Local, as defined above, forty-six per cent.
Inter-urban and inter-county, forty-seven per cent.
Tourist or inter-state traffic, six and one-half per cent.

The results of the traffic count for the two years agree quite closely, and indicate that the traffic over our roads on the basis of its origin, is divided into the following parts:

Local, or town to farm traffic, forty-six per cent.
Inter-urban and inter-county, forty-seven per cent.
Touris tor inter-state traffic, six and one-half per cent.

The traffic counts were taken at each station for a continuous period of seven days, and the results given are the average, daily results for all the stations. The counts taken during the two years, therefore, are the average for eighty-seven stations in thirty-six counties, over one-third of the total counties of the state. These counties are widely distributed and may be taken as fairly representative of the state away from the immediate vicinity of the larger cities, but the averages are misleading as to the total traffic which will occur on roads which lead into the larger cities. The average traffic on one of the main roads leading into the city of Atlantic in Cass county is nearly one thousand vehicles per day.

Preponderance of Motor Driven Vehicles.

Of equal interest is the classification of the traffic in accordance with its motive power. It was surprising to find that in 1917 the averages show that eighty-six per cent of the total traffic was motor driven and only fourteen per cent horse drawn. From the promised development of the motor truck, it is predicted that even this percentage of horse drawn vehicles will be decreased. The above figures are enlightening as to the reason why such an insistent demand is being made for the improvement of our main public highways in such a manner that they will render continuous service for motor driven vehicles.

Briefly summarized, it may be said that the average traffic on the main country road outside the influence of the larger cities, is three hundred vehicles per day, and these vehicles will daily carry more than eight hundred people, and that more than eighty per cent of these vehicles will be motor driven. Also that forty-six per cent of this traffic will be local, forty-seven per cent will be inter-town or inter-county, and six and one-half per cent will be inter-state. The results of future traffic counts may modify these results somewhat but it is considered that these figures present a fair basis on which to base our judgment as to the responsibility for bearing the cost for the improvement of the roads.

Progress Made in Road Improvements.

In any plan proposed for road improvement in an agricultural state like Iowa, there are certain fundamental principles which should be recognized. An improved road leading from a market center into an agricultural district benefits, first, the property immediately adjoining, second, the local community, and third, the state and nation as a whole. If these benefits are recognized in any law providing for the cost of improved roads, there will be no necessity for the issuance of long term bonds or for the undue increase of taxes against property. Further, local initiative in the matter of road improvement should not be destroyed. It is an arduous task to build a system of administration in a state as large as Iowa, and any system proposed for highway improvement in this state should take into consideration and make use of existing agencies. A very large amount of fundamental work has already been done. We are now in a position to make use of the permanent grading, drainage, and bridge building already accomplished, as soon as a plan for financing road surfacing is provided.

Through the joint agencies of the Boards of Supervisors, the County Engineers, and the State Highway Commission during the past four years, more than twenty-five hundred miles of road have been finished to permanent grade ready for a durable surface. During the past three years there have been placed on our roads a total of twenty thousand and twenty-nine culverts and bridges of reinforced concrete, and of structural steel and reinforced concrete. These are divided into eighteen thousand thirty-one reinforced concrete structures, built at a cost of seven million six hundred seventy-nine thousand dollars; and one thousand nine hundred ninety-eight structural steel and reinforced concrete structures, built at a total cost of four million sixty-seven thousand dollars.

It is estimated that there are fifteen hundred miles of permanently graded roads on the inter-county system. Plans are prepared or are now in the process of preparation for four hundred forty additional miles under Federal Aid projects. These roads should be placed under contract this year, which means that by the end of the year 1919 not less than one-third of the entire proposed inter-county road system will have been permanently graded, drained, and permanently bridged. In order to preserve these graded roads from destruction under the heavy traffic of motor vehicles and motor trucks that is developing so rapidly, some method of providing a durable surface is essentially the next step for highway legislation in this state.

It must be remembered that it will be a physical impossibility in this state to build an adequate system of roads within a limited period. Construction work of all character has been handicapped and practically brought to a close by the exigencies of the war. Now it will be necessary to rebuild organizations of contractors, to develop new sources of material and new lines of production adequate to meet the demands of a larger construction program. Any plan for road legislation providing for the surfacing of an adequate system should look forward to the completion of that system in not less than ten years and possibly longer. Even though the greatest efforts are concentrated on a main system of highways. there must not be interference with the improvement and maintenance of the other highway systems. This work must go forward, for these roads also will be constantly receiving an increased amount of traffic.

Federal Aid Appropriations.

The first Federal Aid Act, passed in 1916, provided a total appropriation of seventy-five millions of dollars to be distributed among the states on a five year allotment plan. This provided an average appropriation for the state of Iowa for each of the five years, of approximately four hundred twenty thousand dollars. There is a bill pending before the present congress which proposes to increase the total amount of Federal Aid to one hundred millions of dollars per year, which, on the same basis of distribution as used formerly, would appropriate to this state approximately two million eight hundred thousand dollars per year. It is impossible to predict the outcome of this measure, but the general and increasing sentiment for larger Federal Aid apportionments for road building will undoubtedly receive serious consideration from congress. It may be quite confidently expected that the Federal Aid apportionment to this state will be materially increased almost immediately.

General Plan for Distributing the Cost of Road Improvement.

As an essential basis for any plan for road improvement, the cost must be distributed equitably. The figures which have been gathered by the traffic census provide a basis for such a distribution. As stated before, it is desirable in so far as possible, to avoid the issuance of long term bonds and also to avoid an increase in the taxes upon real property. It has been pointed out that approximately eighty-five per cent of the traffic on our main roads is provided by the motor vehicle. The demand for road improvement comes largely from the motor vehicle owner. It is believed, therefore, that with considerable fairness the greater portion of cost of a system of improved main roads may properly be placed upon the motor vehicle. There were registered in this state during the past eleven months period, approximately two hundred seventy-six thousand motor vehicles.

In Illinois, as a basis of the bond issue which has just been voted by the people of that state, there was a material increase in the motor license fee. This fee for 1920 is as follows:

10 H. P. and less	$ 6.00
25 H. P. and more than 10	8.00
35 H. P. and more than 25	12.00

It will be noted that these rates average somewhat lower than the license fee required under the present Iowa statute. But this is

not the whole story. In Illinois, in addition to the license fee required, motor vehicles are taxed as personal property, and they are also required, in many cities, to pay a wheel tax. It appears equitable, therefore, that the license fee of motor vehicles in this state should be very materially raised. Motor trucks have not paid a fair license fee under the present Iowa law. In fact, it is doubtful if many of the heavier trucks are registered, and this condition should no longer be tolerated. It is believed that the license fees can be adjusted for this state so that the total revenues coupled with the revenues to be derived from registration fees for motor trucks, will be not less than five millions of dollars per year, and yet will not require a fee for the individual motor vehicle in excess of the Illinois registration fee plus the property tax, plus the wheel tax which is levied in many cities. With a fund of this amount available, the greater percentage of the cost of the improvement of the main system of highways would be placed upon road users, which is the fairest distribution that can be made.

The property which is directly served by the improved roads, should also pay an assessment in proportion to the benefits received. Practically all public improvements of streets, sidewalks, sewers, and such construction within our cities, is based upon the principle of a payment for the benefits by the benefited property. These benefits in the case of a public road should not be placed at a high per cent of the total cost. It is believed that somewhere between a minimum of one-tenth and a maximum of one-fifth of the cost would lie the fair proportion that should be paid by the directly benefited property. The limit of the benefited district should be left flexible to provide for special cases.

As stated before, the total amount of the increase in the Federal Aid appropriation for this state is still problematic, but with the reasonable certainty of an increased apportionment, it is believed that a material percentage of the cost of the system of improved roads would be paid from this source.

From the three sources, then, the increased revenue from motor vehicle funds, the increased Federal Aid apportionment, and the assessment against directly benefited property, in the neighborhood of eighty per cent of the total cost of road improvement would be financed outside of general property taxes. Perhaps an even higher percentage of the total cost might be paid from these sources. It is true that such a plan for financing the cost of road improvement would not leave a large percentage of the cost to be

paid by general property, but it must be borne in mind that the other roads must be built and maintained, and bridges and culverts must be built, and the present revenues are needed for this purpose.

In developing this method of financing the cost of main road improvement, the amount of the total cost that is levied against the general property should be met by taxes over the entire county property, including the property both within and without incorporated cities and towns. The community benefits of improved roads are general and extend to the cities and towns as well as to the country districts. There has been too long an unfair distribution of road taxes in this respect, and the situation should be remedied.

It may be said that this plan is open to the objection that in the pay-as-you go policy only a limited number of roads can be built each year. To meet this objection which is becoming serious around our larger centers of population, a plan similar to that used in Florida will provide that any community may proceed at a more rapid rate to improve the roads in its jurisdiction. Under this plan, surveys and plans would be prepared for a definite mileage of road, and bids taken from contractors, and the contracts let, subject to the stipulation that the contract is not effective until approved by a majority vote of electors in the county or district. Such a plan would necessitate the issuance of short term bonds by the county to carry the cost of the improvement, but the community would be reimbursed, except as to the amount to be paid by general property taxes, from the motor vehicle fees, the Federal Aid funds, and the assessments against benefitted property, as these revenues accrue.

Under the above general outline, each county in the state could proceed as slowly or as fast as it might desire, with the knowledge that the major part of the cost of its improvement would be paid for from the three sources mentioned. It should be borne in mind in considering this general plan, that the burden of the cost is thrown upon the road user and not upon property which may or may not be benefited. The property which is particularly benefited pays a direct assessment, and it is probable a very considerable percentage of the cost will be paid from Federal Aid funds. Without a material increase in the general taxes upon property, a construction fund of approximately ten millions of dollars per year can be aprovided from the four sources named, without interfering with the revenues for the upkeep of the township road system or for bridge purposes, and will still leave sufficient revenues for

maintenance and some construction work on the county road system. There are portions of the state that will wish to proceed rapidly with the construction of roads, and other portions which will proceed more slowly. But under this plan, in a period of ten to twelve years, the actual cost of improving the entire inter-county road system will be financed and there will not be left at the end of the period, a staggering amount of bonds outstanding or the revenues from the motor vehicle fund anticipated for a considerable period in the future.

The construction work would be handled through existing agencies without the creation of new departments or new commissions. The boards of supervisors of the various counties, their engineers, and the organization of the State Highway Commission, are working in co-operation, and it is believed that a plan providing substantially for the principles as outlined will be most applicable to the conditions as they exist in this state, and will provide the next reasonable step in the development of highway legislation for the state.

It should be particularly kept in mind that the two sources of revenue from which the major portion of the construction funds would be derived, have come into existence within the past few years. In 1911 there were only thirty thousand motor vehicles in this state, and the total for the year 1918 will undoubtedly be above two hundred eighty thousand. The first assistance for road building to be derived from the Federal Government as a general procedure, was received in 1916. It is from these two new sources of revenue that the greatest part of the cost of road improvement for the main roads of the state is to be derived, and not by increasing the taxes either upon personal or real property.

Needed Legislation Along Other Lines.

Road Guide Posts. With the development of the inter-county system of highways, it becomes important that the system of roads should be defined by permanent markers which will direct the travelers over the road and mark the distances between the different points along the way. The last General Assembly for the State of Wisconsin provided for a system of marking the highways which has proven very convenient to the road users and has been the subject of many favorable comments from the travelers from this state who have been over the Wisconsin roads. In connection with the system of sign posts a map has been published showing

the routes and also describing the various points of scenic and historic interest. Such a guidebook is of inestimable value in advertising the state, and the example set by Wisconsin could well be followed in this state.

The system of sign posts should be placed and maintained under the direction of the State Highway Commission, and for this purpose the cost should be met from the maintenance fund of the State Highway Commission. There has been at the end of each biennial period a balance remaining from this fund which reverts to the General Treasury, and it should be specifically appropriated for the purpose of providing permanent and pleasing signposts. In this connection legislation should prohibit the use of the highways for advertising purposes of all character. It should be made a misdemeanor punishable by a sufficiently heavy fine to prevent absolutely the placing of signs along the public highway for advertising purposes, or for using for this purpose any of the structures built by the public, such as bridges. As travel over our roads becomes greater, the public highway will be used to a greater and greater extent for advertising purposes, unless such a development is prevented by legislation. Pennsylvania and Wisconsin absolutely prevent the placing of advertising signs upon the highway right of way, and such a plan should be followed in this state.

Motor Truck Regulations.

As brought out in the preceding discussion, we do not at present have any legislation regulating the registration and operation of motor trucks of the heavier, slower moving class. A uniform motor truck regulatory measure has been proposed by the United States Chamber of Commerce and the general features of this measure were placed before the joint convention of the American Association of State Highway Officials and the Highways Industries Association in December of this year. It is desirable that any such law should be uniform for all the states, and it is particularly desirable that the laws of contiguous states be uniform. The general measure proposed by the U. S. Chamber of Commerce will be considered by the State Highway Departments of the Mississippi Valley states at an early meeting, and a uniform bill will be agreed upon to recommend to the General Assemblies of the states, including at least Illinois, Wisconsin, Minnesota, Iowa and Missouri.

Motor Vehicle Operators.

In addition to the regulation of motor trucks, there should be some adequate provision to guard against the use of the highways by incompetent and reckless drivers. A study of the accidents which are continually occurring on the highways shows that in practically every case accidents occur by reason of a reckless use of the highways, and often the victims of such accidents are not responsible by their own acts for the injuries which they receive. Reckless use of the highways will prevail so long as no adequate regulatory measure is enforced. As the highways are improved, this condition will become more acute. The actions of one reckless operator may destroy the incentive of a whole community to improve the highways and to such operators, after they have once demonstrated the lack of regard for the rights of others, should be refused permission to use the highways. In some such way only can the highways be made safe and the traveling public be protected.

Issuing of Funding Bonds.

Another matter which deserves consideration is the present practice of issuing county funding bonds. In 1916, and again in 1917, the county expenditures for roads and bridges exceeded the current revenues by about three millions of dollars. This excess of expenditures over receipts was represented by warrants stamped "Not Paid for Want of Funds." After January First of each year over two million dollars worth of these warrants were taken up by issuing funding bonds.

The present law places no restrictions upon the issuing of funding bonds. Thus the overdraft and consequent bond issue may be for permanent improvements, for repairs or general maintenance. At the present time there are approximately $10,000,000 of road and bridge funding bonds outstanding, about eighty per cent of this sum being for bridge expenditures.

During the past three years at least two-thirds of the counties have not kept their expenditures within their current revenues for road and bridge work, a majority of counties had a deficit in road and bridge funds on January 1, 1919, and more than two-thirds of them had a deficit in the bridge fund alone.

In respect to the issuing of funding bonds, several counties have reached their statutory limit of indebtedness, and others are fast

approaching their limit. Some of these counties are continuing to exceed their yearly revenues and are not taking adequate provision for the retirement of their outstanding bonds. About twenty-five counties under the present law have accumulated a large bonded indebtedness for road and bridge construction and under no limitation or restriction as to the expenditure of the money derived from their overdrawing of funds.

In general, there is a tendency to make these bonds long term bonds, which accounts for the comparatively large accumulation of indebtedness of this form. If such bonds are issued, they should be retired within a few years.

The credit of many counties is decidedly impaired by the floating of "stamped warrants." When contractors are cashing these warrants at ridiculously high rates of discount it may be assumed that counties are paying high prices for what they purchase. In reading county advertisements for bids, it is common to note statements that "payment will be made in 'stamped warrants.'" It is poor practice for counties to be in position where they must pay their bills in "stamped warrants." Better prices can be secured if they are in position to pay cash.

Township Road Funds.

Some consideration may well be given the present system of handling township funds. The township funds amounting to over three and one-half millions of dollars annually, are paid over to the sixteen hundred township clerks by the county treasurers. Without attributing any element of dishonesty or misappropriation of funds, it is safe to say that much of this money is wasted. Furthermore, no adequate accounting for this vast sum is secured. Reports as to the use made of these funds are in hundreds of cases incomplete, or not forthcoming at all.

Township funds are sometimes placed in banks with the provision that township road superintendents could check on same in the payment of bills. Road superintendents are also allowed to collect poll taxes and expend same. Use of cemetery funds for road purposes has been known and the transfer of money from the drag fund to the road fund without the required legal action is common. In other cases large accumulations of township funds have been discovered in local banks. An instance recently came to light where the condition of the roads in a certain township was

complained of and it was found that the township had over seven thousand dollars available for road work.

The cash balances in various county and township road funds reported for January 1, 1918, were as follows:

County Bridge Fund	$ 21,220.33
County Road Cash Fund	162,573.93
Motor Vehicle Road Fund	304,820.88
Total County Funds	488,615.14
Township Road Funds	643,443.75

While the county may be too large a unit for maintaining all of the public highways, there is evidence that the township is too small a unit for economically handling road construction. In a certain county during the past year, eight townships purchased tractor grading outfits. No one disputes that such outfits are the proper equipment for doing the work, but why are eight outfits necessary for the work in eight townships? The cost of this equipment represents too large an investment for the individual township.

The present law provides that counties may contract with townships to improve township roads and that the county shall be reimbursed from township funds for the cost of such improvements, but very rarely are such arrangements made. The township administration of road funds is fast becoming an economic impossibility under the conditions that are now imposed.

Chapter III. Administrative Department.

Organization.

The commission during 1918, consisted of H. C. Beard of Mt. Ayr, Chairman, J. W. Holden of Scranton and S. W. Beyer, Dean of Engineer of the Iowa State College. The two commissioners first named, have held office since April, 1913, when the commission was first organized under the present law. Dr. S. W. Beyer holds his membership ex-officio and has been a member of the commission since October 16, 1917.

The work of the commission is carried on under four general departments: The Administrative, the Road, the Bridge and the Department of Drainage Investigation.

District Engineers.

In 1918, it was found necessary to increase the number of district engineers from five to six. This reduced the number of counties under each district engineer from twenty to sixteen or seventeen. This change was made necessary on account of the increased amount of work handled through the district offices, the principal item of additional work being the administration of the Federal Aid Road Law, involving the taking of traffic census, the making of surveys and preparation of plans and estimates.

Fifth Annual Road Conference.

On February 26th, 27th and 28th, the Commission held its Fifth Annual Road Conference of county engineers and county supervisors. The meetings were attended by the employees of the Commission, 85 county engineers, 8 assistant county engineers, 56 county supervisors, 1 county auditor, and two other parties. These meetings are closed to contractors and salesmen in order that full time may be given to discussion and consideration of the topics presented.

In former years, these annual meetings were held primarily for the county engineers but the number of supervisors attending each year gradually increased, and the interest taken in the discussions by these officials, was so marked that for the past two years, the supervisors have been urged to attend and take part in the program. The complete program for the session is as follows:

TUESDAY, FEBRUARY 26TH.

8:00 to 11.00 A. M.—
Registration—Room 105 of State Highway Commission.

11:00 A. M.—
Fifth Annual Road Conference called together by Chairman H. C. Beard.
Topic One. 1918 Road Improvement Policies, State and Federal, Thos. H. MacDonald.
Announcements.

1:15 P. M.—
Topic Two. Materials of Construction, Present Conditions of Supplies, Prices, Contracts and Delivery, J. H. Ames.
General Discussion.
Topic Three. Transportation and Power Problems. Motor Truck Economy, Geo. D. Steele.
Discussion led by W. H. Root, H. E. Cook, Wapello County.
Tractors—Hiring versus Owning.
General discussion.
Team Hauling—Prices and Availability, W. D. Maxwell, Sac City.
Actual Amounts and Weights of Traffic, J. S. Dodds.
Topic Four. Labor Problems.
Holding Labor by the Bonus Method, G. A. Blunt, Fayette County.
Day Labor or Contract, C. Coykendall, Polk County, J. C. Kerrigan, O'Brien County.

7:30 P. M.—
Chairman Beard, presiding.
Topic Five. Two Years Flying Over European Battlefields, Hal O'Flaherty.
Topic Six. Iowa's 1917 Highway Improvement Record.
A short summary of the progress recorded since our last annual conference.
Annual Report, F. W. Parrott.
Road Progress, F. R. White.
Bridge Progress, J. H. Ames.
Motion films showing road building within and without Camp Dodge, Polk County, and road building on Federal Aid Project No. 1, Cerro Gordo County.

WEDNESDAY, FEBRUARY 27TH.

8:30 A. M.—

Topic Seven. 1918 Policy of Road Maintenance.
Patrol Law—Methods of Organization, F. R. White.
County Patrol Organization, Sam Steigerwalt, Story County; F. P. G. Halbfass, Muscatine County.
County Gang Organization, A. F. Fischer, Johnson County; B. F. Conlon, Montgomery County.
Topic Eight. Bridge Maintenance and Economy in Bridge Expenditure for 1918, E. W. Dunn.
Painting, C. E. Smith, Henry County.

Reflooring—General Discussion.
Topic Nine. Road Oiling—Specifications, J. S. Coye; Amos Melberg, Benton County; H. L. Phelps, Cedar County.

11:00 A. M.—
Topic Ten. Law of Patents—Relation of Civil Engineers and Mechanical Engineers to the Patent Lawyers, Wallace R. Lane, Patent Attorney, Chicago, Illinois.

1:30 P. M.—
Topic Eleven. Minnesota Roads, with Particular Reference to the Patrol System for the Maintenance of Gravel Roads, J. H. Mullen, Deputy Highway Commissioner of Minnesota.
General Discussion.
Topic Twelve. The Engineer in Army Service, Capt. George K. McCullough, 313th Engineers, Camp Dodge.

5:30 P. M.—
Topic Thirteen. Engineering and Mechanical Skill as Distinguished from Invention, Wallace R. Lane.

6:30 P. M.—
Loyalty Dinner, Hotel Sheldon-Munn, Chairman, H. C. Beard, presiding.
Engineers' Roll of Honor, Commissioner S. W. Beyer.
Public Service, J. D. Buser, Muscatine County.
Ambulance Work on the Verdun Front, Bert Ragsdale, Des Moines.

THURSDAY, FEBRUARY 28TH.

8:30 A. M.—
Topic Fourteen. Road and Bridge Construction.
Bridge Field Notes and Plans, E. F. Kelley.
Securing Competition at Lettings, W. O. Price, Marion County; A. H. Withington, Appanoose County.
Inspection of Materials, E. B. Lorenzen.
Explosives in Road Work, F. H. Mann.
Filling Bridges and Culverts, C. D. Weller, Guthrie County; Don L. Teal, Jefferson County.
Topic Fifteen. Proportioning Concrete, Prof. D. A. Abrams, Lewis Institute, Chicago.
Discussion: R. W. Crum.
Topic Sixteen. Economics of Road Engineering, with Particular Reference to Road Grading, W. E. Jones.
Topic Eighteen. Inspection of Construction, J. A. Paulsen; R. W. Gearhart, Linn County.

County Engineers.

A large number of county engineers and assistant engineers enlisted for military service or were called in the draft, placing a serious handicap on the engineering department in some counties. This situation would have been of more serious moment had it not been that the Federal restrictions during the past season reduced operations to little more than maintenance and repairs.

On December 21, 1917, the position of county engineer in Ida county was declared vacant by the commission, and the Board of Supervisors of said county instructed to immediately employ a competent engineer.

Appointments of Commissioners.

During the year, 32 formal Commission meetings were held of which 23 were attended by Commissioner Beard, 21 by Commissioner Holden and 31 by Commissioner Beyer. The Commissioners spent a total of 55 days inspecting the proposed intercounty road system of 26 counties. Other appointments involved road inspection, conferences with county boards of supervisors, county and township officers' meetings, conferences with other state officers and inspecting lakes for the State Executive Council.

The Commissioners spent a total of 185 days, attending meetings or on other assignments, while the Chief Engineer and other employees of the Administrative Department spent a total of 193 days on assignments outside the office.

Official Communications.

During the year, the following Official Communications were sent to county, city and town officials: No. 36 to the Trade, regarding State Material Letting; No. 37 to county engineers and county auditors regarding exemption of freight and express shipments from war tax; No. 38 to county supervisors and county engineers regarding restricted use of bitumen products; No. 39 to county supervisors and county engineers regarding priority order as to the use of open top cars; No. 40 to city and town councils, and city engineers regarding restricted use of bitumen products; No. 41 to county engineers, regarding delayed delivery of lumber contracted for; No. 42 to county supervisors, city councils, county engineers and city engineers regarding federal and state approval on all road, bridge and street improvements during the period of the war; No. 43 to county supervisors, city councils, county and city engineers regarding the continuance of construction work on roads, streets and highway bridges now substantially underway, until November 1, 1918; No. 44 to county supervisors, city council, county and city engineers regarding highway, street and bridge improvement, and materials therefor.

Contract Approval.

All contracts approved are entered on the Minutes of the Commission. Two hundred and sixty-three contracts, including road, bridge and material contracts were submitted for approval in 1918.

Accounting.

Although all expenditures by the Commission are made through the Auditor and Treasurer of State, a detailed record and classification of expenditures is kept in the Commission office. The records relating to expenditures in connection with Federal Aid Projects involve the greatest amount of labor.

Statistical Reports.

In addition to the annual reports filed by county engineers, several questionnaires were sent to county engineers and county auditors during the year in gathering the data required in formulating plans to meet conditions and to furnish information requested by various Federal Departments and Boards. Frequent requests for statistical information are received from other state departments, members of the General Assembly, official departments of other states and the general public. All such requests are complied with if the information is at hand or can be compiled. A trained office force has been developed to collect and compile this information.

Publications.

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

Standard Specifications for Bridge Lumber and Piling.
Standard Plans for Reinforced Concrete Abutments—Series "K".
Standard Plans for Thru Riveted Truss Spans, "T" Series.
Standard Plans for Low Riveted Truss Spans with Joists—"Y" Series.
Standard Specifications for Corrugated Metal Culverts.
Standard Specifications for Federal Aid Projects.
Standard Specifications for Bridge Paints.

Changes in County Road System.

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

1. **To eliminate dangerous crossings.**
2. **To eliminate dangerous curves.**
3. **When the proposed change would materially decrease the cost of improving the road.**

4. **When the proposed change would materially decrease the cost of maintenance.**
5. **Whenever all of the roads of the county system have been improved according to the plans provided for.**

Action to amend the county system must first be taken by the county board of supervisors but the action of the county board is not effective until approved by the Highway Commission.

Story county was the first to complete the grading of its county road system. Such grading was practically completed at the end of 1917 or a year ago, but instead of taking over a portion of the township system as may be done under provision 5 cited above, the board of supervisors has so far, pursued the policy of graveling the present county system before making additions to same.

During the year ended December 1, 1918, 82 requests from 50 counties were made for modifications in the county road system. After investigation, the Commission approved 71 of these requests, adding 144.75 miles to the county system, and removing 11.75 miles, making a net increase of 133 miles.

State Fair Exhibit.

At the request of the State Board of Agriculture, the Commission presented its usual exhibit at the State Fair. A large number of visitors requested that their names be placed on the mailing list of the Commission's Service Bulletin.

Employment of Women in Drafting Department.

On account of the increased difficulty in securing and retaining men in the drafting department, it was decided by the Commission on May 31st, 1918, to establish a drafting department composed of women. To provide a trained force of draftswomen, a class was organized in which was enrolled about 20 young women, most of whom had had some training in mechanical drawing. A competent instructor was secured to develop this class, and within a few weeks, some of the members were able to begin tracing plans prepared by regular draftsmen for actual use.

The members of this class were paid in the beginning a salary of $35.00 per month with the promise of advancement in salary as soon as they were able to turn out work for actual use. Within a period of about two months, all of the individuals were able to turn out finished tracings of acceptable workmanship and their salary was advanced in keeping with the amount of work produced. From this class, a force of about ten (10) was selected and retained on

regular work under the direction of a competent woman superintendent, and have been retained as a part of the present organization of the Commission.

Conference with Bridge Companies Regarding Essential Work.

On September 6, 1918, a conference was held between the Highway Commission and representatives of a number of bridge companies relative to bridge contracts under the ruling of the Federal Government, that contracts shall be approved only for essential work. These representatives requested that the bridge work be approved as essential before the actual lettings are held. The Commission agreed to endeavor to see that such proposed work was approved as essential before bids were taken on said work.

Conference with Grading Contractors.

A committee representing the grading contractors of Iowa appeared before the Commission on March 29, 1918, and represented to the Commission that under the then existing industrial conditions, it was impossible for grading contractors to figure successfully on grading work at a flat price, and asked that a plan for taking bids and making contracts on a cost plus percentage basis be approved. The Commission replied that there was some question as to the legal standing of a contract on a cost plus percentage basis under the Iowa laws, but asked the Committee to submit a proposed plan of procedure for consideration.

Later, a suggested plan for taking bids and making contracts for grading work on a cost plus percentage basis was submitted by the same committee of contractors. This plan was submitted by the Highway Commission to the Attorney General for an opinion as to the legal status of such a plan. The Attorney General replied that in his opinion, there was no provision in the Iowa statute under which such form of contract could legally be put into effect. No further action was then taken with reference to said proposal.

Restricting Expenditures for Road and Bridge Work.

Acting in accordance with rulings of the Capital Issues Committee, the Commission requested the county boards of supervisors to confine their expenditures to road and bridge maintenance, and the performance of new work which might be classed as essential.

This action was taken in an effort to keep expenditures for road and bridge work within the current revenue available for such work

and as a result of this retrenchment on the part of the county boards of supervisors, the outstanding warrants at the end of 1918 amounted to two-thirds of a million dollars less than the amount outstanding at the end of 1917.

It has been the practice of counties for the past several years, to issue warrants for highway work amounting to several million dollars more than their receipts from current revenues, and to issue funding bonds at the end of the year to take up such outstanding warrants. Owing to the bond issues by the Federal government, it was thought that difficulty would be experienced in issuing funding bonds to take up warrants at the end of 1918.

Engineering Assistance Rendered Other State Departments.

During the past year, the Highway Commission at the request of other state departments, rendered engineering assistance in making surveys, plans and specifications and in superintending construction. At the request of the Executive Council, assistance was furnished in making detailed plans and specifications for improvement of the Capitol Grounds Extension and in inspecting and superintending the construction of said improvement.

The Executive Council also requested the Commission to survey certain lake beds which were involved in drainage projects. Surveys and plans were made for the improvement of several lakes under the jurisdiction of the Department of Fish and Game.

At the request of the Department of Agriculture, plans and specifications were furnished for paving the Walnut street entrance to the Fair Grounds, and an inspector was furnished while such paving was under construction.

Engineers were furnished to make surveys and plans and to oversee construction and maintenance of roads at various state institutions under the direction of the Board of Control of State Institutions.

At the request of the Department of Justice, the Commission made a survey of certain lands condemned by the state for the use of the cantonment at Camp Dodge.

Preparation of Progressive Military Maps.

At the direct request of Governor W. L. Harding the Highway Commission undertook the preparation of progressive military maps and the compiling of certain information requested by the War Department.

The basic maps were prepared by the women's drafting department from data contained in various government maps and the collection of the detailed information required, was begun by a party supplied with a Ford car. It was intended to start other parties collecting such data but the weather became unseasonable for this character of field work, and work was suspended during the winter seasons.

Stream Guaging.

In co-operation with the U. S. Geological Survey, seven new stream gauging stations have been established in rivers in the south and west part of the state. These stations supplement those which the State Geological Survey had helped maintain in the eastern part of the state. The equipment for these stations was furnished by the Federal Department and the methods used in measuring the stream flow are those developed by that department.

Selection of Inter-County Road System.

As directed by the provisions of Chapter 249, Acts of the 37th General Assembly, the Highway Commission has selected a "comprehensive system" of inter-county highways containing approximately 6,000 miles. The full details of this system have not been definitely determined, but the system as a whole has been selected.

The selection of the inter-county highways involved numerous inspection trips on the part of members of the Commission and Engineers from the general office, and the District Engineers, and some additional inspections must be made before the details of location are finally decided.

Before taking any action towards the selection of the system, each county board of supervisors was asked to submit its recommendation to the Highway Commission. The system approved, conforms in most cases to the roads recommended by the boards of supervisors, but some adjustment had to be made where roads did not connect at county lines.

Bridge Patent Litigation.

The 34th General Assembly of Iowa, on the recommendation of the Highway Commission, passed an act empowering the governor of the state to direct the attorney general to appear for any county, city or town or other municipality, or any officer thereof or contractor therewith whenever any of these became a party to an action charging infringement of any patent involving any process or material entering into highway bridge or culvert construction.

During the interval since this law became operative, the state of Iowa, through the Department of Justice and the State Highway Commission, has prepared or assisted in preparing arguments and evidence for the defense in four patent cases in this state. The evidence gathered in these cases, has been made available for the use of the defense in similar suits in Kansas, Nebraska and Wisconsin. These states have likewise co-operated in making available to Iowa, the evidence gathered by them which is pertinent to the Iowa cases.

The four cases above referred to are as follows: Bone vs. Walsh Construction Co., Davenport, Iowa. Suit for infringement of patent on retaining wall reinforcement; Edwin Thatcher vs. Polk County. Edwin Thatcher vs. City of Des Moines—Suit for infringement of patent on arch reinforcement; Luten vs. Marsh Engineering Company. Infringement on patents of various details of bridge construction.

Of the above cases, the first was dismissed by motion of the plaintiff when the case came before the court in April, 1916. The second was tried before Federal Judge Wade in June, 1916, and under date of September 17th, 1916, the court in a sweeping decision, decided this case in favor of the defendant. Following this decision, the complainants petition in the third case was dismissed by the court. The fourth case was tried before Federal Judge Wade in December, 1917. Immediately after the close of the hearing, Judge Wade announced his decision in favor of the defendant. The decision denied all royalty claims and set aside all charges of infringement. The court further held that the patents involved, were invalid and that the ideas on which the patents were based, are unpatentable.

A detailed description of the evidence compiled by the Department of Justice and the State Highway Commission in the above named cases, is given in Chapter IV of the 1916 Annual Report of the State Highway Commission. Since 1916, however, some additional evidence was collected for the defense in the last named case. The decision of Federal Judge Wade as announced orally in the District Court of the U. S. in and for the southern district of Iowa, central division, on January 3, 1918, is of such great importance, not only to the state of Iowa, but to every state in the Union, that the full text of same is submitted herewith:

In The

DISTRICT COURT OF THE UNITED STATES

In and For the Southern District of Iowa

Central Division.

DANIEL B. LUTEN, Complainant		
versus		No. 4009 Equity.
J. B. MARSH, et al. Respondents.		

Oral Opinion Delivered by HON. MARTIN J. WADE, Presiding Judge, on January 3, 1918.

HOOD & SCHLEY, Indianapolis, Ind., Counsel for Plaintiff.
WALLACE R. LANE, Chicago, Ill., Special Counsel for the State of Iowa.
H. M. HAVNER, Attorney General State of Iowa, Counsel for Defendants.

THE COURT: I am going to dispose of this case now, notwithstanding the fact that it must be self-evident that I have not had time to study the various items of evidence presented here upon both sides, and if I had any doubt in my mind as to what the decision ought to be, I would take the time to go through this record more carefully. But I have not the time to study this record within the next few months and I feel that this is a case that should be promptly disposed of, first, because of the public importance of it—the far reaching effect it may have, and second, because of some of the methods disclosed here which have been employed by the plaintiff in the business of constructing bridges or getting the business of designing bridges. These methods no court can approve—some of them, at least. I am not sure but what they ought to be construed as sufficient to deny the plaintiff relief on the ground that he does not come into equity with clean hands. I refer especially to the half-truths which are worse than falsehoods, in some of these representations made to contractors. Because when a man recites a list of cases as having been tried, or in which decisions have been rendered, without disclosing that nearly all of them have been consent decrees, it is not the truth. It is only half the truth. Those consent decrees should never have been utilized for any such purpose. It ought to appear upon their face, stamped plainly "by consent of parties," and not be held out as the solemn action of the court, which has never inquired into the facts at all. In fact, I am not sure but that there ought to be a prohibition of consent decrees in patent cases, because of the fact that they are by some persons used as the basis of obtaining settlements when the one party knows that the decree is not the decree of the court, but the decree prepared by consent of parties and simply approved by the court without investigation, and the other party does not. So that I feel that this is a matter which ought to be disposed of promptly, and I also feel that, in view of the disclosures in this case,

Congress ought to pass a law providing that the Attorney General, or some one else, may institute a proceeding testing the validity of patents, settling the rights of parties on both sides—at least, as to the validity and as to the construction of the patent. Of course, anybody can see, in a field of this kind, which extends so far, that until these patents are settled, they will always be an obstacle—or always may be an obstacle to the development of the art, and to the utilization by communities of the best there is in bridge engineering. Plaintiff has certain rights, or he has not, and the plaintiff in this length of time, certainly should have some of these rights determined finally. I don't know whose fault it is, so far as the case which Judge Lewis decided so long ago, which has been lying there two years after his decision was rendered, with the rights of the public still in the balance, is all wrong. The final decision of that matter should and would aid very materially the rights of the plaintiff here, and the rights of the public. There is something wrong!

Well now, in this first group of claims under patent No. 852,970, nobody claims that this pavement under a bridge is new. No one claims that the method provided for putting in this pavement is new, but what plaintiff claims is, as I understand it, that the tapering edge extending into the bed of the stream is a new invention. Well, if there is any invention about it, I don't think it is new. Without going into the evidence, the publication in the Engineering News in 1891 is such that I feel that any mechanic called upon to do that work would do it, if he was sufficiently well educated to understand the matter in the manner pointed out by Mr. Luten in his patent. The Engineering News says:

> Wherever water is to be carried, it is very necessary to protect both ends by sheet pile aprons or curb walls as shown in Figures 1 and 3. This is needed as much, if not more, at lower than at upper ends, because if water is at all rapid and material soft, failure most frequently takes place at lower ends, as shown by the line of scour in Fig. 3.
>
> A filling of large and small broken stones to carry this protection still farther is desirable, and, in case of rapid fall in the water surface, several cross walls to protect the scour are often useful. Sheet piles can be used instead of cross walls, if always wet.

And further:

> These remarks cover an important and much neglected matter. Our observation is that the protection is needed very much more at the lower end than the upper. Great carelessness is often shown in this respect when great care should rather be used to carry the water safely away from the structure.

In other words, anybody with powers of observation and experience in handling beds of streams—trying to pave the bed of a stream—would know instinctively when he saw the paving tapering off there that if it stopped with the actual, technical bottom of the stream, the effect of the current would be to do the very thing described in the Engineering News. The very warning that the Engineering News gives for the protection of the lower end must be provided against or else you would have a washout, and of course any one could see without the exercise of any inventive genius that a floor on the bottom of the stream, just level with the bottom of the stream, not extending into it to any degree, would simply invite a

counter-current under the edge there which would wash it out. In this patent, of course, it shows the curve of the whole paving downward to and into the bottom of the stream, but that is not essential at all. It doesn't make any difference, nor is it any advantage, what form the bottom of the paving is. The only thing that is of importance is what is the form of the top of the paving. In other words, if you put paving in there a foot deep in the bottom of the stream and have the lower edge taper off in the form described by Mr. Luten, I assume that you have the same thing exactly as if you had a three-inch paving which curved down and extended into the bed of the stream to the same degree that the surface of the other pavement extended. I do not think in the state of the art at the time that this patent was granted that Mr. Luten's patent is of any validity.

Now, group two is under patent No. 852,970. That relates to the extending of the spandrel and the wing walls. I have not yet been able to determine what Mr. Luten claims to have invented. I understand, of course, what he has described in his application, and what is described in the patent. I understand the purpose which he claims this construction will serve, but the particular thing invented I have not yet been able to grasp. It is not disputed that the extension of the spandrel was old. There cannot be any question about that! It did extend prior to that time, sometimes to a greater or less degree, beyond the pier. Of course, if it was old and varied in its extension, then it became simply a matter of experience and custom of those skilled in the art, working in the peculiar roadway involved in each particular case as to how far the spandrel ought to extend out; how far it would have advantage in extending out, depending of course upon the length of the bridge and other things. And there is no claim here that the extension of the spandrel is a patentable novelty, or was at that time.

As to the wing wall, it is nothing more or less than a retaining wall, which probably has been in use as long as civilization has existed, because I apprehend that even the savage, if there was a bank of earth liable to wash down by the rains upon the back end of his tent, would go out and take stones or other material and try in a crude way to retain it from sliding. Now, whether you need a retaining wall in connection with a bridge, or not, depends of course, upon the nature of the soil, the height of the banks, the extent to which the spandrel goes, and all those things. But I can find no patentable novelty or patentable idea in combining the old extended spandrel and the old retaining wall. It is true that Mr. Luten may have added very materially to the usefulness of the art of building bridges by pointing out a way in which the amount of material necessary for the retaining wall might be reduced by the proper conformation of the embankment or fill which might be possible with an extended spandrel; but this mere reduction of the amount of material, after all, is purely an engineering proposition, and, while to the layman, it may seem to involve invention to reduce materially the amount adequate to stand strain—to the mind of the engineer, it is just as simple as the adjustment of battens on the cracks of a barn, to the ordinary man—or should be at least. It is simply the application of knowledge which he possesses. In judging whether these things involve inventive genius, we have got to consider the field of scientific knowledge in which the party undertook to work. Things that might seem very dense to us, who are not educated in that field, would be matters of common knowledge there.

I thought yesterday when counsel was referring to the opinion of Judge Orr in the Melber case, that this language was peculiarly apt as applied to the claims put forth on this particular group:

> A man is not entitled to a patent for a structure which is old just because he determines the reason why the structure should be used.

Now, it may be that nine-tenths of the men who build circular cisterns do not know or understand the reason why they can build a solid, strong structure with so few brick; they do not understand the arch construction which gives support, one brick to another all the way around, but it does it and it has been done right along. If some man comes along and points out that masons are using too many brick—that all pressure and strains can be met by a wall half the thickness of the structure usually constructed under the methods employed by cisten builders, he has not invented anything at all—he has merely pointed out something that any competent person with knowledge, who sits down and studies the situation, would know.

Now, as to group three under patent No. 853,202, I cannot agree that this extended rod or wire, or support across the abutment, is or was at the time this patent was issued, a patentable invention. It is true that I have not given the study to this matter that possibly the subject requires, but I gave it considerable study at the time of the trial of the Thatcher case, and I have very grave doubts whether any of this method of reinforcing is patenable invention, or has been for twenty years, or has been at all after some man first found that reinforcing could be put into concrete and maintained, and that it would add to its strength. Once you have settled the problem that reinforcing can be added to concrete formation by the use of wires and rods, and that it is possible to form these structures and maintain them intact, and give them strength and power because of this reinforcement, all the rest is a matter of engineering knowledge, pure and simple. The cantilever principle which Mr. Luten sought to apply in this patent, of course, was old and well known. The cantilever principle has been applied in a thousand ways to bridges and other structures, and I do not believe that because a man uses it in a particular structure in which it was never used before, he can get a patent on that structure or the form of use in that structure. It is a matter of simply sitting down and figuring it out with a pencil and paper (that is, for the skilled engineer) where the reinforcement ought to go in order to bring the best support to the structure; and, as I understand, it is a matter which any competent engineer can figure out. Some of them, I admit, are more skilled than others, being perhaps better able to figure it out, but I do not believe that because one man is more skillful in that particular science than some other man, that what he figures out purely, I might say, as a mathematical problem, is invention, and I do not believe that it is patentable.

I do feel that somewhere along the progress of the art, when somebody discovered that it was possible to use these rods, and that they

might be utilized to good advantage in particular work, that he may have exercised inventive genius in bringing that knowledge to the world; but certainly after the Monier patent, and certainly after the disclosures made by the publications in the field of knowledge in which Mr. Luten worked, and certainly after the extensive discussion and great public interest in the work of reinforcement, I do not feel that anybody who in his structure simply applies well settled principles of mathematics applied to strain, has any patentable invention.

Judge Lewis says something about that, and his remarks ought to be approved. He says:

> The complainant as a witness disclaimed that his patents, or any of them, embodied anything beyond or more than placing the steel in a new way that produces better results in a more efficient form. Now, in a concrete bridge, the greatest efficiency is always secured by resisting tension or pull with steel rods. That has been established for a half century; not perhaps with curved tension members, but the basic idea is very old. There is no question about that.

This is the language of complainant in this case, as I understand Judge Lewis' opinion. Judge Lewis continues:

> But none of complainant's patents in its specifications, including drawing and in the claims, gives any specific direction as to just where any of the reinforcing members should be placed. This I suppose would in each instance depend upon the maximum load to be carried.

In other words, strictly speaking, the contention here must logically end in the proposition that you have patented a principle and not a structure. Again, Judge Lewis says:

> This I suppose would in each instance depend upon the maximum load to be carried, the length of the spans, and other elements which involve mechanics only, and would necessarily, I assume, be worked out in determining the amount of compression and tension under the established formulae in statics. In a general way the points of greatest stress can be roughly approximated without the use of mathematical tables, but this is centuries old—that is, it is open to common observation, and the fundamental purpose of reinforcing concrete was to strengthen the structure at these points; such a discovery in Luten's day is no evidence of inventive genius.

I agree with the statement of Judge Lewis. Somewhere along in civilization, humanity came to the point where they same to use barbed wire fences; before that it was a smooth wire fence. The man who put up the first wire fence of any character found that he had to have his corner posts stayed in some way or his fence would fall down. From that time and since, there have been various devices produced to better stay corner posts. The first man that put a stay there may have fastened it on the post four feet from the ground, and may have carried it back eight feet into the earth, and his fence may have slackened because the post gave way in six months or a year. Some other man came along and fastened the wire to the top of the post and carried it back twenty feet, and better results were obtained. I don't think he invented anything at all. I think he has simply applied the ordinary rule of mechanics to a situation, the whole field of which was disclosed in the

first conception of placing the post that way. The rest was a mere matter of detail in carrying it out, depending upon the height of the post and the weight of the fence. Another man comes along, and to hold the fence, he uses a brace on the inside, and I don't think he invented anything. Now, to the mind of the skilled and educated engineer, these bridges are but to a large extent, corner posts. Simple to their minds and complex to ours. And in the varying applications of supports to strains and stresses, they are not using inventive genius. I cannot sustain this patent. Aside from the considerations, I have already expressed, long before this patent was granted, Monier and Von Emperger had given the world—not perhaps the particular piece of wire or iron which the Luten patent contemplated, but the method of doing that very thing. The art is old.

Now, Patent No. 853,203 of 1907, relates to the arch supported on abutments or piers, as shown in Claim 1:

> An arch supported on abutments or piers having tension members embodied near its concave surface, and other tension members passing back and forth through the material of the arch and between the first mentioned tension members and the adjacent surface, substantially as described.

What I have said with regard to the previous patent, No. 853,202, is applicable to this as well. I have also given some consideration to the questions involved in a similar claim in the Thatcher case and I feel that if this patent be valid at all, in view of the prior art, it would be so narrow that this construction of the defendant would not be an infringement. My own judgment, with all the consideration I have given the matter, is that in the description of the invention in this patent, the inventor or patentee simply disclosed an application of the knowledge which at that time had been disclosed by engineers and publications and patents. True, he may have given some study to it, but his conclusion from that study was not inventive. It was merely demonstrative. The application of well settled, well disclosed principles to peculiar conditions which vary in each structure perhaps. But if I should be wrong, if he got something in that patent, it must be limited simply to the very thing that he has disclosed, and that very thing in my judgment, is not infringed in this case. I need not say more about that because I have already considered the same question—not upon the same patents of course, but in the Thatcher case, where the same principles were involved.

Now as to group five, Patent No. 934,411, which pertains to the wall with the coping of such top formation as to divert attention from the defects of the lower wall—there Mr. Luten was applying knowledge which has existed ever since men have understood the placing of lights and shadows in art. So far as that being the particular function of the structure is concerned, I do not think it is patentable at all. He did no more, in that, so far as that particular purpose is concerned, than the men over in France who are now doing the camouflage for the army. If that wall for that purpose was natentable, then every gun over there with its barrel painted to represent a zebra or some other animal to th

to conceal its presence from the enemy, is patentable. As I see it, the principle involved in the patent is simply to adopt a method that will attract attention to one feature of an object and detract from another. It is simply the application of known peculiarities of humanity that they usually think about only one thing at a time, and if you can attract attention to the top of this wall, they don't see the rest. I think it was Josh Billings who disclosed the same theory to us when he said that tight boots were the greatest blessing of humanity because they made a man forget all of his other miseries. I don't think there is anything patentable in that at all. Insofar, now, as he did create a method of putting on a coping which would be more effective, or which might be easier constructed, or having some other valuable purpose in the construction of a wall, there might be a chance for a patentable invention. But it is quite apparent to me that in that particular structure which he describes, he wasn't doing any more than applying matters of knowledge common at that time. The building of a wall partially and then allowing it to harden, and then building on an additional portion on top whether it takes the form of a coping or the mere extension of the same size wall, I don't think is claimed to have been new. I think it must be conceded, in view of the record here, that it was in common use. When I say "common use" and when we talk about "common use" with relation to this art, of course, it does not mean what is ordinarily meant by the word "common", because back at that time there was very little of this concrete used. It was in the beginning of the development of this art, the building of concrete bridges and concrete structures, so that I could not say it was an every day event, but what I mean is that such structures were actually in use and built before this patent was issued, and in a manner practically as described in the patent. In other words, I see nothing of an inventive nature to improve on the methods the other fellows employed in the manner of building the coping or tops of walls. For that reason, I cannot sustain that claim, and the complainant's petition is dismissed, and judgment will be allowed against him for costs.

MR. LANE: May we have a dismissal as to all of the patents in this suit so that the record may show that? There are four patents mentioned in the petition that have not been taken out of the case and concerning which no testimony was introduced, and we would like to have a dismissal as to all of them.

THE COURT: The entire petition is dismissed, of course. The petition in Court here is dismissed.

Registration of Highway Routes.

During 1918, eight (8) highway routes were registered with the State Highway Commission under the Provision of Section 1527-s22, Supplement to the Code 1913.

A complete list of registered highways is given below. Numbers 35 to 42 inclusive were registered during the past year:

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. 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. 2, 1915
19	Daniel Boone Trail	Dec. 22, 1916
20	Perry Pike	Dec. 22 1916
21	Diamond Trail	Dec. 22, 1916
22	Rex 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

Chapter IV. Bridge Department.

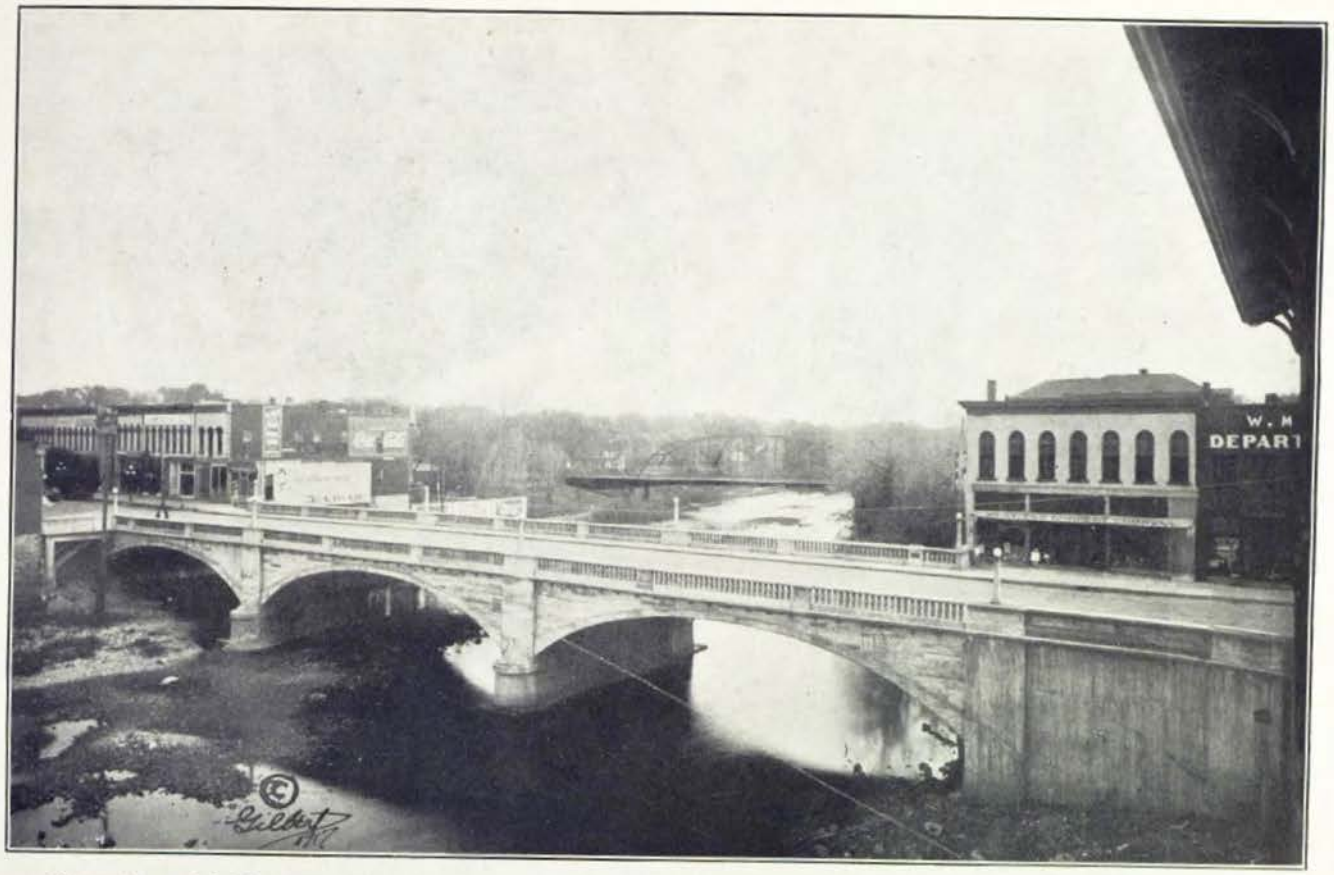
December 1, 1917, to December 1, 1918.

During the period of one year as covered by this report, the bridge department prepared detailed plans for 236 bridges for fifty-eight counties, estimated to cost $1,298,500.00; approved 163 designs submitted from thirty-six counties, the estimated cost of which was $634,000.00; checked and approved seventy-nine detailed shop drawings for steel structures from forty-one counties on work estimated at $184,000.00; checked for approval 173 bridge contracts totaling $1,760,797.85 from sixty-eight counties; approved fifty-six material contracts from thirty-six counties; developed nine new standard designs for bridges; made 103 special inspection trips to forty-six counties.

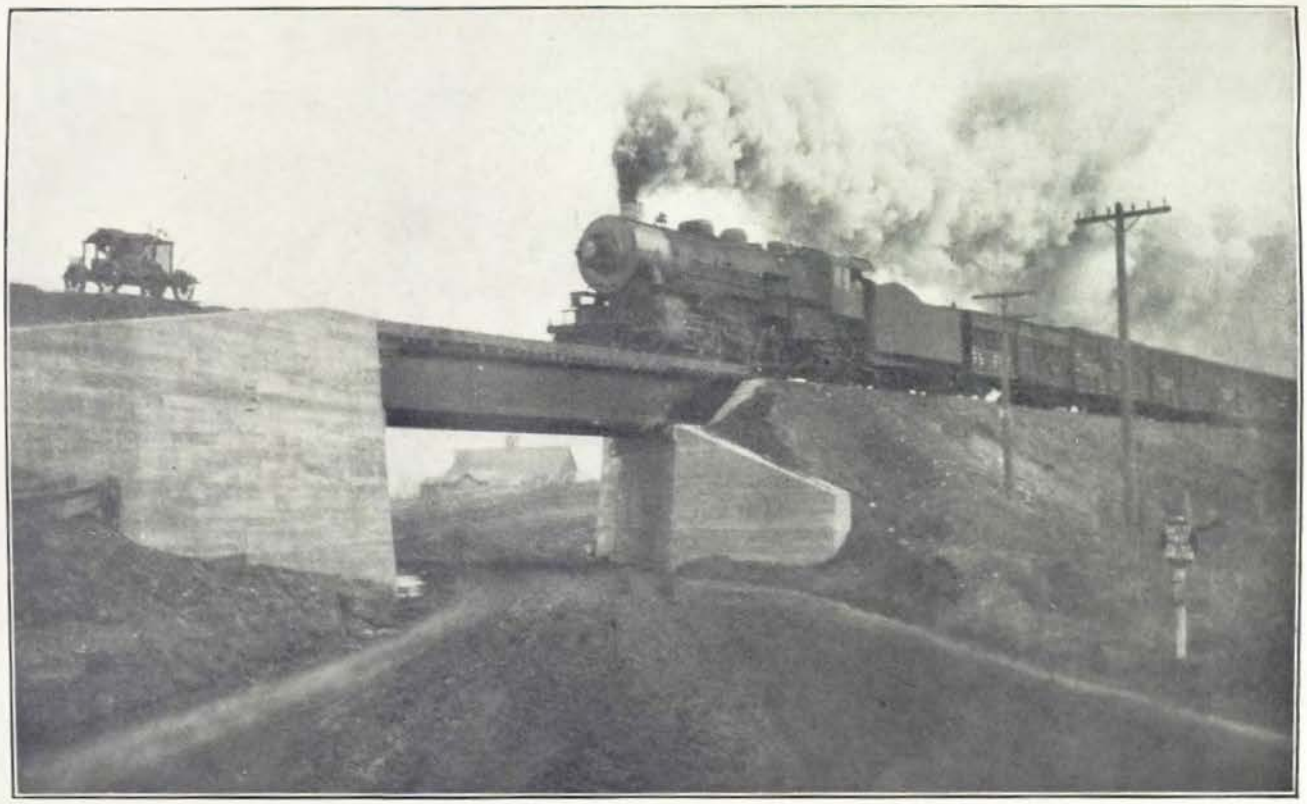
The district engineers representing the bridge department have attended 103 bridge lettings in sixty-nine counties on advertised work totaling $2,226,000.00; attended seventy-five material lettings in fifty-seven counties; spent fifty-eight days in examining bridge sites; spent 180 days in supervising and inspecting bridge work and two days in certifying emergency work.

In addition to the above, this department has handled all of the field and office work on the preparation and checking of plans and estimates 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.

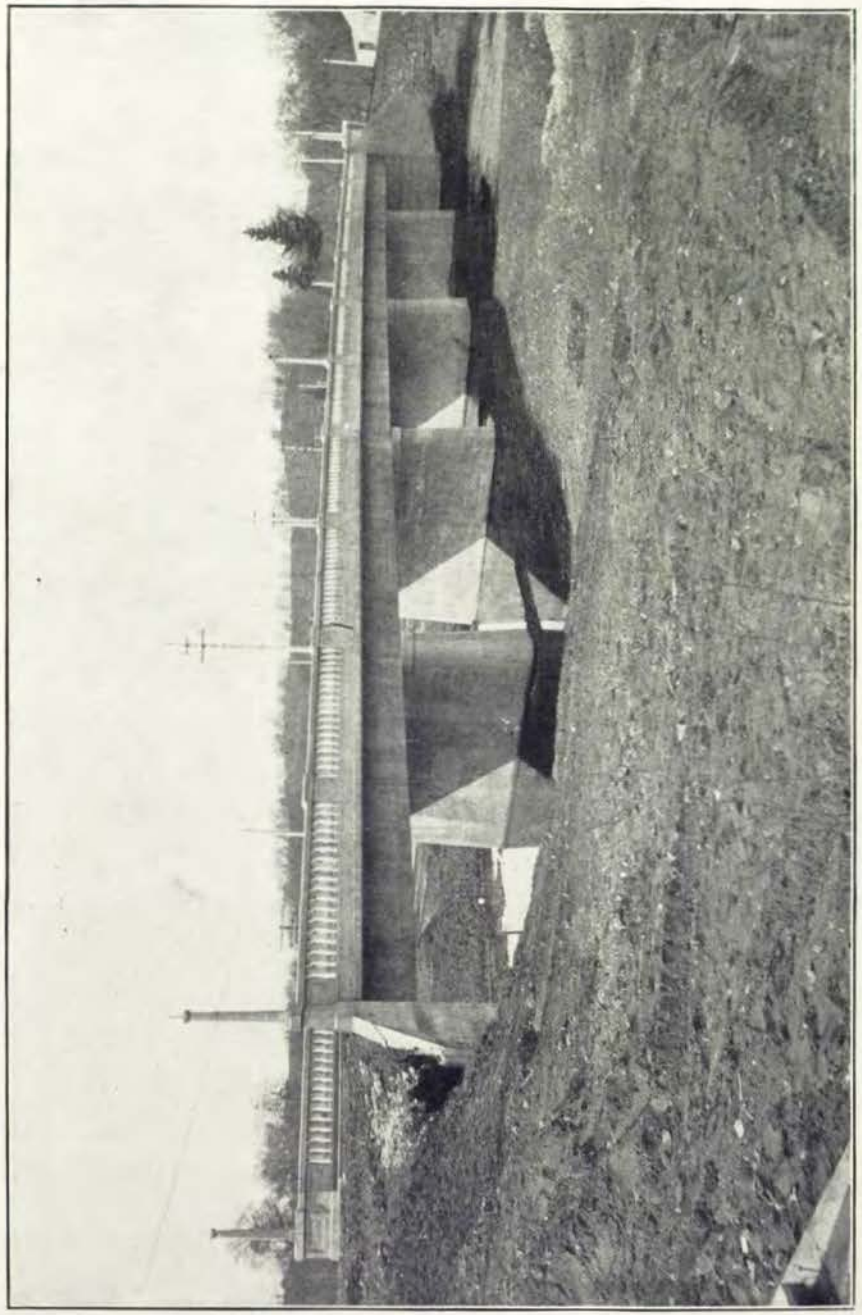
Standard Iowa protecting guard rail design is shown in the two views above. The first will become a familiar sight to summer outing autoists who visit Spirit Lake. The second is in Story county on the Lincoln Highway on a heavy cut and fill west of the city of Ames.



Concrete arch bridge over Wapsipinnicon river in city of Independence built in 1917 at a total contract price of $38,777.00. Bridge consists of three eighty-foot arch spans with a forty-foot roadway and two six-foot sidewalks. Buchanan county contributed $25,000.00 toward the construction of this bridge, the remaining amount being paid by the city of Independence.



Undergrade crossing constructed on Lincoln Highway three miles east of Nevada. A very dangerous grade crossing on the main line of the C. & N. W. R. R. was eliminated by a grade separation as shown above. The total cost of the improvement was estimated to cost $25,000, of which the county paid $3,000.00, the remaining amount being paid by the railroad company.



Traffic over the Volga river in the town of Fayette, in Fayette county, is carried on a new concrete deck girder bridge consisting of five forty-foot spans. The roadway is twenty-six feet with a four-foot sidewalk on one side of the bridge. The bridge takes the place of a sixteen-foot steel structure. The bridge was erected by day labor at a unit cost for the concrete of $16.70. It required 785 cubic yards of concrete for the bridge.

SUMMARY AND COMPARATIVE STATEMENT OF THE DETAILED WORK OF THE BRIDGE DEPARTMENT ON BRIDGES AND CULVERTS, 1916, 1917, 1918.

		1916	1917	1918
Bridge designs	No. of designs	472	343	238
	No. of counties	68	72	58
	Estimated value	$ 1,511,000	$ 1,441,000	$ 1,298,500
Approval of bridge plans	No. approved	288	113	163
	No. of counties	43	30	36
	Estimated value	$ 582,000	$ 413,500	$ 634,000
Approval of shop drawings	No. approved	176	154	79
	No. of counties	54	56	41
	Est'd value of steel work involved	$ 324,000	$ 355,000	$ 184,000
Approval of bridge contracts	No. approved	208	197	159
	No. of counties	80	76	68
	Total am'nt approved	$ 2,043,393	$ 2,128,000	$ 1,589,746
Approval of material contracts	No. approved	68	49	56
	No. of counties	37	30	36
	No. of lettings	139	120	103
Bridge lettings attended	No. of bridges	2,301	2,359	1,714
	Est'd amount bridge work involved	$ 2,322,000	$ 2,631,000	$ 2,226,433
No. of material lettings attended		87	80	75
No. of inspection trips		79	68	103

Since the present highway law became effective in April, 1913, the engineers of the bridge department have designed, checked or approved 4,155 detailed individual plans for specific bridges with a total estimated cost above $11,130,000.00; checked and reported for approval 924 bridge contracts with a total contract price of $8,344,800.00; prepared detailed railroad crossing plans on work estimated at $732,353.00; approved 212 material contracts; attended 502 bridge lettings on advertised bridge work above $8,856,000.00 and attended 318 material lettings.

Bridge Designs for Specific Locations.

The Commission through its bridge department prepares special designs for bridge work for any county in the state without cost. Field notes secured by the county engineers and district engineers of the Commission form the basis of the general and detailed plans. A large number of bridge and culvert designs are prepared by the Commission each year under this plan.

The bridge department has prepared 2,339 designs for specific locations since the road law went into effect in April, 1913, which are estimated to cost $7,169,500.00. The average estimated cost of structures designed for the past four years is as follows:

1915	$2,580
1916	3,200
1917	4,200
1918	5,500

Designs for several bridges of importance were prepared by the Commission last year. Owing to the prevailing high prices of construction and the necessity for the conservation of materials and labor many of the more important pieces of construction were deferred for the period of the war. Among the important bridges which were designed but not built was the reinforced concrete arch span bridge in the city of Manchester, Delaware county. This bridge is a twin arch, each 80 ft. span, carrying a 40 ft. roadway and two 6 ft. sidewalks. The estimated cost of this bridge at the time the plans were prepared was $38,500.00.

Plans were also prepared for a bridge over the Iowa river at Union in Hardin county. This bridge consists of three 65 ft.x18 ft. low riveted truss spans on concrete foundations. The estimated cost was $25,000.00. This bridge was not constructed on account of war conditions. Complete plans were also prepared for two-100 ft.x18 ft. high riveted truss spans on concrete foundations over the Iowa river east of Marshalltown in Marshall county. The estimated cost of the bridge was $27,000.00. Construction was deferred on this bridge for the period of the war.

A chart showing the summary bridge expenditures for 1916, 1917 and 1918 is included in this report. Attention is called to the large expenditures for permanent work as compared with temporary construction.

Under schedule one is given a detailed statement of bridge designs prepared for specific locations in 1918.

Approval and Analysis of Designs Submitted.

Many of the designs prepared by the county engineers and those prepared by private engineers are submitted to the Commission for approval. The work necessary to check and to approve such designs depends largely upon the type of structure, its importance and the completeness with which the details of the plans have been worked out. On the plans for the smaller structures which have been prepared from the standards of the Commission the detailed work of checking the designs is small. On important bridges, particularly of the reinforced girder or arch type, the mathematical analysis and field inspections necessary to check the design require considerable time. On steel bridges the bridge department checks the detailed shop drawings before the steel work is fabricated. Copies of the approved shop drawings are then furnished to the county engineer for his files and to check the steel work in the field.

Since April, 1913, the bridge department has checked 2,339 designs submitted, the cost of which was estimated at $2,667,500.00. During the same period of time and in addition to the above a total of 537 shop drawings were checked on work estimated to cost $1,494,000.00. A detailed record is kept in the Commission's office of the shop drawings submitted for approval each year.

Standard Plans.

During 1918 a complete set of standards for wood trusses for 16 ft. and 18 ft. roadways ranging in length from 30 ft. to 57 ft. were developed. This set of standards was developed primarily to meet a demand arising out of war conditions. The wood trusses offered an opportunity to utilize available material for span lengths up to 57 ft. with the use of the minimum amount of steel. There are, however, many locations in the state where this type of construction may profitably be used at the present time because of the comparatively light traffic which must be carried.

Some work was also done on a revision of the standard plans for concrete thru girders and concrete box culverts. These revised standards will be issued in 1919. A complete set of standard plans revised to date is given below.

STANDARD BRIDGE AND CULVERT PLANS EFFECTIVE JAN. 1, 1919.

Series C—Concrete box culverts for spans from 2 ft. to 12 ft. 22 sheets of designs and one estimate sheet, C-1 to C-23 inclusive. Dated 1916.

Series J—Concrete slab bridges for spans from 14 ft. to 24 ft. inclusive. One design sheet J-1. Dated November, 1915.

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 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 V—I-Beam spans. Four sheets of designs. V-1. Beam spans with concrete floor and angle railing. Dated Jan. 1, 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 M—Concrete bridge piers. One design sheet M-1. Dated July, 1916.

Series D—Circular concrete culverts from 18" to 42" in 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. One sheet F-1. Dated 1914.

Series I—Concrete thru girder bridges for spans from 24 ft. to 40 ft. inclusive. Nine sheets. This series void. New series in course of preparation.

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.

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 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, 16 ft. roadway. Dated January 1, 1917.
G-2a. Pile abutments for short pony truss spans, 18 ft. roadway. Dated January 1, 1917.
G-3. Pile abutment 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 K—Concrete bridge abutments. Five designs of two sheets each, dated November, 1917 and superseding sheets K-1, K-2 and K-3. Dated November, 1913.
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.
Published in booklet form.
Standard overhead bridges for railroad crossings in course of preparation.

Standard Specifications.

A complete revision of the standard specifications for bridge, lumber and piling was made early in 1918. Minor changes were also made in the standard specifications for corrugated metal culvert pipe and a new edition of these specifications was printed and distributed. The list of standard specifications covering bridge and culvert construction as issued by the Commission and which is effective on January 1, 1919, are as follows:

STANDARD SPECIFICATIONS ON BRIDGES AND MATERALS, EFFECTIVE JANUARY 1, 1919.

Highway Bridge and Culvert Construction (Series 1917).
Reinforcing Steel (Series 1914, revised 1917).
Corrugated Metal Culvert Pipe (Series 1918).

A revision of the standard bridge and culvert specifications will be made early in 1919 and revised copies printed for general distribution. Standard specifications for reinforced concrete culvert pipe will also be issued in 1919.

Trips by Members of the Bridge Department.

A number of special inspection trips by members of the bridge department were made during the year at the request of the counties. Many of these inspection trips were made for the purpose of determining the carrying capacity of old bridges or the possibility of replacing temporary wood floors with more permanent construction. In addition to the above several trips were made by members of the department to inspect important bridge work under construction. Some shop inspections of fabricated steel work were also made during the year. The total number of special inspection trips made by members of the bridge department for the past four years as follows—1915, 73; 1916, 79; 1917, 68; 1918, 103.

Bridge Complaints.

A number of complaints are received each year concerning existing bridges and requests for new bridges. These requests are in general referred to the district engineers for examination and report. Whenever it is found that the complaint is meritorious, the matter is referred to the proper official for attention. A later examination and report are made to see that the proper steps have been taken to adjust the complaint. The number of inspection trips made to the counties to adjust such complaints is indicated under the report of the work of the district engineers. Many of

the complaints are of such a nature that they may be adjusted by correspondence and whenever possible this method of adjustment is followed.

Approval of Contracts on Bridge Work.

One of the most important duties of the bridge department is the approval of bridge contracts. During 1918 the total number of such contracts submitted was 173. The total amount included in the contracts submitted for 1918 was $1,760,797.85. The tabulation below gives a summary and comparative statement of the bridge contracts submitted from April, 1913, to December 1, 1918.

BRIDGE CONTRACTS SUBMITTED FOR APPROVAL.

Date of Report	No. submitted	Average contract amt.	Total amt. approved
Apr. 1, 1913 to Dec. 1, 1913	53		$ 344,162.24
Dec. 1, 1913 to Nov. 1, 1914	121	$ 7,774.00	731,205.58
Nov. 1, 1914 to Dec. 1, 1915	172	7,830.00	1,337,069.15
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	173	10,184.00	1,760,797.85
Total	924		$ 8,344,866.82

The use of the standard contract form issued by the Commission and supplied to all of the counties has greatly decreased the time required for the approval of contracts. A contract properly made out which is accompanied by sufficient information to enable approval to be made without the necessity of securing additional information will pass through the Commission's office in two or three days. Where insufficient information concerning the contract award is received with the contract it is necessary to refer the matter to the district engineer for investigation and the time required for approval is greatly increased.

The average contract price as well as the number of contracts submitted and the total contract amount has decreased slightly over that reported for 1917. This may be due to war conditions which curtailed highway bridge improvements to some extent. Since April, 1913, a total of 924 contracts for bridge work have been passed upon by the Commission totaling in amount $8,344,866.82.

Schedule Two shows in detail the contracts which were submitted for approval for the period from December 1, 1917, to December 1, 1918. (Refer to Schedule Two.)

Approval of Contracts for Materials.

The use of the standard contract form as prepared by the Commission for material contracts has assisted greatly in reducing the time required for the approval of these contracts by the Commission. The majority of material contracts now submitted for approval are on the standard form properly filled out and signed and containing complete information regarding the amount of material to be purchased and the contract price. Contracts in the proper form as indicated above can under ordinary circumstances be passed upon and returned within two days from their receipt. A total of fifty-six material contracts from thirty-six counties were submitted for approval from December 1, 1917, to December 1, 1918. A detailed statement of each material contract submitted for approval is given under Schedule Three. (Refer to Schedule Three.)

Blank Forms for Annual and Special Report.

This department has assisted the administrative department in the preparation of blank forms for the county engineers' annual report on bridges. In addition a number of special blank forms for special reports were prepared.

REPORT ON EXISTING BRIDGES AND CULVERTS ON EIGHT PRINCIPAL HIGHWAY ROUTES.

During the year this department with the assistance of the district engineers has compiled complete information regarding the condition of the bridges and culverts on eight of the principal registered highway routes crossing this state. The eight routes chosen for this study are as follows:

North Iowa Pike,
Hawkeye Highway,
Lincoln Highway,
River to River Route,
Great White Way,
Blue Grass Route,
Red Ball Route,
Jefferson Highway.

A detailed report of the condition of the existing bridges and culverts on these routes and the general observations has been prepared.

General Field Work in Connection with the Bridge Department.

A large part of the detailed field work of the bridge department is handled by the district engineers. Such work consists of assistance given at the request of the counties in determining the type and character of drainage structures, certification of emergency work, inspection of work under construction, preliminary work on large bridge projects, the adjustment of differences arising between the contractors and the counties over interpretations of the specifications and general advice pertaining to bridge and culvert work and the materials of construction.

During 1918 the district engineers of the Commission spent a total of fifty-eight days in examining bridge sites, 103 days in attending bridge lettings, seventy-five days in attending material lettings, 180 days in supervising and inspecting bridge and culvert work and two days on examination and certification of emergency work. The following tabulated statement shows in summary and comparative form the work of the district engineers on bridge work during the years of 1915 to 1918 inclusive.

	Total number of days			
	1915	1916	1917	1918
Examination of bridge sites	146	84	85	58
Attending bridge lettings	155	138	101	103
Attending material lettings	84	79	67	75
Supervising and inspecting bridge work	341	163	202	180
Emergency bridge work	33	12	13	2

Bridge and Material Lettings.

The estimated cost of bridge work included in lettings attended during 1918 was $2,226,000.00 which is a decrease of $410,000.00 over 1917. The records of the Commission on the advertised bridge work reported by the district engineers include the location, description, estimated quantities of material in the structures and the county and district engineers' estimated cost. These reports for 1918 cover in detail 1,714 structures which were advertised. The total number of bridge lettings attended during 1918 was 103, and the total number of material lettings attended was 75.

Bridge Construction Work During 1918.

The costs of bridge and culvert construction as well as the costs of material used in connection with such work show a marked advance in price over previous years. This was due almost entirely to war conditions which created a labor and material shortage and operated to increase materially construction costs. Deliveries on materials from mill and warehouse were extremely slow and consequently the counties and contractors experienced serious difficulty

in completing their work. The restrictions placed by the government on many of the materials of construction added further to the difficulty of completing the work on time and within the orginal estimates.

The mill and warehouse price of steel remained practically the same throughout the year due to government regulation of price. The government base price on structural steel for 1918 was $2.90 per cwt., Pittsburgh. The Chicago warehouse base price on structural steel during the same period was $4.20.

The following comparisons between the costs of materials in 1917 and 1918 will illustrate the marked advance in price which occurred on practically all construction materials during 1918:

AVERAGE PRICES PAID FOR LUMBER IN 1917 AND 1918.

Size	Description	Material	Price per 1,000 Ft. B. M. F.O.B. Co. C. L.			
			1917		1918	
			Range in price	Average	Range in price	Average
3x12 ins.	Stand sawed	Doug. Fir	$24 to $26	$ 26.70	$34 to $39	$ 37.00
3x14 ins.	Stand sawed	Doug. Fir	25 to 29	27.00	35 to 40	38.00
3x16 ins.	Stand. sawed	Doug. Fir	25 to 29	27.00	35 to 40	38.00
3x12 ins.	Full sawed	Doug. Fir	27 to 32	29.00	38 to 42	39.50
3x14 ins.	Full sawed	Doug. Fir	28 to 33	30.00	39 to 43	40.50
3x16 ins.	Full sawed	Doug. Fir	28 to 33	30.00	39 to 43	40.50
3x12 ins.	Stand. sawed	White Oak		32.00		38.00

AVERAGE PRICE PAID FOR PILING IN 1917 AND 1918.

Length	Kind	Price per Lin. Ft. F.O.B. County—Car Lots.			
		1917		1918	
		Range in price	Average	Range in price	Average
16 foot	Red Cedar	$.14 to $.17	$ .153	$.16 to $.21	$ .183
20 foot	Red Cedar	.15 to .20	.170	.19 to .23	.217
24 foot	Red Cedar	.17 to .21	.187	.22 to .26	.234
16 foot	Cypress	.12 to .14	.130	.15 to .17	.158
20 foot	Cypress	.13 to .15	.135	.16 to .18	.178
24 foot	Cypress	.14 to .16	.140	.17 to .20	.185

AVERAGE PRICE PAID FOR CORRUGATED METAL CULVERTS IN 1917 AND 1918.

Diameter	Class	Price per Lin. Ft. F.O.B. County—Less Car Lots			
		1917		1918	
		Range in price	Average	Range in price	Average
12 inches	A	$ .75 to $ .85	$ .80	$ .78 to $ .90	$ .85
15 inches	A	1.19 to 1.27	1.22	1.25 to 1.35	1.31
18 inches	A	1.40 to 1.50	1.44	1.50 to 1.70	1.57
24 inches	A	1.85 to 1.97	1.92	2.00 to 2.25	2.08
30 inches	A	3.10 to 3.40	3.25	3.25 to 3.75	3.50
36 inches	A	3.80 to 4.00	3.90	3.90 to 4.35	4.20
12 inches	B	.70 to .75	.73	.76 to .80	.78
15 inches	B	1.08 to 1.15	1.11	1.18 to 1.25	1.22
18 inches	B	1.25 to 1.35	1.30	1.38 to 1.48	1.43
24 inches	B	1.70 to 1.80	1.73	1.80 to 2.00	1.89
30 inches	B	2.85 to 3.10	2.96	3.00 to 3.30	3.12
36 inches	B	3.30 to 3.70	3.58	3.60 to 3.90	3.73

AVERAGE PRICE PAID FOR REINFORCING STEEL IN 1917 AND 1918.

Size	Description	Price per Cwt. Stock Lengths F.O.B. Co.—C. L.			
		1917		1918	
		Range in price	Average	Range in price	Average
½-inch	O. H. Steel New Billet Stock	$3.35 to $3.75	$ 3.52	$3.45 to $3.75	$ 3.66
⅝-inch	O. H. Steel New Billet Stock	3.50 to 3.75	3.60	3.40 to 3.90	*3.62

*Less than car lots.

AVERAGE PRICE PAID FOR STRUCTURAL STEEL IN 1917 AND 1918.

Description	Class of Work	Price per Cwt.			
		1917		1918	
		Range in price	Average	Range in price	Average
I-Beams	Erected	$5.00 to $6.50	$ 5.75	$5.50 to $7.25	$ 6.00
	F. O. B. County	5.00 to 5.50	5.15	5.00 to 5.75	5.25
Trusses	Erected	6.00 to 7.75	6.50	7.00 to 8.26	7.50
	F. O. B. County	5.00 to 6.50	5.90	5.90 to 6.75	6.50

AVERAGE PRICE PAID FOR CEMENT IN 1917 AND 1918.

1917. Dealers net price per bbl. F. O. B. Cedar Rapids—Car Lots Range in Price $1.79 to $2.08. Average, $1.98.

1918. Dealers net price per bbl. F. O. B. Cedar Rapids—Car Lots Range in Price $2.08 to $2.28. Average, $2.18.

Bids received were from local dealers only for handling and storage at prices ranging from 10 cents to 25 cents per bbl. above prevailing dealers' price.

SCHEDULE ONE

BRIDGE DESIGNS FOR SPECIFIC LOCATIONS.

County	No. of Designs	Estimated Value	County	No. of Designs	Estimated Value
Appanoose	3	$ 26,156.00	Kossuth	1	2,608.00
Audubon	1	4,631.00	Lee	3	20,562.00
Bremer	4	25,621.00	Linn	2	20,959.00
Butler	1	3,443.00	Lucas	4	22,870.00
Carroll	2	15,165.00	Lyon	4	20,204.00
Cerro Gordo	17	67,275.00	Marion	2	18,862.00
Chickasaw	6	23,610.00	Marshall	5	69,891.00
Clay	5	26,328.00	Mills	3	31,416.00
Clayton	3	39,695.00	Mitchell	4	10,732.00
Crawford	5	37,700.00	Muscatine	8	19,871.00
Dallas	1	7,266.00	O'Brien	13	59,432.00
Decatur	6	23,896.00	Palo Alto	4	18,643.00
Delaware	1	38,488.00	Pocahontas	2	8,527.00
Dickinson	7	23,400.00	Polk	14	65,337.00
Dubuque	1	2,453.00	Pottawattamie	2	4,770.00
Fayette	2	1,406.00	Poweshiek	5	17,776.00
Franklin	3	6,969.00	Ringgold	3	8,437.00
Fremont	1	4,082.00	Shelby	3	10,321.00
Greene	3	14,332.00	Sioux	1	7,966.00
Grundy	20	62,472.00	Story	2	30,394.00
Guthrie	3	19,470.00	Tama	7	22,692.00
Hamilton	3	38,840.00	Van Buren	1	814.00
Hancock	7	19,440.00	Wapello	1	7,526.00
Hardin	5	49,119.00	Warren	3	10,664.00
Howard	2	7,240.00	Winneshiek	3	7,258.00
Humboldt	3	37,056.00	Woodbury	1	7,776.00
Iowa	7	40,965.00	Worth	4	13,420.00
Jasper	6	65,560.00	Wright	1	4,858.00
Jefferson	4	16,813.00			
Keokuk	1	5,109.00	Totals	236	$ 1,298,500.00

SCHEDULE TWO.

BRIDGE CONTRACTS SUBMITTED FOR APPROVAL.
DECEMBER 1, 1917, TO DECEMBER 1, 1918

County	Contractor	Date Approved	Amount Approved
Appanoose	I. W. Manson	Feb. 20, 1918	$ 3,760.00
	Ottumwa Supply & Const. Co.	Feb. 20, 1918	9,100.00
	Staley Construction Co.	Apr. 11, 1918	9,600.00
Audubon	Jensen Construction Co.	Mar. 26, 1918	4,050.00
	Jensen Construction Co.	May 22, 1918	11,500.00
Benton	Waterloo Construction Co.	Mar. 15, 1918	7,180.00
	Fifield Construction Co.	Mar. 15, 1918	12,139.00
Boone	N. E. Marsh	Apr. 22, 1918	16,381.00
	F. E. Marsh & Co.	Apr. 22, 1918	5,664.00
	S. Witmer Company	Apr. 23, 1918	15,743.00
	N. E. Marsh	July 17, 1918	5,272.00
Bremer	C. H. & J. H. Russell	Mar. 11, 1918	11,750.00
	Fifield Construction Co.	Mar. 15, 1918	8,700.00
	Clinton Bridge Works		
Buchanan	J. B. Elliott	May 28, 1918	3,345.00
	F. E. Reinhold	June 1, 1918	2,906.00
	F. E. Reinhold	July 30, 1918	5,676.00
	J. B. Elliott	July 30, 1918	5,315.00
Butler	Waugh & Tackman		
	Waugh & Tackman	Sept. 4, 1918	350.00
	T. H. Waugh	Oct. 25, 1918	7,238.00
Calhoun	Rockwell City Cement Co.	Sept. 2, 1918	3,319.76
Cass	S. K. Anderson	Mar. 29, 1918	36,127.80
Cedar	Clinton Bridge Works	Sept. 7, 1918	468.00
Cerro Gordo	Clinton Bridge Works	Mar. 21, 1918	
Cherokee	H. B. Construction Co.	Apr. 23, 1918	36,985.00

SCHEDULE TWO—Continued.

County	Contractor	Date Approved	Amount Approved
Chickasaw	Alfred Olson	Feb. 8, 1918	21,500.00
Clay	Des Moines Br. & Iron Works	Apr. 15, 1918	23,800.00
Clayton	Rodies & Bales	Mar. 15, 1918	26,805.00
	F. E. Marsh & Co.	June 9, 1918	16,783.00
	A. C. Boyle	Sept. 13, 1918	2,220.00
Clinton	J. R. Kane	Apr. 29, 1918	33,759.00
Crawford	Taylor & Anderson	Apr. 11, 1918	5,662.00
	Pickus Engineering & Const. Co.	Apr. 11, 1918	14,223.00
	Deloit Bridge Co.		
Dallas	F. E. Marsh & Co.		
	R. E. Shackleton	July 9, 1918	7,003.60
	Iowa Bridge Company	Aug. 6, 1918	5,314.00
	F. E. Marsh & Co.	Sept. 5, 1918	12,500.00
	R. E. Shackleton	Sept. 16, 1918	3,310.00
Delaware	Geo. Herman	May 18, 1918	4,100.00
	Mills & Henderson	May 18, 1918	5,450.00
	Robt. Hackbarth	May 23, 1918	4,310.00
Dickinson	Harry V. Brown	Mar. 15, 1918	10,099.00
	August Schaaf	Mar. 15, 1918	13,328.00
Dubuque	Staner-Herkes Const. Co.		
	Anton Zwack	May 2, 1918	31,489.00
	Peter Eisbach		
Franklin	G. E. Sargent	May 13, 1918	2,660.00
	Des Moines Br. & Iron Works	May 21, 1918	1,790.00
Fremont	J. F. Tysor	Aug. 5, 1918	6,387.92
Greene	R. E. Shackleton	Aug. 19, 1918	4,700.00
Grundy	Iowa Bridge Company	July 5, 1918	11,222.00
	Des Moines Bridge & Iron Wks.	Aug. 22, 1918	4,750.00
	Des Moines Bridge & Iron Wks.	Sept. 7, 1918	1,058.00
	Clinton Bridge Works	Sept. 7, 1918	2,448.00
	Waterloo Const. Co.	Sept. 18, 1918	7,298.62
	Iowa Bridge Company	Sept. 18, 1918	8,900.00
	Waterloo Const. Co.	Oct. 28, 1918	5,700.00
Guthrie	Lana Construction Co.	Apr. 20, 1918	12,982.00
	Lana Construction Co.	July 1, 1918	7,846.00
	Lana Construction Co.	Aug. 9, 1918	1,300.00
Hamilton	J. A. Dunkle	Apr. 13, 1918	4,394.00
	Albert Swanson & Co.	Apr. 13, 1918	9,189.00
	A. H. Austin	May 21, 1918	2,668.00
	Albert Swanson & Co.	July 5, 1918	3,908.70
	H. A. Teget	Aug. 5, 1918	3,685.00
Hancock	Hey-Keeler Const. Co.	June 1, 1918	8,369.00
	Alfred Olson	June 1, 1918	10,240.00
	W. A. Hey Const. Co.	Aug. 10, 1918	3,521.00
Hardin	Fifield Const. Co.	June 10, 1918	10,395.00
	Hey-Keeler Const. Co.	June 11, 1918	6,980.00
	T. J. Wagner	July 16, 1918	11,809.00
	F. E. Marsh & Co.		
	Fifield Const. Co.		
	Des Moines Bridge & Iron Works.		
Harrison	Standard Bridge Company	Apr. 9, 1918	6,291.00
	Witmer Company	Apr. 9, 1918	7,867.00
	Witmer Company	July 1, 1918	12,300.00
Henry and Washington	Iowa Bridge Co.	May 21, 1918	3,350.00
Humboldt	C. A. Miller	Apr. 9, 1918	27,856.04
	Carl Johnson	Aug. 25, 1918	5,939.69
Ida	Clinton Bridge Works	Apr. 13, 1918	3,000.00
	Leslie G. Haywood	Apr. 30, 1918	15,000.00
Iowa	Federal Bridge Co.		
	Iowa Bridge Company	Mar. 19, 1918	7,995.00
	Federal Bridge Co.	Apr. 10, 1918	9,810.00
	Waterloo Const. Co.	Apr. 10, 1918	6,750.00
	M. O. Burnett	Apr. 11, 1918	16,218.00
	M. O. Burnett	Apr. 11, 1918	10,714.00
	M. O. Burnett	Apr. 11, 1918	11,344.00
	M. O. Burnett	Apr. 11, 1918	14,996.00
	Federal Bridge Co.	Apr. 22, 1918	6,640.00
	Iowa Bridge Co.	Sept. 11, 1918	
	Waterloo Const. Co.		
Jackson	Perry Jayne	May 2, 1918	11,701.00
	Bullock Bros.	May 2, 1918	5,186.00
	Jno. Anderson & Son	July 30, 1918	2,940.00
Jefferson	Iowa Bridge Company	Mar. 5, 1918	5,231.00
Jones	V. L. Hanssen	July 31, 1918	9,250.00

SCHEDULE TWO—Continued.

County	Contractor	Date Approved	Amount Approved
Keokuk	Waterloo Construction Co.	Apr. 29, 1918	34,800.00
	Waterloo Construction Co.	Aug. 10, 1918	
	Waterloo Construction Co.	Sept. 2, 1918	
Kossuth	F. E. Marsh & Co.	Oct. 28, 1918	2,902.00
Lee	Clinton Bridge Works	Jan. 15, 1918	1,920.00
	Clinton Bridge Works	Apr. 2, 1918	1,496.00
Linn	J. P. Riddle	Apr. 19, 1918	5,180.00
	Perry Jayne	Apr. 19, 1918	27,003.00
	W. F. Wickham	May 22, 1918	9,475.00
	Perry Jayne	July 31, 1918	6,024.00
Lucas	J. P. Riddle	May 13, 1918	9,625.00
Mahaska	H. E. Whitlatch	July 20, 1918	13,000.00
Marion	J. P. Riddle	Apr. 8, 1918	10,778.50
Marshall	Ingersoll-Stoufer Eng. Co.	Mar. 11, 1918	19,685.00
	A. P. Munson	Mar. 15, 1918	26,750.00
	A. P. Munson	Mar. 15, 1918	16,684.00
	Cole Bros.	Mar. 15, 1918	10,700.00
	Ingersoll-Stoufer Eng. Co.	Mar. 18, 1918	16,833.00
	Alexander & Higbie	May 13, 1918	8,900.00
Mills	A. O. Evans	May 21, 1918	16,200.00
	E. C. Barber	May 24, 1918	5,180.00
	Iowa Bridge Company	Sept. 13, 1918	2,632.50
	Standard Bridge Company		
Monona	I. P. Riddle		
	J. P. Riddle	Feb. 25, 1918	3,500.00
	Standard Bridge Company	Mar. 2, 1918	20,892.00
	I. P. Riddle	Apr. 9, 1918	5,285.00
	Standard Bridge Company	Apr. 13, 1918	4,424.00
Monroe	F. A. Lafferty	May 2, 1918	5,100.00
Montgomery	Red Oak Bridge & Iron Works	May 8, 1918	18,650.00
Muscatine	L. R. Gabriel	Feb. 25, 1918	1,875.00
	S. R. Johnston	May 21, 1918	8,800.00
	Thos. Maher	June 10, 1918	2,468.00
O'Brien	Geo. Gardner & Sons	July 9, 1918	1,735.45
	Eugene Grant	Apr. 19, 1918	14,285.55
	H. B. Construction Co.	Apr. 19, 1918	3,259.00
	Illinois Steel Bridge Co.	Apr. 20, 1918	5,503.00
	Taylor & Anderson	Apr. 22, 1918	2,434.00
	Taylor & Anderson	July 30, 1918	12,764.00
Palo Alto	Witmer Company	July 30, 1918	19,727.50
	Witmer Company	Mar. 19, 1918	8,710.00
	Des Moines Bridge & Iron Works.	July 18, 1918	15,972.00
	L. D. Brereton	Aug. 9, 1918	4,250.00
Pocahontas	Iowa Bridge Company	May 29, 1918	8,593.00
Polk	N. M. Stark & Co.	Feb. 20, 1918	14,650.00
	Koss Construction Co.	June 11, 1918	22,575.00
	Koss Construction Co.	June 17, 1918	18,400.00
	N. M. Stark & Co.	June 17, 1918	20,600.00
Pottawattamie	Wickham Bridge & Pipe Co.	July 1, 1918	7,165.00
	Philip Cuneen	July 16, 1918	1,400.00
Poweshiek	Iowa Bridge Company	Apr. 25, 1918	22,375.00
Sac	F. M. Stewart	Feb. 20, 1918	7,268.00
	Iowa Bridge Company	Feb. 23, 1918	38,122.00
	Jas. Waddicor	Feb. 23, 1918	2,385.00
Shelby	Des Moines Eng. & Const. Co.	Apr. 23, 1918	24,178.22
	Lana Construction Co.	Apr. 23, 1918	2,634.00
	Jensen Construction Co.	Apr. 23, 1918	9,375.00
Story	Cole Bros.	Jan. 31, 1918	31,000.00
Tama	A. P. Munson	Apr. 2, 1918	6,778.00
	A. P. Munson	Apr. 2, 1918	6,673.00
	A. P. Munson	Apr. 8, 1918	16,500.00
	Clinton Bridge Works	Sept. 18, 1918	1,670.00
Union	A. P. Munson	Nov. 21, 1918	4,010.00
	Standard Bridge Company	May 22, 1918	4,665.00
Wapello	Carey-Morrison Co.	May 23, 1918	4,337.00
Warren	Chautauqua Supply & Const. Co.	July 10, 1918	9,866.00
Washington	Des Moines Bridge & Iron Works.	Aug. 22, 1918	24,687.00
Winneshiek	Iowa Bridge Company	May 21, 1918	4,820.00
Woodbury	E. B. Fowler	June 10, 1918	8,800.00
	Des Moines Bridge & Iron Works.	Apr. 2, 1918	10,953.00
Worth	L. G. Hayward	Apr. 20, 1918	17,000.00
Wright	C. A. Halvik	Mar. 18, 1918	7,550.00
	Iowa Bridge Company	July 9, 1918	6,510.00
			$ 1,589,746.85

SCHEDULE THREE.

MATERIAL CONTRACTS SUBMITTED FOR APPROVAL. DECEMBER 1, 1917, TO DECEMBER 1, 1918.

County	Company	Material	Date Approved
Adams	Nebr. Br. Sup. & Lbr. Co.	Lumber and piling	
Allamakee	Speers-Jevne	Reinforcing steel	March 15, 1918
Bremer	Clinton Bridge Works	Reinforcing steel	
Cass	Lana Construction Co.	Concrete pipe	
	Standard Bridge Co.	Lumber and piling	March 11, 1918
	Lana Construction Co.	Concrete pipe	March 29, 1918
	Iowa Pure Iron Co.	Corrugated pipe	July 29, 1918
Cedar	Clinton Bridge Works	Reinforcing steel	Sept. 2, 1918
	Fuller-Hiller Hdw. Co.	Reinforcing steel	Sept. 2, 1918
Cherokee	Wheeler Br. Lbr. & Sup. Co.	Lumber and piling	
	Fort Dodge Culvert Co.	Corrugated culverts	April 23, 1918
Chickasaw	Wheeler Br. Lbr. & Sup. Co.	Lumber	April 2, 1918
Clay	Fort Dodge Culvert Co.	Corrugated culverts	June 27, 1918
Clayton	L. James Lumber Co.	Lumber	April 2, 1918
Clinton	Ia. Culv. & Sheet Metal Co.	Corrugated culverts	July 9, 1918
Crawford	Fort Dodge Culvert Co.	Corrugated culverts	
Delaware	Klauer Manufacturing Co.	Str. & Reinf. steel	April 9, 1918
Des Moines	Clinton Bridge Works	Corrugated culverts	March 5, 1918
	Wilson Concrete Co.	Concrete pipe	
	Burlington Sand & Gravel Co.	Sand and gravel	March 26, 1918
	Iowa Pure Iron Co.	Corrugated pipe	July 30, 1918
Dubuque	Standard Lbr. Yard Co.	Lumber	May 18, 1918
Emmet	L. James Lumber Co.	Lumber	April 9, 1918
Fayette	Clinton Bridge Works	B'ms, ang. & chan.	July 16, 1918
Franklin	Speers-Jevne	Reinforcing steel	March 2, 1918
Fremont	Wilson Concrete Co.	Concrete pipe	April 13, 1918
Grundy	Gaynor Lumber Co.	Piling	July 3, 1918
	Waterloo Const. Co.	Reinforcing steel	July 31, 1918
Hancock	L. James Lumber Co.	Lumber	Feb. 25, 1918
Hardin	Waterloo Const. Co.	Reinforcing steel	March 29, 1918
	Klauer Manufacturing Co.	Concrete pipe	May 18, 1918
Henry	Waterloo Const. Co.	Reinforcing steel	Dec. 20, 1917
Ida	Standard Bridge Co.	Reinforcing steel	
Jackson	Standard Bridge Company	Lumber	Jan. 11, 1918
Jefferson	Spaulding & Kearns	Cement	
	Clinton Bridge Works	Reinforcing steel	March 5, 1918
	Midland Metal Mfg. Co.	Corrugated pipe	March 5, 1918
Johnson	Midland Metal Mfg. Co.	Corrugated pipe	March 18, 1918
	Paul J. Kalman Co.	Reinforcing steel	March 18, 1918
	Wheeler Lbr. Br. & Sup. Co.	Lumber	March 18, 1918
Keokuk	Standard Bridge Company	Lumber	April 29, 1918
Kossuth	Wheeler Lbr. Br. & Supply Co.	Lumber and piling	
Lee	Wheeler Lbr. Br. & Supply Co.	Lumber	
	Clinton Bridge Works	Reinforcing steel	Jan. 18, 1918
	Standard Bridge Company	Reinforcing steel	Jan. 23, 1918
	Hawkeye Lumber Company	Cement	
	S. & J. C. Atlee	Cement	
Linn	Klauer Manufacturing Co.	Corrugated pipe	Feb. 25, 1918
Mahaska	Wilson Concrete Company	Concrete pipe	April 9, 1918
	Western Boiler Pipe Co.	Corrugated pipe	April 9, 1918
	Iowa Pure Iron Company	Corrugated pipe	April 9, 1918
	Klauer Manufacturing Co.	Corrugated pipe	April 9, 1918
Mitchell	Lyle Corrugated Culvert Co.	Corrugated pipe	Feb. 25, 1918
Monona	Nebraska Br. Sup. & Lbr. Co.	Lumber	
Muscatine	Muscatine Lbr. & Coal Co.	Lumber	March 21, 1918
	Fuller-Hiller Hdw. Co.	Reinforcing steel	March 21, 1918
	Klauer Mfg. Co.	Corrugated pipe	March 21, 1918
Pocahontas	Wheeler Lbr. Br. & Supply Co.	Lumber and piling	
Pottawattamie	Wickham Bridge & Pipe Co.	Lumber and piling	
	Klauer Manufacturing Co.	Corrugated pipe	Feb. 25, 1918
Sac	Standard Bridge Company	Lumber	Feb. 23, 1918
	Clinton Bridge Works	Reinforcing steel	Feb. 23, 1918
	Nebr. & Iowa Steel Tank Co.	Corrugated pipe	March 11, 1918
Scott	Fuller-Hiller Hdw. Co.	Reinforcing steel	March 11, 1918
	Builders Lime & Cement Co.	Cement	
Shelby	Wickham Bridge & Pipe Co.	Lumber and piling	
Tama	Wilson Concrete Co.	Concrete pipe	March 26, 1918
	Klauer Manufacturing Co.	Cor. & Cast iron p.	March 29, 1918
Taylor	S. E. Wainwright	Cement	
	Nebr. Br. Sup. & Lbr. Co.	Lumber and piling	
	Clinton Bridge Works	Reinforcing steel	

SCHEDULE THREE—Continued.

County	Company	Material	Date Approved
Washington	Klauer Manufacturing Co.	Corrugated pipe	March 18, 1918
Webster	Nebr. Br. Sup. & Lbr. Co.	Lumber	April 2, 1918
Winnebago	Crystal Farmers Association	Cement	
	Lake Mills Lumber Co.	Cement	
	F. Weyerhauser Co.	Cement	
	Fort Dodge Culvert Co.	Corrugated pipe	March 15, 1918
	Clinton Bridge Works	Reinforcing steel	March 21, 1918
	Nebr. Br. Sup. & Lumber Co.	Lumber	
	Thompson Yards Co.	Cement	
Winneshiek	Nebr. Br. Sup. & Lbr. Co.	Lumber	
	Lyle Corrugated Culvert Co.	Corrugated pipe	March 15, 1918

Chapter V. Railroad Crossing Improvement.

January 1, 1918, to January 1, 1919.

During the year of 1918 the work done and results accomplished by county boards and the Commission toward the improvement of dangerous railroad crossings does not measure up to that done in former years. The necessity for the conservation of all materials of construction and labor on account of war conditions necessitated the postponement of many projects of merit. Governmental control of the railroads became effective on January 1, 1918, and with it a revision of the responsibilities and authority of the officials with whom such matter have been adjusted in the past. Furthermore, the policy of the United States Railroad Administration, as announced through their Regional Directors, was to defer, for the period of the war, all improvements not of the utmost importance in winning the war.

In view of these conditions active work to secure the improvement of crossings in general was abandoned and only such projects as were of immediate necessity to the welfare and safety of the traveling public and those projects requiring a very limited expenditure for materials or labor were considered.

Conditions are now more favorable for a continuance of this work and many of the projects which had to be abandoned on account of the war will be taken up in 1919.

The Commission has no means of keeping an accurate record of the accidents or deaths resulting from railroad crossing accidents, but in newspaper clippings there were reported a total of sixty-two deaths in 1918 resulting from crossing accidents. In addition to the deaths reported, a total of 136 accidents to automobiles struck by trains and their occupants injured, was obtained from the same source. These records, while incomplete, serve to emphasize the necessity for greater efforts towards the elimination of dangers at railroad crossings. Below is given in tabulated form the summary and comparative results accomplished on railroad crossing improvements during the past five years.

COMPARATIVE STATEMENT OF WORK ACCOMPLISHED—RAILROAD CROSSING IMPROVEMENTS TO JAN. 1, 1919.

	During 1917	During 1918	Grand total to Jan. 1, 1919
Crossing projects listed	38	30	305
Number of railroad crossings involved on projects listed	41	32	375
Projects surveyed	11	11	143
Projects for which plans and estimates were prepared	30	6	140
Number of conferences held	36	13	114
Number of projects satisfactorily adjusted	27	18	99
Projects completed during the year	28	17	94
No. of projects listed which have been appealed to Railroad Commission	4	2	20
Projects adjusted by Railroad Commission	4	0	10
Crossings entirely eliminated	4	0	24
Grade crossings eliminated by grade separation	5	1	23
Crossings improved	17	12	108
Crossing projects temporarily abandoned	40	8	82
Estimated cost of crossing improvements satisfactorily adjusted	$ 50,172	$ 14,827	$ 282,582
Estimated cost of improvements on Commission plans	103,650	67,216	732,353
Total estimated amount appropriated by railroad companies for crossing improvements	20,947	4,600	172,010
Total estimated amount appropriated from public funds for crossing improvements	20,674	10,227	111,021
Average percentage of cost paid by railroad companies for crossing improvements	60%	30%	80%
Average percentage of cost paid from public funds for crossing improvements	40%	70%	20%

The location of all of the individual crossing projects listed to January 1, 1919, in the state are shown on a map accompanying this report. Many of the projects listed have been adjusted and completed.

Methods of Handling Railroad Crossing Complaints.

The Commission receives each year many complaints from highway officials, associations and individuals of dangerous railroad crossings. Each complaint when received is investigated and if found meritorious a project number is assigned and correspondence is taken up to secure the necessary improvement. If it develops that a survey and plan is necessary, an engineer of the Commission is assigned to the work. This engineer and the county engineer go over the situation and secure such notes as are necessary to work out the details of the proposed improvement. Plans and estimates of cost are then prepared by the Commission and are furnished without cost to the proper highway officials and railroad companies. Unless it develops that the matter can be satisfactorily adjusted by correspondence a conference is held at or near the site of the proposed improvement, where the plans and estimates can be gone over in detail. If possible an agreement is reached at this time on the proposed improvement and the dis-

tribution of cost between interested parties. It has been found that in the majority of cases the representative of the railroad company, county, Commission and those interested can agree on the method of improvement and the distribution of expense at these conferences. In the event that no agreement can be reached and the improvement is of importance the entire matter is appealed to the Railroad Commission as provided by statute. Out of a total of 305 crossing projects listed to date it has been found necessary to appeal only twenty or approximately six and six-tenths per cent to the Railroad Commission for adjustment. A total of ninety-nine projects have been satisfactorily adjusted of which number ten or approximately ten per cent have been adjusted by a formal order of the Railroad Commission.

Owing to the dissimilarity of the projects it has been found impractical to follow a uniform method for the distribution of cost of these improvements. Each project is taken up separately and adjusted in so far as possible on the basis of the benefits to be derived by the contributing parties.

Distribution of Dangerous Crossings.

The dangers existing at grade crossings have received the principal attention of the Commission in the past. However, many of the complaints received and investigated refer to dangerous conditions existing on overhead and undergrade crossings. The following tabulation shows the distribution of crossings classified according to the number and type of individual crossings listed for improvement.

DISTRIBUTION AND PERCENTAGE OF CROSSINGS LISTED FOR IMPROVEMENT OR IMPROVED TO JANUARY 1, 1919.

Type of Crossing	Number listed 1918	Distribution of original crossings as listed by Commission	
		Number	Percentage
Grade	18	292	78
Overhead	5	32	9
Undergrade	9	47	12
New crossings	0	5	1
Total	32	376	100%

DISTRIBUTION OF CROSSING IMPROVEMENTS ACCORDING TO THE PLANS AND RECOMMENDATIONS OF THE COMMISSION.

Type of Crossing	Eliminated		Improved		Grade Separation		Total number
	No.	%	No.	%	No.	%	
Grade	60	26	110	48	58	26	228
Overhead	2	7	25	93			27
Undergrade	5	12	35	88			40
New crossings							
Total number	67		170		58		295
Percentage of total		23		58		19	

DISTRIBUTION OF CROSSING IMPROVEMENTS SATISFACTORILY ADJUSTED TO JANUARY 1, 1919.

Type of Crossing	Eliminated		Improved		Grade Separation		Total number
	No.	%	No.	%	No.	%	
Grade crossing	25	20	75	62	22	18	122
Overhead	1	5	17	95			18
Undergrade	2	8	23	92			25
New crossings							
Total number	28		115		22		165
Percentage of total		17		70		13	

Methods of Improvements.

The following outline suggests the possible methods of improvement which may be utilized in securing the elimination of dangers at railroad crossings. Each crossing project if important is inspected in the field by a representative of the Commission and whenever practical plans are prepared or recommendations made for the improvement of the crossing. In general the recommendations for improvement are made in accordince with the most practical and feasible means of eliminating or minimizing the danger about in the order as listed below:

Grade Crossings.

1. Elimination by relocation of highway.
2. Separation of railroad and highway grades.
3. Relocation of highway to divert major portion of traffic from the the crossing.
4. Removal of obstructions interfering with clear view of approaching trains and vehicles.
5. Installation of crossing gates or adequate protection to the traveling public on crossings which cannot be made reasonably safe by one or more of the methods mentioned above.

Overhead Crossings.

1. Elimination of crossings by relocation of highway.
2. Construction of substantial overhead bridges capable of carrying the standard loadings and provided with roadways adequate to accommodate the traffic.
3. Reduction of steep approach grades to facilitate the hauling of heavy loads and to obtain better view of approaching vehicles on the highways.
4. Elimination of short turns and obstructed views at the approaches of overhead crossings.
5. Relocation of highway to divert traffic from overhead crossings which cannot be put in a safe condition for travel by one or more of the methods of improvement suggested above.

Undergrade Crossings.

1. Elimination of crossing by relocation of highway.
2. Provision for an adequate horizontal and vertical clearance where the highway passes under the railroad.
3. Removal of obstructions interfering with a clear view of approaching vehicles on the highway.
4. Improvement of drainage so that roadway beneath the tracks will be properly drained at all times of the year.
5. Relocation of highway to divert the traffic in the event that the dangerous condition cannot be satisfactorily remedied by one of the methods indicated above.

Recommendations for Crossing Improvements.

The minimum requirements as adopted by the Commission for the different type of crossings are given in detailed form below:

Grade Crossings.

Location of crossing signs at all grade crossings a minimum distance of 300 ft. from the crossing.

Maximum approach grade to the crossing of 6 per cent.

Level approach grade on either side of the tracks of 25 ft.

Minimum width of planking measured at right angles to the center line of the highway of 24 ft. on the County Road System and 20 ft. on the Township Road System.

Clear view which allows a person in a vehicle 200 ft. from the crossing to observe an approaching train an equal distance from the crossing.

Undergrade Crossings.

Minimum vertical clearance of 13 ft. with a recommended clearance of at least 14 ft. wherever practical.

Minimum horizontal clearance for temporary construction of 18 ft.

Minimum horizontal clearance for permanent construction of 24 ft. for crossings on the County Road System and 20 ft. for crossings on the Township Road System.

Clear view which will permit one vehicle on the highway to observe another vehicle approaching a minimum distance of 200 ft.

Overhead Crossings.

Minimum vertical distance from top of rail to low steel of 22 ft.

A bridge structure capable of safely carrying the Commission's standardized loadings.

Minimum width of roadway for temporary construction of 20 ft.

Minimum width of roadway for permanent construction on the County Road System of 24 ft. and for the Township Road System of 20 ft.

Changes in grade on the bridge structure not to exceed 2% between bents.

Clear view which will permit one vehicle on the highway to observe another vehicle approaching for a minimum distance of 200 ft.

Distribution of Crossing Improvements.

The distribution of crossing improvements according to the number of crossings in the county and township road system and the mileage of track in the various railroad systems in the state is given in tabulated form below. It will be noted that the distribution of crossings listed for improvement is almost in direct ratio to the mileage in each of the railroad systems. Attention might also be called to the large number of crossings existing on the highways in the state.

DISTRIBUTION OF CROSSINGS AND PROJECTS LISTED.

Railroads	No. of crossings on county road system	No. of crossings on township road system	Total number of crossings	No. of crossings on projects listed by Commission	Total mileage of track in the state
C., R. I. & P.	349	1,526	1,875	60	2,959
C., M. & St. P.	251	1,277	1,528	41	2,663
C., B. & Q.	272	915	1,187	70	2,020
C. & N. W.	208	1,183	1,391	44	2,539
C. G. W.	123	633	756	27	1,066
M. & St. L.	111	582	693	22	1,053
I. C.	95	442	537	16	928
Wabash	41	142	183	11	237
Great Northern	9	56	65	4	103
C., M., St. P. & O.	11	60	71	3	139
Misc.—R. R. and Interurban	63	327	390	18	481
Total	1,533	7,143	8,676	316	14,188

Plans for Future Crossing Work.

Surveys have been completed and plans are in the course of preparation for several important crossing improvements. The attention of the Commission will be directed during 1919 to securing the improvement of crossings located on Federal Aid projects and other crossings on important highways in the state.

SCHEDULE FOUR.

Detailed Statement of Work Accomplished on Individual Crossing Projects Listed.

NO. 24—CLARKE COUNTY.

In Singler's Addition, town of Woodburn; Chicago, Burlington and Quincy Railroad.

On January 30, 1918, the Commission was advised by the Secretary of the Board of Railroad Commissioners that a formal hearing would be held in the matter of this improvement.

NO. 66—MARION COUNTY.

In Section 2, Knoxville Township, 2 miles west of Knoxville; Chicago, Burlington and Quincy Railroad.

Arrangements were made with the railroad company and the board of supervisors for a conference to consider the plans prepared by the Commission for this improvement and to secure an adjustment of the distribution of cost of the proposed improvement. The railroad company requested that the discussion of this matter be deferred for the period of the war owing to the fact that they were using this branch line for extensive troop movement and which would be interfered with to some extent if the construction work were undertaken at this time. The consent of the board of supervisors to defer this improvement for the period of the war was secured. Correspondence will be taken up soon to arrange for the conference which was postponed as noted above.

NO. 74—LEE COUNTY.

Between Sections 3 and 4, West Point Township, near West Point; Chicago, Burlington and Quincy Railroad.

On January 17th the Commission was advised by the county attorney that adjustment of this crossing project had been referred to the Board of Railroad Commissioners. Owing to war conditions no further negotiations were carried on to secure the improvement at this time.

NO. 125—STORY COUNTY.

Between Sections 3 and 10, Nevada Township, 3 miles east of Nevada; Chicago and North Western Railroad and Chicago, Rock Island and Pacific Railroad.

Further negotiations with the Chicago, Rock Island and Pacific concerning the overhead bridge carrying the highway over their tracks, which is a part of this project, were deferred for the period of the war upon the request of the Regional Director of the United States Railroad Administration. The present overhead bridge was satisfactorily repaired to accommodate traffic and upon the conclusion of the war an agreement will be sought which will insure the construction of the reinforced concrete structure over the Rock Island tracks.

NO. 126—SCOTT COUNTY.

Section 35, Princeton Township; Davenport, Rock Island and North Western Railroad.

In accordance with the opinion of the Board of Railroad Commissioners the Davenport, Rock Island and North Western Railroad submitted detailed plans for the subway crossing to the Commission for approval. Upon examination it was found that these plans conform to the general plans as prepared by the Commission and on June 13th the detailed plans were approved and returned to the railroad company. On July 29th the Board of Railroad Commissioners granted an extension of time to the board of supervisors and railroad company for the construction of this project until June 1, 1919.

NO. 146—PLYMOUTH COUNTY.

Section 6, Fredonia Township; Chicago, St. Paul, Minneapolis and Omaha Railroad.

At a conference held in LeMars on April 9th between representatives of the board of supervisors of Plymouth and Sioux counties, the Chicago, St. Paul, Minneapolis and Omaha Railroad and the Commission, a proposition was formulated and submitted to the railroad company concerning the improvement of the two grade crossings involved in this project. Previous conferences have been held with the railroad company concerning the improvement proposed. A refusal was received from the railroad company under date of May 9th to accept or modify the proposition as submitted to them. Accordingly a formal appeal was made to the Board of Railroad Commissioners for the adjustment of this improvement. No date of hearing has been set by the Board of Railroad Commissioners of which this Commission has been advised.

NO. 148—KEOKUK COUNTY.

Jackson Street in northwest part of Sigourney; Chicago, Rock Island and Pacific Railroad.

Survey has been made for the proposed replacement of the existing wooden overhead bridge with a permanent structure. Plans and estimates will be prepared by the Commission and furnished to the county and railroad company.

NO. 181—WEBSTER COUNTY.

North line of Section 1, Fulton Township; Minneapolis and St. Louis Railroad.

Upon the request of the railroad company the construction of this crossing was deferred for the period of the war owing to the prevailing high prices of construction work and the scarcity of labor and materials.

NO. 212—JEFFERSON COUNTY.

Sections 31, 32 and 33, Lockridge Township, near Glendale; Chicago, Burlington and Quincy Railroad.

The board of supervisors and railroad company being unable to agree on the distribution of the cost of carrying out this improvement in accordance with the Commission's plans, an appeal was made to the Board of Railroad Commissioners for a formal order requiring the improvement. The petition was forwarded to the Board of Railroad Commissioners on March 16th. The estimated cost of the improvement on the basis of the present plans and present cost of materials and labor is $21,200. The county has requested the railroad company to donate about three acres of right of way parallel to their tracks and pay the sum of $4,000 toward the improvement, the county to assume the balance of the expense. Practically all of the traffic which now crosses the main line tracks of the Chicago, Burlington and Quincy Railroad on two grade crossings and one overhead and one subway crossing would be diverted so that no crossing of the Chicago, Burlington and Quincy tracks would be necessary. Negotiations are still in progress with the railroad company in an effort to secure an adjustment of this proposition.

NO. 216—MUSCATINE COUNTY.

Section 21, 22 and 23, Montpelier Township; Chicago, Rock Island and Pacific Railroad.

At a conference held in Des Moines between representatives of the county, railroad company and Commission, an agreement was reached which insures the completion of this crossing project in 1918 in accordance with the plans as prepared by the Commission. The plans contemplate a relocation of two miles of the county road which will avoid three grade crossings on the tracks of the railroad company. The estimated cost of the improvement is $13,500. The county agreed to construct the crossing project as planned and the railroad company agreed to pay $4,000 toward the improvement when completed. In addition, the railroad company is to donate a portion of their right of way required for highway purposes. The proposition has been satisfactorily adjusted and is awaiting final approval of the contract form by the railroad management and federal authorities.

NO. 227—O'BRIEN COUNTY.

Sections 2 and 11, Liberty Township; Chicago and North Western Railroad.

Survey has been completed for the improvement of this crossing. Plans will be prepared early in 1919.

NO. 243—JEFFERSON COUNTY.

In town of Batavia; Chicago, Burlington and Quincy Railroad.

Listed for survey.

NO. 245—STORY COUNTY.

Sections 16 and 17, Washington Township; Fort Dodge, Des Moines and Southern Railroad.

On April 27th a conference was held between representatives of the Commission and the railroad company concerning this improvement. The railroad company agreed to pay $200 of the cost of improving this crossing. The improvement has been made and the crossing project satisfactorily adjusted.

NO. 247—JONES COUNTY.

Sections 13 and 14, Cass Township; Chicago, Milwaukee and St. Paul Railroad.

Project listed for survey.

NO. 256—MAHASKA COUNTY.

Sections 8 and 9, White Oak Township, one mile west of Rose Hill; Chicago, Rock Island and Pacific Railroad.

The Commission took up correspondence with the railroad company regarding the improvement of this crossing and secured the consent of the railroad company to contribute $400 or approximately 50 per cent of the estimated cost of the improvement. The crossing project was completed in 1918.

NO. 264—WAPELLO COUNTY.

Sections 23 and 24, Columbia Township; Chicago, Rock Island and Pacific Railroad.

Survey completed for the improvement and plans now in the course of preparation.

NO. 272—WRIGHT COUNTY.

Section 33, Iowa Township; Chicago Great Western Railroad.

A letter was received from the railroad company advising the Commission that improvements to this crossing would be made substantially in accordance with the recommendations of the Commission. These improvements were to be made during the year of 1918. A further inspection will be made of this crossing to determine if it is in satisfactory condition and the complaint satisfactorily adjusted.

NO. 275—IOWA COUNTY.

Sections 11 and 12, Hartford Township, 1 mile west of Ladora; Chicago, Rock Island and Pacific Railroad.

Listed for survey.

NO. 276—BOONE COUNTY.

Crossings in city of Ogden; Chicago and North Western Railroad.

The Commission was requested to investigate the condition of the crossings located in the city of Ogden to assist in securing some relief from the conditions complained of. A conference was held on February 5th at which time a representative of the Commission met with members of the city council and the mayor of the city of Ogden to discuss the proposed improvement and methods for remedying the conditions complained of. It appeared at this conference that the matter had previously been referred to the Board of Railroad Commissioners and an opinion had been rendered by them under date of August 3, 1917. Owing to the fact that the matter was being handled by the Railroad Commission and that the expenditure necessary to satisfactorily adjust the complaint would be large, it was considered advisable to defer further action in this matter for the period of the war.

NO. 277—SIOUX COUNTY.

Sections 11 and 12, Reading Township, 3 miles west of Maurice; Chicago and North Western Railroad.

Plans were submitted by the railroad company for approval. The improvement contemplated consists of the construction of a permanent undergrade crossing to replace a temporary wooden undercrossing in this location. An examination of the conditions at the site of the crossing was made by our district engineer and with a slight modification of the road grade near the crossing the plans were approved.

NO. 278—MONROE COUNTY.

Section 12, Troy Township, 2 miles northeast of Albia; Minneapolis and St. Louis Railroad.

The complaint which was received by the Commission concerning the condition of this crossing was satisfactorily adjusted at a conference held to consider the improvements which were to be made. The railroad company, county and Commission were represented at the conference and the project was satisfactorily adjusted. The crossing improvement has been completed.

NO. 279—MONROE COUNTY.

Near center of Section 6, Mantua Township, 2 miles west of Avery; Minneapolis and St. Louis Railroad.

(Same report as No. 278.)

NO. 280—MONROE COUNTY.

Section 33, Troy Township, 2 miles south of Avery; Minneapolis and St. Louis Railroad.

(Same report as No. 278.)

NO. 281—MONROE COUNTY.

Section 14, Pleasant Township, 2 miles southwest of Eddyville; Minneapolis and St. Louis Railroad.

(Same report as No. 278.)

NO. 282—POWESHIEK COUNTY.

Sections 3 and 10, Lincoln Township, 1½ miles north of Guernsey; Chicago and North Western Railroad.

Plans for the construction of a permanent undergrade crossing to replace a temporary wood bridge in this location were submitted to the Commission for approval by the railroad company. Upon the request of the Commission a modification of the vertical clearance was made and the plan was then approved. This crossing improvement has been completed.

NO. 283—UNION COUNTY.

Section 13, Jones Township, 1 mile east of Thayer; Chicago, Burlington and Quincy Railroad.

Plans for the improvement of a wooden overhead bridge by the substitution of a steel and concrete structure were submitted to the Commission for approval by the railroad company. An investigation of the conditions was made by a representative of the Commission and upon his recommendation the matter was temporarily deferred. Later a further and more detailed examination of the possibility of relocating the existing road so as to entirely avoid this crossing was made by the board of supervisors and Commission. It was found that an extensive relocation was possible which would avoid several crossings of the railroad and improve highway conditions in the county. Owing to the prevailing high prices of construction work at this time it was considered advisable to request the railroad company to repair the existing overhead wooden bridge in this location and to defer the construction of the permanent bridge until the county was in a position to give full consideration to the possibility of relocating the road and avoiding this and several other crossings. The matter has been temporarily deferred as noted above.

NO. 284—CLARKE COUNTY.

Section 7, Troy Township, 2 miles west of Murray; Chicago, Burlington and Quincy Railroad.

(See report on project No. 283.)

NO. 285—JEFFERSON COUNTY.

Sections 28 and 29, Fairfield Township; Chicago, Burlington and Quincy Railroad.

Plans were submitted by the railroad company to the Commission for approval which contemplated the reconstruction of the present wooden overhead bridge in this location by the substitution of a steel and concrete structure of a permanent nature. Plans were approved by the Commission with slight modifications.

NO. 286—KEOKUK COUNTY.

Section 20, English River Township, 2 miles northeast of Webster; Chicago, Milwaukee and St. Paul Railroad.

Listed for survey.

NO. 287—WAYNE COUNTY.

In the city of Lineville; Chicago, Rock Island and Pacific Railroad.

Listed for survey.

NO. 288—WAYNE COUNTY.

Section 16, Walnut Township; Chicago, Rock Island and Pacific Railroad.

Upon request of the county a representative of the Commission investigated the conditions complained of at the site of this crossing. The project was satisfactorily adjusted later by correspondence and has been completed.

NO. 289—WAYNE COUNTY.

Section 5, Union Township, 2 miles north of Millerton; Chicago, Rock Island and Pacific Railroad.

Upon request of the county the Commission's representative made an inspection of this crossing improvement and reports that some improvement to the drainage conditions will be necessary. This matter is being taken up with the railroad company at this time.

NO. 290—MONONA COUNTY.

Sections 21 and 28, Franklin Township, 3¼ miles south of Onawa; Chicago and North Western Railroad.

Request was made to the Commission for assistance in preparing a survey and securing the improvement of this railroad crossing. The matter was later taken up by the county with the railroad company and satisfactorily adjusted. The improvement has been carried out in accordance with the plans made by the county engineer.

NO. 291—HANCOCK COUNTY.

Sections 1 and 2, Madison Township, 2 miles south of Forest City; Minneapolis and St. Louis Railroad.

Complaint was received by the Commission concerning the obstructed view to approaching trains at this crossing. The Commission took the matter up with the railroad company by correspondence and secured a promise from the railroad company to remove the obstructions which were interfering with the view of approaching trains. This satisfactorily adjusted the complaint and the improvement was completed in 1918.

NO. 292—DES MOINES COUNTY.

In the city of West Burlington; Chicago, Burlington and Quincy Railroad.

Plans for the reconstruction of a wooden overhead bridge on the main line of the Burlington was submitted to the Commission for approval. Modifications in the approach grade and in the details of the overhead structure were made by the Commission and accepted by the railroad company. The plans were later approved and the project has been completed.

NO. 293—POTTAWATTAMIE COUNTY.

Section 28, Garner Township; Chicago Great Western Railroad.

Plans for the improvement of this undergrade crossing by reconstruction of the railroad bridge was submitted to the Commission for approval. An engineer of the Commission made an inspection of the crossing and reported that the plans as prepared by the railroad company were not satisfactory for acceptance. Modifications to the plans are being made and will be submitted to the railroad company for consideration at an early date.

NO. 294—BREMER COUNTY.

Section 20, Lafayette Township; Illinois Central Railroad.

Project has recently been surveyed and plans are in the course of preparation for the improvement of this crossing.

NO. 295—RINGGOLD COUNTY.

Section 2, Rice Township, 2 miles west of Mount Ayr; Chicago, Burlington and Quincy Railroad.

The improvement of this crossing is included as a part of the federal aid project of Ringgold County and detailed plans for the crossing improvement will be worked up in connection with the federal aid plans.

NO. 296—MONROE COUNTY.

Section 5, Jackson Township, 1 mile west of Melrose; Chicago, Burlington and Quincy Railroad.

Plans for the improvement of this grade crossing were prepared by the county engineer and forwarded to the Commission with a request that the matter be taken up with the railroad company. The Commission took the matter up with the railroad company by correspondence but has not been able to secure an approval of the plans from the railroad company or a satisfactory distribution of cost. The project is under adjustment at this time.

NO. 297—CASS COUNTY.

Section 31, Grant Township, 2 miles west of Anita; Chicago, Rock Island and Pacific Railroad.

The Commission received a petition signed by a large number of citizens living in the vicinity of this crossing requesting our assistance in securing the improvement of an undergrade crossing in the above location. A survey was made and plans and estimates were prepared by the Commission and furnished to the railroad company and county. A proposition has been submitted to the railroad company for temporary repairs

to the crossing which will relieve the conditions complained of. No reply has been received from the railroad company to date. The matter is under adjustment at this time.

NO. 298—LEE COUNTY.

Section 3, Van Buren Township, ½ mile west of Belfast; Chicago, Rock Island and Pacific Railroad.

Complaint was received by the Commission concerning the unsatisfactory condition of an undergrade crossing in the above location. An investigation by a representative of the Commission disclosed the fact that the conditions complained of should be relieved. The matter was taken up with the railroad company but no satisfactory adjustment has been secured to date.

NO. 299—DECATUR COUNTY.

Section 19, Eden Township, 4 miles southwest of Leon; Chicago, Burlington and Quincy Railroad.

This crossing is located on the proposed federal aid projects in Decatur County and plans for its improvement were worked up in connection with the plans for the improvement of the road. Surveys were made by the Commission and alternate plans and estimates submitted to the board for consideration. Upon acceptance of one of the plans by the board of supervisors the matter will be taken up with the railroad company in an effort to secure a distribution of cost between the interested parties.

NO. 300—DECATUR COUNTY.

Sections 3 and 10, New Buda Township, 2½ miles southwest of Davis City; Chicago, Burlington and Quincy Railroad.

A survey was made for the improvement of this crossing and plans and estimates of cost have been prepared and furnished to the county. The matter will be taken up with the railroad company at an early date.

NO. 301—WOODBURY COUNTY.

Section 9, Woodbury Township; Chicago, Milwaukee and St. Paul Railroad.

A survey was made and plans have been prepared for the substitution of an overhead crossing for the existing grade crossing in the above location. The estimated cost of the improvement based on the plans as prepared was $30,000. The matter was taken up with the board of supervisors of Woodbury County in connection with their federal aid project upon which the crossing is located. The plans as prepared by the Commission have been presented to the board and are under consideration at this time.

NO. 302—FREMONT COUNTY.

In the town of Summit, Sections 26 and 35, Monroe Township; Wabash Railroad.

At a conference held at the site of this crossing on September 27th it was agreed between the representatives of the county, railroad company and Commission that an improvement to this crossing should be made, the county to do the necessary grading work outside of the railroad company's right of way and the railroad company to take care of the grading work and drainage within the right of way lines. The improvement contemplated consists of securing a greater vertical and horizontal clearance to an existing undergrade crossing. Work will probably be undertaken in 1919.

NO. 303—STORY COUNTY.

In the city of Ames; Chicago and North Western Railroad.

Listed for survey.

NO. 304—MAHASKA-POWESHIEK COUNTIES.

Present crossing in Section 1, Prairie Township, Mahaska County, proposed improvement in Section 36, Sugar Creek Township, Poweshiek County; Minneapolis and St. Louis Railroad.

Survey has been made and plans have been prepared for the improvement of this crossing. The present grade crossing will be improved by the construction of an overhead crossing on a relocated road. The project is under adjustment at this time.

NO. 305—BREMER COUNTY.

At corner of Sections 11, 12, 13 and 14, Jefferson Township, 2 miles north of Denver; Chicago Great Western Railroad.

Survey has been made and plans and estimates have been prepared for the improvement of an overhead crossing in the above location. The plans for the improvement are being submitted to the railroad company and county.

Chapter VI. Road Department.

December 1, 1917, to December 1, 1918.

In 1918, due to war conditions, the mileage of road work contracted fell 42 per cent below the 1916 mileage and 58 per cent below the 1917 mileage; the prices of earthwork increased 59.6 per cent over the 1916 prices, and 38.5 per cent over the 1917 prices. In 1918 the 272 miles contracted cost the same as 434 miles in 1916.

During the period covered by this report, engineers of the road department have checked and approved county profiles for the improvement of 321.1 miles of road, involving the moving of 1,797,753 cubic yards of earth; approved thirty-four contracts for road work amounting to $477,365.00; investigated and undertook the adjustment of sixty-two road complaints; investigated and passed upon eighty-two requests for changes in county roads; supervised state road work involving the grading of one mile, the graveling of five and one-half miles, the building of three concrete culverts, the laying of 3814 square yards of paving, and the building of 5600 lineal feet of guard rail; gave detailed supervision to county road work involving the construction of four miles of brick pavement, one and one-fourth miles of concrete pavement, and five miles of gravel road; prepared and submitted to the federal authorities project statements for twenty-one federal aid projects, and collected data for six federal aid projects for which the project statements have not been submitted; made counts of the traffic on nineteen federal aid projects; made field surveys of nineteen federal aid projects involving 260 miles of road; prepared detailed plans for fifteen federal aid projects involving 248 miles of road, prepared special specifications for six federal aid projects, and prepared standard federal aid specifications for earth roads, gravel roads, concrete roads, monolithic brick roads, and bituminous filled brick roads.

District engineers representing the road department have made field examination of the 321.1 miles for which profiles were approved; attended twenty-eight road lettings for road work costing $580,944.00 and involving the moving of 1,587,741 cubic yards of earth; made field examination of all the proposed changes

To hasten the improvement of its transcontinental route, the Lincoln Highway for several years made a standing offer to counties through which the road passed to supply free of charge enough cement for the construction of a mile of concrete road surfacing. These roads were to be called "seedling miles." Linn county was the only county in Iowa to take advantage of this offer. The two views show the road under construction and a finished section. The "seedling mile" is located about six miles east of Cedar Rapids.

The Thirty-Seventh general assembly instructed the Highway Commission to select and designate with the help of the boards of supervisors, a state system of inter county roads, consisting of between 2,000 and 6,000 miles, which should connect all the county seats and main market centers, with the needs of the state as a whole, not the individual counties, as the chief consideration. The above map shows the system practically complete. It comprises 6,284 miles.

"Travel through gravel" not on it would be an appropriate label for this picture. Iowa has built many miles of gravel road and has some beautiful stretches of such surfacing. Under the right amount of moisture and under traffic that is not too heavy the gravel surface is giving fine service. Under extremely wet or dry conditions or under heavy traffic, it goes to pieces rapidly and its maintenance in satisfactory condition, has been shown to be impossible. The above road was gravelled, but at this particular spot drainage had been neglected.

Motor truck hauling on the Iowa highways is not all joy, as is shown in the above picture. The road has a gravelled surface which was put down upon a permanently graded subgrade. In this particular instance, the condition of the road is due to lack of drainage. The view was taken on one of the most widely known and heavily travelled roads of Iowa.

in the county road systems concerning which there could be any question, and made reconnaissance surveys and estimates of the cost of eighteen proposed federal aid projects involving 206.56 miles of road, and have given general supervision to the construction work in progress on the three federal aid projects under contract.

Road Profiles Approved. (Refer to Schedule Five.)

Profiles for the improvement of 321.1 miles of road have been checked and approved. This required the handling and checking of 369 separate profile drawings. Since the Commission was organized in 1913, profiles for 3123.6 miles of road have been checked and approved.

The following table shows the mileage of road profiles approved each year since the Commission was organized, and indicates the falling off of road work due to the war:

Year	Profiles Approved
1913	29 miles
1914	445 "
1915	549 "
1916	880 "
1917	899.5 "
1918	321.1 "

A comparison of the maximum grades, rise and fall, and quantity of earthwork for the profiles approved in 1916, 1917 and 1918 follows:

	1916	1917	1918
Average maximum grade before improvement	5.77%	5.55%	5.49%
Average maximum grade after improvement.	3.61%	3.55%	3.48%
Reduction in average maximum grade.....	2.16%	2.00%	2.01%
Average rise and fall per mile before improvement	50.0 ft.	48.1 ft.	51.9 ft.
Average rise and fall per mile after improveprovement	40.1 ft.	37.9 ft.	41.7 ft.
Reduction in average rise and fall.....	9.9 ft.	10.2 ft.	10.2 ft.
Earthwork required by profiles—cubic yards.	4,739,485	4,806,668	1,797,753
Average quantity earthwork per mile—cubic yards	5,655	5,418	5,599

Specifications.

Special specifications have been prepared for six federal aid projects including one mile of pavement, thirty miles of gravel, and one hundred four miles of earth road. Standard federal aid road specifications have been prepared for earth roads, gravel roads, concrete roads, and brick roads.

Road Lettings Attended. (Refer to Schedule Six.)

Twenty-eight lettings for the improvement of 272.1 miles of road have been attended. The total contract price was $580,-944.45. The earth excavation included in these lettings amounted to 1,587,741 cubic yards, which cost $543,167.87, or an average of 34.21 cents per cubic yard.

The effect of the war in reducing the amount of road work and increasing the prices for such work is well illustrated in the following table:

	Miles of Road Constructed	Average Cost of Earthwork
1916	468.4 miles	21.43c per cu. yd.
1917	646.7 "	24.69c " " "
1918	272.1 "	34.21c " " "

The number of miles contracted in 1918 was only 58.1 per cent of the mileage contracted in 1916. The price for earthwork in 1918 was 59.6 per cent higher than in 1916. Thus in 1918 it cost as much to build 272 miles as it would have cost in 1916 to build 434 miles. It will be noticed that the mileage contracted in 1917 was greatly in excess of the mileage contracted in 1916. A large per cent of the 1917 work was contracted early in the year before the United States entered the war. The mileage contracted in 1918 was only 42 per cent of the mileage contracted in 1917.

Road Contracts Approved. (Refer to Schedule Seven.)

Thirty-four contracts for the improvement of 204.25 miles of road have been approved. The total amount of these contracts is $477,365.67, of which $393,242.50 is for earth excavation. These contracts provide for the moving of 1,167,102 cubic yards of earth, at an average price of 33.69 cents per cubic yard.

Road Complaints. (Refer to Schedule Eight.)

The records show that during 1918 the Commission received and undertook the adjustment of sixty-two road complaints. In many instances, when these complaints were investigated it was found that the roads were in bad shape because the road superintendent had gone to the army and no one had been found to take his place. Since April, 1913, there have been filed with the Commission 704 road complaints, as follows:

1913	28	complaints
1914	83	"
1915	254	"
1916	151	"
1917	126	"
1918	62	"

Inspection and Supervision of Road Work.

The district engineers of the Commission give general supervision to the ordinary county road construction work. Sixty-seven days have been spent on this general supervisory work.

On special county road projects and those requiring more detailed supervision than the county engineer can give, the Commission has assisted the counties by assigning special engineers to give the work detailed inspection and supervision. Five such special projects were handled in 1918. The days spent on each were as follows:

Camp Dodge Road, Polk County	514 days
Dubuque Post Road, Dubuque County	124 "
Sageville Road, Dubuque County	558 "
Seedling Mile, Linn County	57 "
Colby Road, Polk County	18 "
	1,276 "

The work on the Camp Dodge Road consisted of giving detailed inspection and supervision to the laying of 32,000 square yards of monolithic brick pavement, the construction of 28,000 square yards of gravel shoulders, the construction of 5,000 lineal feet of guard rail, and the general work of finishing the whole five miles included in this project. This project is completed. From one to three engineers were employed on this work.

The work on the Dubuque Post Road consisted in giving detailed supervision and inspection to the grading of three miles, the scarifying and re-shaping of 15,833 square yards of old macadam, the graveling of five miles, and the construction of 14,000 lineal feet of guard rail. This road is now completed from Dubuque to Dyersville. One engineer was employed on this work.

The work on the Sageville Road consisted in giving detailed inspection and supervision to the laying of about 18,000 square yards of monolithic brick pavement and the general work of finishing the three and one-third miles included in this project. This project is completed except that it will be necessary to remove and reconstruct about one-third mile of defective pavement laid in the fall of 1917.

The work on the Seedling Mile in Linn County consisted of inspecting the construction of about three-fourths mile of concrete pavement on the Lincoln Highway between Mt. Vernon and Cedar Rapids. The cement for this mile was donated by the Lincoln Highway Association. This work is about three-fourths completed. One engineer was employed on this work.

The work on the Colby Road consisted of inspecting the construction of about one-half mile of concrete pavement on the Clive Road just west of the city limits of Des Moines. This work is completed. One engineer was employed on this work.

Changes in County Road System. (Refer to Schedule Nine.)

The Commission has taken action on proposed additions or alterations in the county road system in fifty counties, involving eighty-two separate requests by the boards of supervisors. Seventy-one of these requests were approved. These involve the addition of 144.75 miles to the county road system and the removal of 11.75 miles from the county system. The net increase in the mileage of the county road system was 133.00 miles.

Annual Report Blanks.

In co-operation with the administrative department the blanks for the annual reports of township trustees, clerks, and road superintendents, and the road division of the county engineers' annual reports have been revised and copies sent out to the various officers.

Surveys for Federal Aid Projects.

Engineers of the road department have made detailed surveys for nineteen federal aid projects involving 260.46 miles. In making these surveys the Commission furnished the chief of party and one roadman. The county furnished the necessary additional help and the transportation. It is believed that better results will be secured by the Commission furnishing the chief of party, one rodman, one chairman, and the transportation.

Plans for Federal Aid Projects.

In addition to checking and approving plans sent in by the county engineers for 321 miles of road, engineers of the road department have prepared plans for thirteen federal aid projects involving 182.13 miles of road, and have checked and approved the plans for two other projects involving 65.85 miles of road.

State Road Work.

The engineering work on the roads at state institutions was as follows:

Made detailed surveys for two and one-half miles at the Clive Custodial Farm. The plans are now being prepared.

Prepared plans for improvement of one and one-half miles at the Soldiers Orphans Home at Davenport.

Supervised the finished grading of three miles at the Cherokee and Mount Pleasant Hospitals.

Supervised the graveling of five and one-half miles at the Cherokee and Mount Pleasant Hospitals.

Supervised the graveling of five and one-half miles at the Cherokee and Woodward Hospitals and the college at Ames.

Supervised the construction of one-fourth mile of concrete pavement at the Knoxville Asylum.

Supervised the building of 5,600 lineal feet of guard rail at Cherokee and Ames.

Repaired flood damages at Ames, requiring the building of two temporary bridges and the rebuilding of grades.

Constructed three concrete culverts, one at the Clive Custodial Farm and the other two at Knoxville.

SCHEDULE 5.

ROAD PROFILES APPROVED.

County		County	
Adair	----	Delaware	7
Adams	----	Des Moines	----
Allamakee	----	Dickinson	----
Appanoose	----	Dubuque	----
Audubon	1	Emmet	2
Benton	1	Fayette	----
Black Hawk	----	Floyd	13
Boone	----	Franklin	----
Bremer	----	Fremont	1
Buchanan	----	Greene	3
Buena Vista	----	Grundy	1
Butler	----	Guthrie	4
Calhoun	13	Hamilton	25
Carroll	6	Hancock	----
Cass	----	Hardin	6
Cerro Gordo	1	Harrison	----
Cherokee	12	Henry	----
Cedar	----	Howard	8
Chickasaw	7	Hnmboldt	26
Clarke	----	Ida	----
Clay	----	Iowa	----
Clayton	----	Jackson	4
Clinton	8	Jasper	4
Crawford	14	Jefferson	----
Dallas	2	Johnson	----
Davis	----	Jones	----
Decatur	1	Keokuk	----

SCHEDULE FIVE—Continued

County		County	
Kossuth	7	Poweshiek	
Lee		Ringgold	
Linn	1	Sac	36
Louisa	1	Scott	3
Lucas		Shelby	
Lyon	3	Sioux	10
Madison		Story	1
Mahaska	1	Tama	11
Marion	1	Taylor	
Marshall	20	Union	
Mills		Van Buren	
Mitchell	3	Wapello	
Monona	7	Warren	
Monroe		Washington	
Montgomery		Wayne	
Muscatine	11	Webster	
O'Brien	9	Winnebago	8
Osceola		Winneshiek	
Page		Woodbury	
Palo Alto	29	Worth	
Plymouth		Wright	
Pocahontas	14		
Polk	23	Total	369
Pottawattamie			

SCHEDULE SIX.

ROAD LETTINGS ATTENDED.

County	No. of lettings	Miles of Road				Quantity	Kind of Work and Unit Prices	Approx. Total
		Finished grade	Gravel	Pavem't	Total			
Carroll	1	6.0	----	----	6.0	83,000	Earthwork 25c per c. y.	$ 20,750.00
Cherokee	1	15.7	----	----	15.7	103,000	Earthwork 38½ per c. y.	39,655.00
Clayton	1	0.5	----	----	0.5	5,000	Loose rock 55c per c. y.	2,740.00
Crawford	1	5.0	----	----	5.0	58,525	Earthwork 36.2c per c. y.	21,171.39
Hamilton	2	24.0	----	----	24.0	87,000	Earthwork 31.8c per c. y.	27,697.80
Howard	1	8.0	----	----	8.0	32,700	Earthwork 35c per c. y.	11,500.00
Humboldt	1	16.0	----	----	16.0	32,500	Earthwork 39½c per c. y.	12,837.50
Jackson	1	1.0	----	----	1.0	15,600	Earthwork 54.5c per c. y.	
						2,600	Rock $1.44 per c. y.	12,246.00
Kossuth	2	7.0	----	----	7.0	29,124	Earthwork 33c per c. y.	9,622.91
Linn	2	------	----	1.0	1.0	7,000	Earthwork 52c per c. y.	3,640.00
						600	Guard rail $1.00 per lin. ft.	600.00
						148	Temp. Culv. 75c per lin. ft.	111.00
						9,387	Concrete Pavem't, $2.84 per sq. yd.	26,659.08
Lyon	1	3.0	----	----	3.0	29,064	Earthwork 41½c per c. y.	12,061.56
Madison	1	0.75	----	----	0.75	9,000	Earthwork 40c per c. y.	3,600.00
Marshall	1	9.0	----	----	9.0	84,515	Earthwork 36.8 per c. y.	31,121.55
Marion	2	19.0	----	----	19.0	174,277	Earthwork 36.7c per c. y.	64,314.09
O'Brien	1	16.0	----	----	16.0	53,944	Earthwork 36.5c per c. y.	19,662.04
Palo Alto	1	24.0	----	----	24.0	91,764	Earthwork 30.1c per c. y.	27,598.95
Polk	2	8.0	----	----	8.0	48,800	Earthwork 41.8c per c. y.	20,399.20
Sioux	1	10.0	----	----	10.0	55,525	Earthwork 38.9 per c. y.	21,599.23
Sac	1	34.4	----	----	34.4	140,000	Earthwork 32c per c. y.	44,800.00
Wapello	1	------	----	----	------	3,600	Earthwork 27½c per c. y.	900.00
Winnebago	1	9.0	----	----	9.0	65,000	Earthwork 27½c per c. y.	17,875.00
Woodbury	2	53.75	----	1.0	54.75	383,803	Earthwork 32.4c per c. y.	124,178.65
							Guard rail 50c per lin. ft.	3,304.50
							6-inch tile 20c per lin. ft.	299.00
Totals	28	------	----	2.0	272.1	1,587,741		$ 580,944.45

Total quantity of earthwork, 1,587,741 cu. yd.
Total cost of earthwork, $543,167.87.
Average cost of earthwork, 34.21c per cu. yd.

SCHEDULE SEVEN.

ROAD CONTRACTS APPROVED.

County	Contractor	No. of miles	Kind of Work	Unit Price	Quantity	Total amount
Buchanan	Sayers & Sayers		Laying 6-in. tile	$1.00-$1.50 per rod	660 rd.	$ 715.00
			Laying 8-in. tile	1.00- 1.50 per rod	32 rd.	40.50
			Laying 10-in. tile	1.25- 2.00 per rod	33 rd.	53.50
			Laying 12-in. tile	1.25- 2.50 per rod	36 rd.	66.00
Carroll	Thos. Carey & Son	------	Earthwork	.52 per cu. yd.	14,420 cu. yd.	7,500.00
Dubuque	Anton Zwack	5.0	Earthwork	Cost plus 10%	6,250 cu. yd.	
			Scarifying old macadam	Cost plus 10%	15,833 sq. yd.	
			Shaping subgrade and shoulders	Cost plus 10%	29,290 sq. yd.	
			Gravel surface	Cost plus 10%	6,900 cu. yd.	38,558.85
Fremont	D. E. Finley	2.5	Earthwork	0.18 per cu. yd.	70,000 cu. yd.	12,600.00
Hardin	L. C. Wood	5.0	Earthwork	0.33 per cu. yd.	19,500 cu. yd.	6,435.00
Hardin	Wm. Cox	3.0	Earthwork	0.347 per cu. yd.	8,952 cu. yd.	3,406.34
Hardin	L. C. Wood	2.0	Earthwork	0.36 per cu. yd.	6,145 cu. yd.	2,212.20
Hardin	L. C. Wood	5.0	Graveling	0.77 per cu. yd.	4,400 cu. yd.	3,388.00
Hardin	E. A. Brownfield	4.0	Earthwork	0.27 per cu. yd.	18,800 cu. yd.	5,076.00
Hardin	John Birch	2.75	Gravel	0.675 per cu. yd.	2,420 cu. yd.	1,633.50
Hancock	McGuire & Handy	1.0	Gravel	1.75 per cu. yd.	880 cu. yd.	1,540.00
Hancock	Vern May	2.0	Gravel	1.25 per cu. yd.	1,760 cu. yd.	2,200.00
Howard	Frank Richardson	8.0	Earthwork	0.35 per cu. yd.	32,700 cu. yd.	11,500.00
Harrison	E. L. Young	2.0	Earthwork	0.285 per cu. yd.	7,600 cu. yd.	2,166.00
Jackson	S. Streets	0.5	Earthwork	0.37 per cu. yd.	8,600 cu. yd.	3,182.00
			6-in. tile	0.15 per lin. ft.	5,600 lin. ft.	840.00
Jackson	John Anderson	0.5	Earth and loose rock	0.76 per cu. yd.	7,000 cu. yd.	5,320.00
			Rock	1.44 per cu. yd.	2,600 cu. yd.	3,744.00
Linn	Ford Paving Co.	1.0	Earthwork	0.52 per cu. yd.	7,000 cu. yd.	3,640.00
			Guard rail	1.00 per lin. ft.	600 lin. ft.	600.00
			Temporary culverts	0.75 per lin. ft.	148 lin. ft.	111.00
			Concrete pavement	2.84 per sq. yd.	9,387 sq. yd.	26,659.08
Marion	F. Richardson	1.0	Earthwork	0.35 per cu. yd.	14,900 cu. yd.	5,215.00
			Guard rail	0.20 per lin. ft.	1,450 lin. ft.	290.00
			6-in. tile	0.10 per lin. ft.	200 lin. ft.	20.00
Marion	Shugart & Barnes	14.75	Earthwork	0.3768 per cu. yd.	119,863 cu. yd.	45,156.76
	Sam Bowers	3.25	Earthwork	0.345 per cu. yd.	39,540 cu. yd.	13,632.33
Marshall	R. F. Elzy	0.3	Earthwork	0.60 per cu. yd.	11,600 cu. yd.	6,960.00
Muscatine	Fuller Bros. & Co.	0.7	Earthwork	0.45 per cu. yd.	2,000 cu. yd.	900.00
			Placing temp. culv.	0.35 per ft.	172 lin. ft.	60.20
			Load'g and haul'g gravel	1.35 per cu. yd.	1,670 cu. yd.	2,254.00
			Building gravel surface	0.10 per cu. yd.	6,400 sq. yd.	640.00
O'Brien	C. F. Betz	12.0	Earthwork	0.3675 per cu. yd.	44,665 cu. yd.	16,414.39
Palo Alto	W. W. McCullough	6.0	Earthwork	0.27 per cu. yd.	29,038 cu. yd.	7,840.26
Palo Alto	Edw. Peterson Co.	18.0	Earthwork	0.315 per cu. yd.	62,726 cu. yd.	19,758.69
Sac	E. W. Beaman	16.0	Earthwork	0.32 per cu. yd.	64,000 cu. yd.	20,480.00
Sac	Phelan & Shirley	18.0	Earthwork	0.32 per cu. yd.	76,000 cu. yd.	24,320.00
Scott	Thos. Carey & Son	3.75	Earthwork	0.53 per cu. yd.	30,000 cu. yd.	15,900.00
			Rock	3.00 per cu. yd.	200 cu. yd.	600.00
			Clearing and grubbing	150.00 per acre	8 acres	1,200.00
Tama	E. J. Wilson	2.5	Earthwork	0.40 per cu. yd.	17,000 cu. yd.	6,800.00
Winnebago	Lamoreaux Bros.	9.0	Earthwork	0.275 per cu. yd.	65,000 cu. yd.	17,875.00
Woodbury	Buis & Olson	22.75	Earthwork	0.315 per cu. yd.	186,114 cu. yd.	58,625.91
			Guard rail	0.50 per lin. ft.	6,609 lin. ft.	3,304.50
			6-in. tile	0.20 per lin. ft.	1,495 lin. ft.	299.00
Woodbury	M. Moran	9.5	Earthwork	0.31⅓ per cu. yd.	60,440 cu. yd.	18,937.87
Woodbury	W. H. Dugan	9.4	Earthwork	0.365 per cu. yd.	59,893 cu. yd.	21,860.95
Woodbury	H. O. Ward	13.1	Earthwork	0.32 per cu. yd.	77,356 cu. yd.	24,753.92
Totals		204.25				$ 477,365.67

Total number of contracts approved, 34.
Total quantity of earthwork in approved contracts, 1,167,102 cu. yd.
Total cost of earthwork, $393, 242.50.
Average cost of earthwork, 33.69 cts. per cu. yd.

SCHEDULE EIGHT.

ROAD COMPLAINTS.

County	Filed	Adjusted	County	Filed	Adjusted
Adair	----	----	Jasper	----	----
Adams	----	----	Jefferson	----	----
Allamakee	1	1	Johnson	3	1
Audubon	2	1	Jones	----	----
Appanoose	1	----	Keokuk	1	----
Benton	2	1	Kossuth	----	----
Black Hawk	----	----	Lee	----	----
Boone	----	----	Linn	----	----
Bremer	1	1	Louisa	----	----
Buchanan	----	----	Lucas	----	----
Buena Vista	----	----	Lyon	----	----
Butler	1	----	Madison	1	1
Calhoun	----	----	Mahaska	2	1
Carroll	----	----	Marion	1	1
Cass	1	----	Marshall	----	----
Cerro Gordo	----	----	Mills	----	----
Cherokee	1	----	Mitchell	----	----
Cedar	1	----	Monona	----	----
Chickasaw	1	----	Monroe	1	1
Clarke	3	2	Montgomery	1	----
Clay	----	----	Muscatine	----	----
Clayton	----	----	O'Brien	----	----
Clinton	1	----	Osceola	----	----
Crawford	----	----	Page	----	----
Davis	2	----	Palo Alto	1	----
Dallas	----	----	Plymouth	----	----
Decatur	----	----	Pocahontas	1	----
Delaware	1	----	Polk	----	----
Des Moines	----	----	Pottawattamie	3	3
Dickinson	----	----	Poweshiek	----	---
Dubuque	----	----	Ringgold	1	----
Emmet	----	----	Sac	----	----
Fayette	----	----	Scott	----	----
Floyd	1	1	Shelby	1	1
Franklin	4	2	Sioux	----	----
Fremont	----	----	Story	1	----
Greene	----	----	Tama	----	----
Grundy	----	----	Taylor	----	----
Guthrie	1	----	Union	1	1
Hamilton	----	----	Van Buren	----	----
Hancock	----	----	Wapello	1	1
Hardin	1	1	Warren	1	----
Harrison	3	----	Washington	----	----
Henry	----	----	Wayne	3	2
Howard	1	----	Webster	1	----
Humboldt	1	1	Winnebago	----	----
Ida	----	----	Winneshiek	1	----
Iowa	----	----	Woodbury	3	----
Jackson	----	----	Worth	----	----
			Wright	2	1

No final report received on 9 complaints listed above as not adjusted.

SCHEDULE NINE.

COUNTY ROAD CHANGES.

County	Date filed with Commission	Date of action by Commission	Was Board's action approved?	Mi. to be added to county system	Mi. to be deducted from county system
Allamakee	11-17-17	5- 6-18	Yes	10.0	----
Allamakee	11-17-17	5- 6-18	Yes	4.5	----
Allamakee	11-17-17	5-16-18	Yes	9.0	----
Buena Vista	6-14-18	6-28-18	Yes	0.15	----
Butler	6-15-18	7-19-18	Yes	11.0	----
Cass	4-30-17	4-26-18	Deferred	7.0	----
Cass	5-22-18	6-28-18	Yes	1.0	2.0
Cass	5-22-18	6-28-18	Yes	------	----
Cass	5-22-18	6-28-18	Yes	------	----
Cass	5-22-18	6-28-18	Yes	------	----
Cass	5-22-18	6-28-18	Yes	------	----
Cerro Gordo	4-23-18	5- 6-18	Yes	3.4	----
Cherokee	4-15-18	4-26-18	Yes	1.5	----
Clarke	--------	4-16-18	No	1.5	----
Clarke	10-21-18	11- 6-18	Yes	1.9	----
Clayton	5-11-18	5-17-18	Yes	2.0	----
Clinton	8- 2-18	10-11-18	Yes	5.75	----
Dallas	--------	8-15-18	Yes	1.0	----
Dallas	4-18-18	4-26-18	Yes	------	----
Decatur	6-10-18	6-28-18	Yes	------	----
Decatur	6-10-18	6-28-18	Yes	------	----
Decatur	6-10-18	6-28-18	Yes	------	----
Delaware	4- 4-18	4-26-18	Yes	0.5	----
Delaware	9-26-18	--------	----	------	----
Des Moines	4- 4-18	4-16-18	Yes	.50	.50
Dickinson	4- 3-18	4-16-18	Yes	------	----
Dickinson	4- 3-18	4-16-18	Yes	------	----
Dickinson	6- 8-18	6-28-18	Yes	5.00	----
Emmet	6-11-18	6-28-18	Yes	2.50	----
Fayette	3- 6-18	3-29-18	Yes	------	----
Floyd	1-30-18	3-29-18	Yes	2.00	----
Franklin	5-20-18	5-31-18	Yes	------	----
Greene	9-12-18	9-13-18	Yes	0.12	----
Greene	9-12-18	9-13-18	Yes	0.25	----
Humboldt	9-23-18	10-11-18	Yes	2.00	----
Hancock	8-12-18	10-11-18	Yes	2.00	----
Hamilton	10-25-18	5-17-18	Yes	9.00	----
Hamilton	4- 9-18	5-17-18	Yes	7.00	----
Hardin	5-16-18	5-17-18	Yes	4.00	----
Iowa	6-15-17	9-20-18	Yes	5.25	----
Jasper	4-22-18	4-26-18	Yes	------	.25
Jackson	4- 9-18	4-16-18	Yes	------	----
Johnson	5-14-17	9-20-18	Yes	10.00	----
Johnson	8-10-18	9- 6-18	No	7.75	----
Johnson	8-10-18	9- 6-18	No	10.00	----
Johnson	8-10-18	9- 6-18	Yes	6.00	----
Jones	4- 9-18	5-31-18	Yes	------	----
Kossuth	4-15-18	4-16-18	Yes	0.50	----
Louisa	10-11-18	10-11-18	No	------	----
Lucas	12-31-17	4-16-18	No	------	----
Lucas	12-31-17	4-16-18	Yes	1.00	----
Lucas	5-27-18	6-28-18	Yes	------	----
Lucas	12- 5-18	12-19-18	Yes	0.62	----
Lyon	4-22-18	6-28-18	Yes	1.50	----
Mahaska	3-19-18	4-16-18	Yes	------	----
Mahaska	3-29-18	4-16-18	Yes	0.75	----
Marion	3- 4-18	3-16-18	Yes	0.25	----
Marion	3- 6-18	5-31-18	Yes	1.00	2.00
Marion	3-29-18	4-16-18	Yes	4.00	0.75
Marshall	4-17-18	4-26-18	Yes	0.75	0.50
Monona	5- 7-18	6-28-18	Yes	------	----
Muscatine	5-18-18	10-11-18	No	0.75	----
O'Brien	4-14-17	4-26-18	Yes	1.50	----
Osceola	2- 7-18	3-16-18	Yes	3.00	3.00
Palo Alto	3-25-18	4-26-18	No	3.00	6.00
Polk	1-24-18	9- 6-18	No	6.00	----
Polk	4-24-18	5- 6-18	Yes	------	----

SCHEDULE NINE—Continued.

County	Date filed with Commission	Date of action by Commission	Was Board's action approved?	Mi. to be added to county system	Mi. to be deducted from county system
Polk	7-17-18	7-19-18	Yes	2.50	----
Polk	7-17-18	7-19-18	Yes	3.00	----
Pottawattamie	9-26-18	6-28-18	Yes	2.50	1.00
Pottawattamie	12-13-17	2- 2-18	No	21.00	----
Sac	3-30-18	4-16-18	Yes	0.95	----
Scott	3-28-18	4-16-18	Yes	------	----
Scott	3-28-18	4-16-18	Yes	------	----
Wayne	9-27-18	11- 6-18	Yes	------	----
Wayne	5-28-18	5-31-18	Yes	------	----
Winnebago	10-24-17	9- 6-18	No	8.00	----
Winnebago	10-24-17	9- 6-18	No	2.00	2.00
Winnebago	10-24-17	9- 6-18	Yes	0.50	----
Winnebago	10-24-17	9- 6-18	Yes	2.00	1.75
Woodbury	5-11-18	5-17-18	Yes	0.62	----
Wright	6-12-18	6-28-18	Yes	------	----
Wright	8- 2-18	10-11-18	Yes	6.00	----
Wright	8-17-18	9- 6-18	Yes	0.13	----

Chapter VII—Federal Aid for Rural Highways

Thirty-nine Federal Aid road projects, involving the improvement of 555.5 miles of road, have been outlined. Thirty-three of these projects, including 457.74 miles of road and estimated to cost $2,193,930.00, have been formally submitted to the government. Twenty-seven of these projects have been approved by the government. Detailed surveys have been made for twenty-seven projects, including 402.21 miles of road. Detailed plans have been completed for sixteen projects including 252.55 miles of road, and plans for three other projects including 54.3 miles of road are nearing completion. One project, involving the paving of 4.07 miles, has been completed. Two other projects, involving the paving of one mile and the permanent grading of 71.75 miles, are partly constructed.

Traffic counts taken in thirty-six counties in different parts of the state and at eighty-seven different stations, show an average daily traffic on the inter-county road system of 300 vehicles per day. This traffic is classified as follows:

Motor driven	82.6%
Horse drawn	17.4%
Farm-town	47.1%
Inter-urban and inter-county	46.1%
Inter-state	6.7%

These percentages may be slightly changed by future traffic counts in the remaining counties, but it is believed that the counts already taken are fairly representative.

Inter-county Road System.

The Inter-county Road System connecting all county seats, all cities, all important towns, and including all the main thoroughfares of the state, has been selected by the boards of supervisors and the Highway Commission. This Inter-county Road System constitutes a "comprehensive system" of highways reaching all sections of the state and "giving equitable consideration to the claims of each county." Some details of this system remain to be adjusted, but the system as a whole has been designated. The completed system will contain about 6,000 miles.

Projects Outlined.

Thirty-nine road improvement projects located in as many different counties have been definitely outlined under the Federal Aid Road Law.These projects include the improvement of 555.5 miles of road, or an average of 14.24 miles per county.

Thirty-three of these projects have been submitted to the federal authorities, and twenty-seven have been approved by them, as follows:

County	Project No. Submitted in 1917	Approved or Pending
Cerro Gordo	1	Approved
Woodbury	2	"
Jefferson	3	"
Delaware	4	"
Buchanan	5	"
Ringgold	6	"
Marion	7	"
Decatur	8	"
Johnson	9	"
Warren	11	"
Dallas	12	"
Calhoun	10	"
Webster	13	"
Harrison	14	"
Mills	15	"
Montgomery	16	"
Clinton	18	"
Monroe	20	"
Jackson	21	"
Linn	22	"
Polk	24	"
Black Hawk	25	Pending
Adams	26	Approved
Appanoose	27	"
Wright	29	"
Winnebago	30	Pending
Howard	31	Approved
Des Moines	32	Pending
Clarke	33	"
Keokuk	34	Approved
Chickasaw	35	"
Floyd	41	Pending
Wapello	42	"

These thirty-three projects include the improvement of 457.74 miles of road. Of this mileage 271.25 miles are to be built to finished grade but not surfaced; 171.37 miles are to be surfaced

with gravel, and 15.12 miles are to be paved. The preliminary estimate is distributed as follows:

To be paid from Federal Aid Funds	$ 709,161.48
To be paid from State Aid Funds	709,161.48
To be paid from County Funds	775,607.94
	$2,193,930.90

A detailed statement of projects No. 1 to No. 21 inclusive appears in the report for 1917. Project No. 19 as described therein was disapproved by the Commission, and a new project has been tentatively outlined extending eastward from Grundy Center through Reinbeck to the east county line. This project will include about five miles of gravel surfacing or a short section of pavement. A detailed statement of the other eighteen projects outlined follows:

Project No. 22, Linn County. Length 17.8 miles. Located on the cutoff to the Lincoln Highway east of Cedar Rapids, the boulevard between Cedar Rapids and Marion, and the Marion-Manchester Road. The improvement proposed consists of building the entire mileage to finished grade, surfacing 10.5 miles with gravel, and surfacing 2.05 miles with pavement. Project statement approved by Secretary of Agriculture, September 28, 1918.

Project No. 23, Marshall County. Length 15.33 miles. Located on the inter-county road from Marshaltown west to the county line. The improvement proposed consists of building the road to finished grade and surfacing with gravel. Project statement not yet submitted to the Federal Department.

Project No. 24, Polk County. Length 7.75 miles. Located on the Jefferson Highway from Des Moines to the Warren County line; also on the Ames-Des Moines road extending south five miles from the north county line. The improvement proposed consists of building the entire project to finished grade and surfacing same with gravel. Project statement approved by Secretary of Agriculture, October 18, 1918.

Project No. 25, Black Hawk County. Length 4.08 miles. Located on the Whitney Road between Waterloo and Cedar Falls. The improvement consists of building the road to finished grade and surfacing the same with a pavement 20 feet wide. Project statement submitted to the Federal Department, June 3, 1918.

Project No. 26, Adams County. Length 10 miles. Extends west from Corning to the county line. The improvement consists of constructing the road to finished grade. Project statement approved by the Secretary of Agriculture, October 8, 1918.

Project No. 27, Appanoose County. Length 11 miles. Located on the Waubonsie Trail, 5½ miles east and 5½ miles west of Centerville. The improvement consists of building the road to finished grade. Project statement approved by the Secretary of Agriculture, October 7, 1918.

Project No. 28, Sioux County. Length 24.25 miles. Extends from Sioux Center to Maurice and from Orange City to Hawarden. The improvement proposed consists of building the road to finished grade. Project statement has not yet been submitted to the Federal Department.

Project No. 29, Wright County. Length 14.88 miles. Located on the Eagle Grove-Goldfield road, the Goldfield-Clarion road, and the Goldfield-Belmond road. The improvement proposed consists of reshaping the grades and surfacing the entire project with gravel. Project statement approved by the Secretary of Agriculture, November 4, 1918.

Project No. 30, Winnebago County. Length 7:5 miles. Located on the Forest City-Thompson road. The improvement proposed consists of building 4 miles to finished grade, reshaping 3.5 miles which are now built to finished grade, and surfacing the whole project with gravel. Project statement submitted to the Federal Department, November 15, 1918.

Project No. 31, Howard County. Length 10.5 miles. Located on the Cresco-Riceville road extending west from Cresco. The improvement proposed consists of building the road to finished grade and surfacing same with gravel. Project statement approved by the Secretary of Agriculture, November 1, 1918.

Project No. 32, Des Moines County. Length 2.82 miles. Located on the Agency Road and the Blue Grass Road extending west from Burlington. The improvement proposed consists of building the road to finished grade and surfacing with a pavement 9 feet wide. Project statement was submitted to the Federal Department, December 5, 1918.

Project No. 33, Clarke County. Length 9.6 miles. Located on the Jefferson Highway extending south from Osceola to the county line. The improvement proposed consists of building the road to finished grade. Project statement was submitted to the Federal Department, November 11, 1918.

Project No. 34, Keokuk County. Length 12.25 miles. Located on the White Pole Road from the west county line through Sigourney to a point 1½ miles east of that town. The improvement proposed consists of building the road to finished grade. Project statement approved by the Secretary of Agriculture, October 9, 1918.

Project No. 35, Chickasaw County. Length 13.07 miles. Located on the road extending south from New Hampton to the county line. Also extending three miles north from New Hampton. The proposed improvement consists of building the road to finished grade and surfacing same with gravel. Project statement approved by the Secretary of Agriculture, October 22, 1918.

Project No. 36, Palo Alto County. Length 11.93 miles. Located on the North Iowa Pike extending west from Emmetsburg to the county line. The improvement proposed consists of building 3.93 miles to finished grade, reshaping 8 miles, and surfacing the whole road with gravel. Project statement has not yet been submitted to the Federal Department.

Project No. 41, Floyd County. Length 11.72 miles. Located on the North Iowa Pike extending from Charles City to Rudd. The improvement proposed consists of building the road to finished grade and surfacing same with gravel. Project statement was submitted to the Federal Department, December 3, 1918.

Project No. 42, Wapello County. Length 10.8 miles. Located on the Bloomfield-Ottumwa road extending south from Ottumwa to the county line. Also on the Air Line road extending west from Ottumwa 3 miles. The improvement proposed consists of building the road to finished grade. Project statement was submitted to the Federal Department, November 15, 1918.

Project No. 44, Cass County. Length 12 miles. Located on the White Pole Road from Anita to Atlantic. The improvement proposed consists of building the road to finished grade. Project statement has not yet been submitted to the Federal Department.

Surveys.

Detailed surveys have been completed on twenty-seven projects, including 402.21 miles of road, as follows:

Surveyed in 1917.

County	Project No.	County	Project No.
Cerro Gordo	1	Marion	7
Woodbury	2	Johnson	9
Delaware	4	Warren	11
Buchanan	5		

Surveyed in 1918.

County	Project No.	County	Project No.
Jefferson	3	Monroe	20
Ringgold	6	Linn	22
Decatur	8	Polk	24
Calhoun	10	Black Hawk	25
Dallas	12	Appanoose	27
Webster	13	Sioux	28
Harrison	14	Howard	31
Mills	15	Des Moines	32
Montgomery	16	Keokuk	34
Clinton	18	Chickasaw	35

Seven of these surveys, involving 134 miles of road, were made in 1917. The remaining twenty surveys, involving 268.21 miles of road, were made in 1918. The surveys for the projejct in Cerro Gordo, Johnson, Clinton, and Polk Counties, involving 41.23 miles of road, were made by the respective county engineers. The remainder of the surveys have been made by cooperation between the Commission and the counties. The Commission usually furnished a chief of party and one assistant, the county furnishing the transportation and the remainder of the help.

Plans.

Plans have been completed for sixteen projects involving 252.55 miles of road, as follows:

County	Project No.	County	Project No.
Cerro Gordo	1	Johnson	9
Woodbury	2	Calhoun	10
Jefferson	3	Dallas	12
Delaware	4	Warren	11
Buchanan	5	Webster	13
Ringgold	6	Montgomery	16
Marion	7	Monroe	20
Decatur	8	Black Hawk	25

Plans for three other projects, located in Harrison, Clinton, and Linn Counties respectively, are nearing completion. These projects include 54.3 miles of road.

Construction.

One project (located in Cerro Gordo County) has been completed. Two projects (located in Woodbury and Marion Counties) have been contracted and are now partially completed. Lettings were held on two projects located in Delaware and Buchanan Counties) but no bids were received. Lettings would have been held on a number of other projects had it not been for the existing war conditions.

A detailed statement of each of the three projects on which construction has been started, follows:

Project No. 1, Cerro Gordo County.

The project included the grading and paving of 4.07 miles of the Mason City-Clear Lake Road. The pavement is of concrete and is sixteen feet wide. The contract was let September 4, 1917, to the Bryant Asphalt Paving Company at Waterloo. The road was completed and dedicated August 29, 1918. A statement of the completed cost of the project follows:

Construction.

Contract Price.

Earthwork, 14,162 cu. yd. at $0.50	$ 7,081.00	
Overhaul, 12,378 cu. yd. stations, at $0.02	247.56	
Clearing and grubbing	148.42	
Lateral drains, 4 at $1.50	6.00	

Concrete pavement (not including cement) 38,352.4 sq. yd. at $1.62		62,130.89
Cement and freight on same, 12,418.75 bbl. at $1.873 per bbl.		23,259.57
		$ 92,873.44

Deductions.

Use of county's grader	$ 15.00	
Difference in cost between stone specified and gravel used on last mile	1,571.82	
Total deductions		$ 1,586.82
Total net cost of construction		$ 91,286.62

Engineering.

Surveys, plans, specifications, traffic county, letting contract, etc.	$ 351.97	
Inspection, setting stakes, general supervision, and administration	1,459.30	
Total engineering cost		$ 1,811.27
Total cost of project		$ 93,097.89

Payments.

Paid by Federal Government	$ 22,453.75
Paid by State	22,453.75
Paid by Cerro Gordo County	48,190.39
	$ 93,097.89

Project No. 2, Woodbury County.

This project includes building 54.75 miles to finished grade and paving one mile with concrete 16 feet wide. This project is located on the Sioux City-Correctionville Road and the Sioux City-Smithland Road. A letting was held July 23, 1918. Contracts were let for part of the grading work. The remainder of the grading was re-advertised and let on August 5th. No bids were received on the mile of concrete pavement. The contracts awarded were as follows:

Buis & Olson, St. Joseph, Mo.

Earthwork, 186,114 cu. yd. at $0.315	$ 58,625.91	
Guard rail, 6,609 lin. ft. at $0.50	3,304.50	
6-inch tile in place, 1,495 lin. ft. at $0.20	299.00	$ 62,229.41

M. Moran, Moville, Ia.

Earthwork, 60,440 cu. yd. at $0.31½	$ 18,937.87	$ 18,937.87

W. H. Dugan, Omaha, Neb.

Earthwork, 59,893 cu. yd. at $0.365	$ 21,860.95	$ 21,860.95

R. C. Ward, Correctionville, Ia.

Earthwork, 77,356 cu. yd. at $0.32	$ 24,753.92	$ 24,753.92

Total amount of contract	$127,782.15
Total earthwork included in contracts	383,803 cu. yd.
Average price of earthwork	32.36 cts. per cu. yd.

No contracts were let for the mile of concrete, nor for the tile drainage or guard rail on the Smithland Road. These items will be constructed later when conditions are more favorable.

To date the earthwork is 28.6 per cent completed, or 110,000 cubic yards have been moved.

Project No. 7, Marion County.

This project includes building 18.0 miles to finished grade. A letting was held August 8th, at which time contracts were awarded as follows:

Shugart & Barnes, Nevada, Ia.

Earthwork, 29,723 cu. yd. at $0.375	$ 11,146.13
Earthwork, 39,753 cu. yd. at 0.398	15,921.69
Earthwork, 50,387 cu. yd. at 0.359	18,088.94

Sam Bowers, Ames, Ia.

Earthwork, 39,514 cu. yd. at $0.345	$ 13,632.33
Total earthwork contracts	$58,789.09
Total quantity of earthwork	159,377 cu. yd.
Average price of earthwork	$ 0.369 per cu. yd.

No contracts were let for the tile drainage nor the guard rail. These items will be let at a later date or built by day labor.

The earthwork contracts are 68.5 per cent completed, that is, 109,079 cubic yards of material has been moved.

Traffic Count. (Refer to Schedule Ten.)

In preparing the data for submitting projects to the Federal Department, traffic was counted on the roads included in nineteen projects, requiring 40 counting stations. The average daily traffic for all of these stations was 260 vehicles or units of traffic. This traffic was classified:

According to motive power,

Motor driven	78.5%
Horse drawn	21.5%

According to origin and object or destination,

Farm-Town	47.7%
Inter-urban	30.4%
Inter-county	15.0%
Inter-state	6.9%

Farm-Town. All traffic from farm to town or from town to farm, or from one farm to another, is classified as "farm-town" traffic. This includes all purely local traffic.

2. Inter-urban. All traffic starting from a town and going to another town within the same county, or to another town in another county and not over twenty-five miles distant; also all traffic starting from a town and passing out into the country, then returning to the town from whence it came without having touched any other town, or stopped on business or to visit at a farm, is classified as "inter-urban" traffic.

3. Inter-county. All traffic starting in one county and traveling to a point in another county more than twenty-five miles distant, is classified as "inter-county" traffic.

4. Inter-state. All traffic passing from one state to a point in another state, which is more than twenty-five miles distant, is classified as "inter-state" traffic.

It will be noted that these classifications differ from the classifications used in 1917. The 1918 class "Farm-Town" includes the two 1917 classes "Farm" and "Town." The 1917 class "Inter-urban" includes both the 1918 classes "Inter-urban" and "Inter-county." The 1918 class "Inter-state" is the same as the 1917 class "Tourist."

A comparison of the traffic data collected in 1917 and 1918 follows:

	1917	1918
Average daily traffic	339 units	260 units
Motor driven	86.1%	78.5%
Horse-drawn	13.9%	21.5%
Farm-town	46.6%	47.7%
Inter-urban	46.9%	30.4%
Inter-county	.....	15.0%
Inter-state	6.5%	6.9%

SCHEDULE TEN.

SUMMARY OF TRAFFIC DATA ON FEDERAL AID PROJECTS.

County	Project No.	No. of counting stations	Total Daily Per Station		Average Traffic		Motor Driven		Horse Drawn	
			No. of units	No. of passengers			No. of units	Per cent	No. of units	Per cent
Adams	26	1	96	212			51	53.1	45	46.9
Appanoose	27	2	347	878			251	72.4	96	27.6
Sioux	28	4	159	382			121	76.1	38	23.9
Wright	29	3	195	558			181	92.8	14	7.2
Winnebago	30	1	144	384			106	73.6	38	26.4
Howard	31	1	238	628			173	72.7	65	27.3
Des Moines	32	1	358	950			293	81.8	65	18.2
Clarke	33	2	251	696			148	59.0	103	41.0
Keokuk	34	2	241	556			185	76.8	56	23.2
Chickasaw	35	2	199	520			146	73.4	53	26.6
Palo Alto	36	2	277	783			229	82.6	48	17.4
Plymouth	38	3	403	1,171			369	91.6	34	8.4
Floyd	41	3	216	609			171	79.2	45	20.8
Wapello	42	2	208	461			118	56.8	90	43.2
Cass	44	2	557	1,389			505	90.6	52	9.4
Linn	22	4	310	689			237	76.5	73	23.5
Marshall	23	2	256	569			218	85.2	38	14.8
Polk	24	2	310	793			230	74.2	80	25.8
Black Hawk	25	1	180	313			142	78.9	38	21.1
Average daily traffic			260	657			204	78.5	56	21.5
Total number of stations		40								

SCHEDULE TEN—(CONT.)

County	Classification of Average Daily Traffic According to Origin or Purpose							
	Farm-Town		Inter-Urban		Inter-County		Inter-State	
	No. of units	Per Cent	No. of units	Per Cent	No. of units	Per Cent	No. of units	Per Cent
Adams	72	75.0	16	16.7	1	1.0	7	7.3
Appanoose	201	57.9	118	34.0	16	4.6	12	3.5
Sioux	97	61.0	35	22.0	17	10.7	10	6.3
Wright	66	33.8	97	49.7	29	14.9	3	1.6
Winnebago	94	65.2	42	29.2	4	2.8	4	2.8
Howard	137	57.6	85	35.7	11	4.6	5	2.1
Des Moines	150	41.9	145	40.5	53	14.8	10	2.8
Clarke	87	34.7	75	29.9	46	18.3	43	17.1
Keokuk	134	55.6	52	21.6	15	6.2	40	16.6
Chickasaw	123	61.8	54	27.2	18	9.0	4	2.0
Palo Alto	132	47.7	50	18.0	71	25.6	24	8.7
Plymouth	85	21.1	115	28.6	175	43.5	28	6.8
Floyd	72	33.4	88	40.7	39	18.1	17	7.8
Wapello	166	79.8	26	12.5	11	5.3	5	2.4
Cass	243	43.6	183	32.8	80	14.4	51	9.2
Linn								
Marshall								
Polk								
Black Hawk								
Average per station	124	47.7	79	30.4	39	15.0	18	6.9

Note: Traffic for counting stations in Linn, Marshall, Polk and Black Hawk counties not classified as to origin or purpose.

Chapter VIII—Work of the District Engineers

The district engineers have spent 1,222 days in the various counties assisting in the county and township highway work. They have attended twenty-eight lettings for the improvement of 272.1 miles of road costing $580,944.45; 104 lettings for the construction of 1,714 bridges costing $2,226,433.00, and seventy-five lettings for bridge and road material. The profiles for 321 miles of road have been examined in the field to pass upon the improvement contemplated. Eighteen federal aid road projects involving 206.56 miles of road have been examined in detail. Thirty-six complaints regarding the condition of the highways have been investigated, and a number of meetings have been held for the purpose of explaining the annual report blanks to the county engineers.

The number of days spent in the field are classified as follows:

	1916	1917	1918
Examination of bridge sites	84	85	58
Attending bridge lettings	138	101	118
Attending material lettings	79	67	69
Inspection and supervision bridge work	163	202	180
Examination of emergency work	12	13	2
Special assignments	2	....	....
Attending road lettings	44	38	30
Approval of grade lines	166	125	60
Inspection and supervision road work	99	83	67
Inspection of proposed changes in county road system	37	51	46
Investigation of complaints	77	63	45
Explanation of report blanks	93	56	66
Railroad Crossing work	....	35	24
Federal Aid road work	....	139	243
Unclassified	182	111	214
	1,177	1,169	1,222

It will be noted that the time spent in the field in 1918 by the six district engineers is only fifty-three days more than the time spent in the field in 1917 by five district engineers. This is accounted for as follows: This report covers twelve months beginning December 1, 1917. The sixth district was not estab-

lished until March 18, 1918, when more than one-fourth of the year was gone. District Engineer Martin was in the army from January 1st to March 18th, during which time there was no district engineer in his district. District Engineer Phelps resigned August 15th and District Engineer Lee, who took his place, was not appointed until September 24th. District Engineer Coykendall resigned February 1st and District Engineer Dunn was not appointed until February 12th.

It has been necessary to cover the field work on the districts left at periods without a district engineer, from the central office force. The impossibility of maintaining competent engineers in each district continuously because of the demands of the Federal service has at times seriously interfered with prompt and efficient action by the Commission on matters submitted by the county boards.

Re-organization of Districts.

At the beginning of 1918 it was evident that an increase should be made in the number of district engineers. The counties needed additional help, due to the fact that many of the experienced county engineers had gone into the army. The Federal Aid road work was demanding more and more of the district engineers' time. The number of district engineers was accordingly increased from five to six and the districts were reorganized. The headquarters of the sixth district was located at Cedar Rapids, the other district headquarters remaining as before.

Changes in Personnel.

District Engineer C. Coykendall resigned February 1st to become county engineer of Polk County. County Engineers H. L. Phelps of Cedar County, and E. W. Dunn of Hardin County, were appointed to fill the vacancies. In July Mr. Phelps resigned to enter the army and former county engineer, Will M. Lee, of Winneshiek County, was appointed to fill the vacancy.

Districts.

A statement of the counties included in each district, the location of headquarters, and the district engineer assigned to each district follows:

FIRST DISTRICT.

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

Boone	Dallas	Humboldt	Madison
Calhoun	Greene	Jasper	Story
Carroll	Hamilton	Polk	Warren
Crawford	Hardin	Marshall	Webster

SECOND DISTRICT.

Engineer, W. H. Root, Headquarters, Mason City.

Allamakee	Cerro Gordo	Franklin	Mitchell
Black Hawk	Chickasaw	Hancock	Winnebago
Bremer	Clayton	Howard	Winneshiek
Butler	Floyd	Kossuth	Worth
		Wright	

THIRD DISTRICT.

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

Buena Vista	Emmet	O'Brien	Pocahontas
Cherokee	Ida	Osceola	Sac
Clay	Lyon	Palo Alto	Sioux
Dickinson	Monona	Plymouth	Woodbury

FOURTH DISTRICT.

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

Adair	Clarke	Harrison	Pottawattamie
Adams	Decatur	Mills	Ringgold
Audubon	Fremont	Montgomery	Shelby
Cass	Guthrie	Page	Taylor
		Union.	

FIFTH DISTRICT.

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

Appanoose	Jefferson	Lucas	Van Buren
Davis	Keokuk	Mahaska	Wapello
Des Moines	Lee	Marion	Washington
Henry	Louisa	Monroe	Wayne

SIXTH DISTRICT.

Engineer, Will M. Lee, Headquarters, Cedar Rapids.

Benton	Delaware	Iowa	Linn
Buchanan	Dubuque	Jackson	Muscatine
Cedar	Fayette	Johnson	Poweshiek
Clinton	Grundy	Jones	Scott
		Tama	

Summary of Field Work for each District Engineer.

C. Coykendall, Dec. 1, 1917 to Feb. 1, 1918. Attended five material lettings, one bridge letting for fifty-three structures costing $31,000.00; one road letting for work costing $10,949.00; investigated two federal aid projects; spent two days in taking field measurements for bridges, one day on field examination of road profiles, and five days in the supervision and inspection of bridge and road work. A total of thirty-six days was spent in the field.

W. H. Root, Dec. 1, 1917 to Dec. 1, 1918. Attended eighteen material lettings, eighteen bridge lettings for seventy-seven structures costing $241,993.00; five road lettings for 24.5 miles

of road costing $41,736.91; investigated six federal aid projects; investigated ten road complaints; spent twenty-two days in taking field measurements for bridges; eleven days on field examination of road profiles, and fifty days in the supervision and inspection of bridge and road work. A total of 259 days has been spent in the field.

W. F. Beard, Dec. 1, 1917 to Dec. 1, 1918. Attended seventeen material lettings, twenty-four bridge lettings for 412 structures costing $578,660.00; nine road lettings for 80.15 miles of road costing $151,479.14; investigated one federal aid project; investigated two road complaints; spent ten days taking field measurements for bridges, sixteen days in field examination of road profiles, and thirty-seven days in the inspection and supervision of bridge and road work. A total of 221 days has been spent in the field.

L. M. Martin, Dec. 1 to 31, 1917 and March 18 to Dec. 1, 1918. Attended four material lettings, nine bridge lettings for 107 structures costing $159,762.00; investigated three federal aid projects; investigated twelve road complaints; spent six days taking field measurements for bridges; three days on field inspection of road profiles, and thirty-eight days in the supervision and inspection of bridge and road work. A total of 162 days was spent in the field.

J. S. Morrison, Dec. 1, 1917 to Dec. 1, 1918. Attended twelve material lettings, nineteen bridge lettings for 27 structures costing $349,453.00; three road lettings for 19.00 miles costing $65,304.00; investigated four federal aid projects; investigated four road complaints; spent ten days in taking field measurement for bridges, four days in field examination of road profiles, and fifty-three days in the supervision and inspection of road and bridge work. A total of 240 days has been spent in the field.

H. L. Phelps, March 19 to August 15, 1918. Attended three material lettings, sixteen bridge lettings for 317 structures costing $301,313.00; two road lettings for two miles of road costing $44,204.00; investigated one road complaint; spent seven days in taking field measurements for bridges, nine days on field examination of road profiles, and twenty-one days in the supervision and inspection of bridge and road work. A total of eighty-six days was spent in the field.

E. W. Dunn, February 12 to Dec. 1, 1918. Attended twelve material lettings, sixteen bridge lettings for 422 structures costing $432,556.00; seven lettings for 139.45 miles of road costing $261,949.43; investigated two federal aid projects; investigated five road complaints; spent twenty-three days on field examination of road profiles, and thirty-two days in the supervision and inspection of bridge and road work. A total of 189 days were spent in the field.

Will M. Lee, Sept. 24 to Dec. 1, 1918. Investigated one federal aid project; investigated two complaints; spent ten days in the supervision and inspection of bridge and road work, and ten days in general administrative work. A total of thirty days was spent in the field.

SCHEDULE ELEVEN.

DAYS SPENT IN EACH COUNTY BY DISTRICT ENGINEERS.

County	Days	County	Days
Adair	7	Johnson	7
Adams	8	Jones	9
Allamakee	7	Keokuk	21
Appanoose	13	Kossuth	10
Audubon	8	Lee	12
Benton	6	Linn	26
Black Hawk	14	Louisa	10
Boone	12	Lucas	12
Bremer	15	Lyon	10
Buchanan	9	Madison	9
Buena Vista	8	Mahaska	24
Butler	12	Marion	16
Calhoun	6	Marshall	15
Carroll	9	Mills	14
Cass	23	Mitchell	11
Cerro Gordo	21	Monona	15
Cherokee	10	Monroe	14
Cedar	9	Montgomery	18
Chickasaw	9	Muscatine	6
Clarke	11	O'Brien	15
Clay	6	Osceola	4
Clayton	11	Page	6
Clinton	12	Palo Alto	20
Crawford	8	Plymouth	15
Dallas	19	Pocahontas	9
Davis	9	Polk	23
Decatur	11	Pottawattamie	19
Delaware	9	Poweshiek	8
Des Moines	19	Ringgold	5
Dickinson	9	Sac	9
Dubuque	21	Scott	5
Emmet	6	Shelby	9
Fayette	5	Sioux	23
Floyd	10	Story	3
Franklin	12	Tama	9
Fremont	7	Taylor	3
Greene	12	Union	10
Grundy	10	Van Buren	6
Guthrie	8	Wapello	13
Hamilton	14	Warren	12
Hancock	12	Washington	5
Hardin	19	Wayne	9
Harrison	11	Webster	8
Henry	7	Winnebago	8
Howard	14	Winneshiek	15
Humboldt	2	Woodbury	30
Ida	10	Worth	9
Iowa	19	Wright	18
Jackson	7		
Jasper	12	Total	1,151
Jefferson	16		

Chapter IX—Roads at State Institutions

At the beginning of the season, the Board of Control of State Institutions requested the Supervisor of State Roads to do no more work during 1918 than was necessary. For this reason, the road work at the various institutions was not carried on as previously planned. In fact, little or no new work was done except that which had been started the year before, and was in such condition that it could not be abandoned. During the coming season however, it is anticipated that the road building at these places will proceed at the usual rate.

Iowa State College:

A heavy flood in June washed out 150 feet of grade on the North Campus road; also about 100 feet on the Lincoln Highway between the College and the City of Ames. For four days, wheel traffic between the two was absolutely cut off except by a very round about trip of a dozen miles or more. An emergency repair gang was immediately organized and the damage repaired. This repair work involved the building of 120 feet of temporary bridge, and rebuilding approximately 100 feet of grade—a 26-foot roadway in a 6-foot fill.

In addition to these flood repairs, the entire system of roads at this place, was reshaped with a heavy grader, drawn by a 10-ton steam roller. These roads, except for about one-quarter of a mile, have all been gravelled, and this operation of blading and rolling put all the roads in excellent condition. A patrolman is employed here who devotes his entire attention to the care of the roads. In addition to his dragging and blading, he finds time to haul considerable gravel—it being the plan to have this patrolman put on a second course of gravel in conjunction with his regular work. The following expenditures were made at this Institution:

Flood repairs and general repairs, including part of patrolman's charge	$3,530.40
Patrolman on general maintenance	927.92
Finished grade, sloping and shaping	200.40
Surfacing with gravel; second course partially due to flood	516.09
Tiling-drainage	5.10
Equipment and repairs	92.57
Guard rail, 1,620 feet	350.81
Engineering	8.00
Oiling roads	230.92
	$5,862.21

State Hospital—Cherokee:

In 1917, a contract was let to Geo. W. Condon for grading one mile of road on the South boundary of the State Farm, extending from the city limits one mile west. This mile is the last of a three and one-half (3½) mile system which is all now built to a permanent grade, some of which has been extremely heavy work. This last mile which was completed this season was unusually heavy work and involved the moving of almost 30,000 cubic yards, most of which was moved in the first three-quarter (¾) mile. The total cost of improving this mile is as follows:

27,193 cu. yds. of earth @ .254c	$6,907.02	
1,265 cu. yds. of loose rock @ 75c	948.75	
7 cu. yds. of solid rock @ $2.00	14.00	
1.69 acres, clearing and grubbing @ $175	295.75	
1.06 acres, clearing @ $60	63.00	
		$8,229.12
Cost of 3 concrete culverts		918.55
Total cost		$9,147.67
Of this amount, there was spent on this road during the season of 1917		$6,051.55
Balance spent in 1918		$3,096.12

In addition to this, the following expenditures were made:

Dragging	$ 150.00
Repairs	308.78
Patrol	214.75
Guard rail, 4,000 feet	1,838.77
Gravelling 2½ miles of road, labor, cost	1,633.66
Miscellaneous	17.27
Engineers' salary and expenses	524.25
	$4,687.48

The work of gravelling was halted on account of cold weather but will be continued in the spring. There remains but three-quarters (¾) of a mile yet to gravel, and when finished, the en-

tire system of roads at this place will have been permanently graded and gravelled.

There are some very high grades on this road system—fills twenty to thirty feet in height and have all been provided with a good substantial guard rail, true to alignment and grade, and painted white.

Colony for Epileptics—Woodward:

In the past three seasons, the five (5) miles of road here have all been permanently graded and one course of gravel put on all except for three-quarter (¾) of a mile. The grading work was done nearly all by contract but the gravel was placed by day labor using convicts, farm hands from the State Farm.

The first course of gravel was obtained from a pit located on the state land, and while it made a very good material for a first course, was not considered quite right for wearing quality. A second course was applied this season, using gravel from the Flint pit at Granger. This gravel is a much better grade and has excellent wearing qualities. A contract for gravelling about three (3) miles was let to the Deven Construction Company of Omaha.

Prior to the gravelling operation, the road bed was made ready and re-shaped, using a heavy blade grader drawn by a ten-ton roller, which put the road in first class condition to receive the second course. The expenditures are as listed below:

Gravelling Contract.

Cost of gravel	$1,715.84	
Freight on same	1,949.62	
Hauling contract	2,864.63	
Spreading	406.30	
		$6,936.39
Shaping roadbed, rolling—from General Maintenance	$1,095.22	
		$8,031.61
Dragging	$ 394.15	
Repairs	441.00	
Patrol	49.40	
Tiling	3.56	
Equipment	35.50	
		923.61
		$8,955.22

School for the Deaf—Council Bluffs:

The following expenditures are listed below:

Dragging	$ 90.75
Repairs	92.00
	$ 182.75

An appropriation of $6,000.00 was made by the Thirty-Seventh General Assembly for paving from the city limits west to the Institution gateway, providing further that convicts be used for this work. Owing to the high prices and difficult labor conditions, it has been deemed wise to put off this work until 1919, at which time, the paving will undoubtedly be constructed, and additional funds provided to pave entirely in front of ground.

Iowa Soldiers' Orphans' Home—Davenport:

Surveys and plans have been made here for the improvement of approximately one and one-half (1½) miles of road, the estimated cost of which is $6,798.00.

This sum has been appropriated for the improvement of these roads and bids were taken in connection with some grading work the county was letting. The price bid for the work on the state roads was 63c per cubic yard, which was considered somewhat excessive even for this year. Even at this price, the contract would have been approved but the contractor could not cover this work this season, and undoubtedly next season will see lower prices.

State Hospital for Insane—Mt. Pleasant:

The work that was started here in 1917 was finished during this season—all on the day labor basis, under the supervision of the Institution Steward, Ralph Hueling. Satisfactory results were produced and the roads put in a very satisfactory condition. Total expenditures for this entire work, 1917 and 1918, are as follows:

Concrete culverts	$ 980.44
Grading	2,415.19
Engineering	14.84
	$3,410.47
	$1,448.52
Spent in 1917	1,961.94
Spent in 1918	11.25
Repairs	
	$1,973.19

State Penitentiary—Ft. Madison:

Work, on the improvement of one-half (½) mile of road, started in 1917, under the management of the warden of the penitentiary who used convicts for the work, his pay to be the amount of the engineer's estimate which was $2,700.00. At the beginning of 1918, this work had nearly all been completed but final payment has not been made. There will be due for this work, the sum of $1,930.12 when settlement is finally made. (See 1917 Report)

Custodial Farm—Clive:

Surveys have been made of the entire road system and during the coming season, it is contemplated that the greater part of the road system here will be improved. The cost of the survey of three (3) miles amounted to $244.68.

State Hospital for Inebriates—Knoxville:

The Thirty-Seventh General Assembly made appropriation for $11,000.00 to cover paving from the city limits to the cemetery past the State grounds. The work was let to Akin & Flutter in conjunction with one-half (½) mile of city work, all one project. The cost is distributed as follows:

3,814.33 cu. yds. concrete paving @ $2.09	$ 7,971.95
2,921.5 ft. of curb and gutter @ 62c	1,811.33
26 ft. header curb @ 35c	19.60
2 street inlets @ $50.00	100.00
42 ft. of 12-inch drain @ $1.25	52.50
924.7 cu. yds. extra grading @ 60c	554.82
Force account work, extras including 15%—culverts	400.10
	$ 10,910.30
Engineering, paid from General Maintenance	326.53
	$ 11,236.83

Institutions—General:

Each year inspection trips are made to the various State institutions and arrangement made either for construction or other improvements. This work has been under the supervision of an engineer from the State Highway Commission, who spends parts of his time on this work.

In addition, there is now employed, a good practical road builder, skillful in the handling of road maintenance machinery, whose duty during the coming season will be to visit as many institutions as possible, taking with him the necessary road machinery and actually spend time enough at each place to put the roads in good condition. The greater part of his time will be spent on roads that have been permanently graded and gravelled, but in addition, he will have time to visit other places that require attention.

Under this head—Institutions General—there was spent, during the year, $289.73.

Chapter X. Drainage Department.

Purpose:

In the preparation of bridge and culvert plans, one of the main features governing the design is the amount of flood flow which the structure will be called upon to carry. Very meager data is on hand regarding the size and frequency of floods, particularly on the smaller streams. The Department of Drainage Investigation was organized, primarily to obtain this information.

The flood flow of every stream depends first of all upon the rainfall. The size, shape and slopes of the area affect the run-off. The amount of loss from evaporation and plant life as well as the natural storage in ponds and swamps, and in the soil itself, all influence the size of floods. It is evident then that the effect of many and varying factors must be considered before the most economical size of bridge opening can be intelligently decided upon.

Organization of Department:

The Department as organized, consists of one engineer who devotes his time to the various investigations undertaken. From time to time such technical and other help has been employed as has been necessary.

Work Done:

During the year, a very complete compilation has been made of all the available rain fall records in the State which shows not only the amount of rainfall but also the average frequency with which storms of different intensities have occurred.

In co-operation with the U. S. Geological Survey, seven new stream gaging stations have been established on rivers in the south and west part of the state. These stations supplement those which the State Geological Survey has helped maintain in the eastern part of the state. The equipment for these stations has been furnished by the Federal Department, and the methods used in measuring the stream flow are those developed by that department.

The new stations are located as follows:

RIVER	TOWN	COUNTY	OBSERVER
Grand	Davis City	Davis	W. L. Severe
Nodaway	Clarinda	Page	Floyd Kelley
Seven Mile Creek	Villisca	Montgomery	G. S. Dunn
Nishnabotna	White Cloud	Mills	Chas. Nones Hammock
Boyer	Logan	Harrison	C. F. Peckenpaugh
Little Sioux	Correctionville	Woodbury	Edwin H. Worrell
Nodaway	Red Oak	Montgomery	Leonard England

In addition to the measurements made at the regular stations, the engineer visits other streams where severe floods have been reported, and if conditions are favorable, either makes direct measurements of the flow or estimates based on the slope of the water surface and the size and nature of the cross-section. In June, 1918, a storm of unusual severity swept central Iowa, and floods, (the largest in forty years) occurred in the Skunk and Iowa Rivers. Careful estimates of the flow in some of the smaller tributaries to these rivers were made by Mr. D. P. Weeks, Jr. for this Department. Surveys were made in the following named areas: Linn Creek, Marshall County; Skunk River at Colfax in Jasper County; Bear Creek in Iowa County and Bear Creek in Poweshiek County.

Special Assignments:

In addition to the regular work, there has been undertaken special work at the request of other state departments.

Keokuk and Odessa Lakes:

These two lakes lie in a joint drainage district in Muscatine and Louisa Counties, and in what is known as Muscatine Slough. Keokuk Lake in Muscatine County has been drained by a dredge ditch, and Odessa Lake in Louisa County has been partly drained. At the request of the Executive Council, the Commission has caused both lake beds to be surveyed, old lines run out, the state land divided into forty acre tracts, and maps and descriptions of each tract prepared so that the state lands can be disposed of as required by law. The surveys and office work have been performed by The Central States Engineering Company of Muscatine, under the general direction of this Department.

At the request of the Executive Council, the Department has conducted some investigations regarding the level at which Spirit and the two Okoboji Lakes should be held, and the methods by which such regulation can be obtained. Several

miles of levels have been run tying up the different high and low lake stages of past years, as given by old settlers. A study has been made of the drainage areas tributary to these lakes and of the effect which drainage projects in this area will have on the run off.

For the Attorney General's office, a rather complete outline of the literature bearing on the subject of the valuation of public utilities, has been prepared.

At the request of the Mahaska, Wapello and Monroe County Boards, plans for plank and willow mats and for bank revetment have been prepared, and specifications written covering the construction of bank protection for the Des Moines River at the county bridge near Eddyville. Owing to war time conditions in the labor and material market, bids have not been taken on this work.

At the request of the Fish and Game Department, plans have been prepared for reinforced concrete dams at the outlets of six of the state lakes. The fixing of lake level, permissible variation in water surface, as well as the superintendence of construction was all done by Mr. Paul Graham, Engineer for the Fish and Game Department.

Working in co-operation with the Bridge Department, a special survey was made of the Skunk River bottom, near Colfax, for the purpose of deciding how best the river could be bridged. and the flood conditions relieved.

Chapter XI. Experiments, Tests and Technical Investigations

The testing work for the Highway Commission is done in the laboratories of the Iowa State College by members of the Experimental Station staff. No charge is made by the Experiment Station for this work. Samples of materials for use on county road and bridge work sent to the Commission for examination, are tested and a report made as to the compliance with the Commission's specifications and the requirements of standard practice.

Owing to the decrease in constructing work in 1918, the number of samples submitted for tests was much smaller than in 1916 and 1917. The following schedule shows the number of tests of various kinds of material made for the Commission during the past year:

Cement	5
Culvert metals	3
Gravel	5
Paints	9
Road oils	30
Sand	2
Steel reinforcing	6
Stone	7
Total	67

Experimental Work.

Industrial conditions and the necessity of assigning all available engineers to other work, prevented the doing of any experimental work in 1918. In previous years some experiments have been conducted on gravelled and oiled roads.

The only work of this character attempted in 1918 was an inspection in the spring of some roads previously oiled and on which previous observations had been recorded.

Inspection of Oiled Roads.

During the first week in April 1917 an engineer from the Highway Commission and an Engineer from the Engineering Experi-

ment Station of Iowa State College made an inspection of roads that had been oiled in 1916 and previous years in eleven counties of the state. During the first week in April, 1918, this inspection trip was repeated by an engineer from the Highway Commission. It is the plan to inspect oiled roads each year at about the time the roads break up in the spring, visiting a number of the same roads each year, particularly if they have received a treatment of oil since the last inspection. Roads in nine counties were inspected on this trip.

The object of these inspections is to observe the more permanent benefits, if any, that are derived from oiling earth and graveled roads, to compare the results obtained from the use of various grades of oil and various methods of application, also by questions addressed to road officials and people living near the roads to determine the general benefits derived from road oiling. Where roads had been oiled for two or three successive years an effort was made to determine if any cumulative benefits were derived from repeated application of oil.

One road that was inspected in 1917 and again in 1918 and which had not received any oil treatment during the intervening year was the Toledo-Traer road in Tama county. While this road showed beneficial results from oiling in 1917, the only trace of oil treatment shown in 1918 was a slight coloring at the sides of the road.

One road that was inspected in 1917 and again in 1918 which had received a second treatment of oil in the summer of 1917 was the Anamosa-Marion road in Jones county. The soil on this road is yellow clay. It received ¼ gallon per square yard treatment of light oil in 1916 and ½ gallon per square yard treatment of heavy oil in 1917. The condition of the road was practically the same on both inspections. In both cases the road was reported to have been in good condition all summer but had grown rough in the spring.

In 1918 a number of roads in Cedar county were inspected that had received a fairly heavy application of light oil. The people near the road reported that this oil had prevented dust in the fall, but little trace of oil was found when the inspection was made.

A heavy grade of oil had been used in Scott, Muscatine and Clinton counties. These roads did not become as muddy in the

spring as adjacent unoiled roads. The effects of the oil was quite apparent on these roads at the time the inspection was made.

The observations made on both inspections were practically the same. They were briefly as follows: That a heavy oil applied hot gives more lasting benefits than a lighter oil; that good drainage is absolutely necessary if benefit is to be derived from oiling; that a heavy grade of oil con be expected to be more than a dust preventive; that people along the oiled roads consider an oiled road an improvement on the untreated earth road.

Specifications for Road Oils.

In 1918 tentative specifications for road oils were issued for the benefit of county, city and town officials desiring to apply oil to their earth or gravelled roads. These specifications specified the minimum flash point, the maximum specific viscosity, the minimum per cent of asphaltenes and the minimum per cent of fixed carbon for four general classes of road surfaces and for both hot and cold application.

Chapter XII—Financial Report

Showing Appropriations and Expenditures, State Highway Commission Maintenance Fund, Federal Aid Engineering Fund, Federal County Co-operation Road Fund.

General.

During the fiscal year ended June 30, 1918 the volume of work handled by the State Highway Commission has been greater than that handled in any previous year since its organization. This increase has been due to added lines of activity, chief of which has been the application of the so-called Federal Aid Law.

The total expenditures from the maintenance fund of the State Highway Commission for the year ended June 30, 1918 amounted to $113,488.49 of which sum, $23,073.91 was for surveys, plans and specifications of Federal Aid Projects. The maintenance fund was reimbursed by transfer from the Federal Aid Engineering Fund for the sum last above named, so that the actual expenditure from the maintenance fund was but $90,414.58 as compared with $89,786.84 for the year ended June 30, 1917 and $90,821.34 for the year ended June 30, 1916.

Brief reference to the new features handled by the various departments during the past year is given below.

Administrative Department.

Under this classification is included all of the general office work as well as the supervision of all lines of activity the details of which are managed by the various department heads.

The larger special projects handled by this department were the Merle Hay Road, connecting the city of Des Moines and the Camp Dodge Cantonment; assisting the Executive Council in the preparation of plans for the improvement of State Capitol Grounds; outlining and approving plans for the application of the Federal Aid Law and handling the many problems presented by the unusual conditions resulting from the war.

In the office a system of accounting was inaugurated to care for the construction of Federal Aid Projects and the engineering cost connected therewith. This system provides for records in sufficient detail to give cost of each step in the preparation of plans and in the construction of the project.

This additional feature increased the bookkeeping until it was necessary to employ a person to take charge of the bookkeeping work, thus one employee was added to this department.

Road Department.

The road department was called upon to make surveys, plans and specifications for Federal Aid Projects under the provisions of Chapter 249, Acts of the 37th General Assembly, and to furnish engineering supervision and inspection on Roads at State Institutions, the Hawkeye Highway and Dubuque-Sageville Road in Dubuque County, the Merle Hay Road to Camp Dodge and on the State Capitol Grounds Improvement. This necessitated the employment of a much larger force than in former years and as most of the men with this department at the beginning of the year and many hired during the year went into the Federal Service, the labor turnover was quite large.

Schedules attached to this report show the cost of engineering on the various special assignments named, the totals being as follows:

Roads at State Institutions	$ 458.32
Hawkeye Highway, Dubuque County	248.47
Dubuque-Sageville Road	3,094.38
Merle Hay Road, Polk County	3,111.50
State Capitol Grounds Improvement	454.84

Bridge Department.

The volume of work handled by the bridge department was approximately the same as for the previous year. While the amount of county construction work diminished to some extent, the Highway Commission was called upon to a greater extent in designing new bridges as the engineering departments of most of the counties were considerably curtailed by reason of men entering military service.

During the past year the counties have been assisted a great deal in inspecting the construction of larger structures, an engineer from the bridge department being assigned to this work as well as the district engineers.

Testing and Experimental Work.

No special work was undertaken by this department during the year except the testing of materials for the Merle Hay Road, Federal Aid Project No. 1 in Cerro Gordo County and the State Capitol Grounds Improvement but the usual testing of materials used by counties and cities was carried on.

The cost of such work charged to the testing and experimental department is less than in previous years but a large part of such work was cared for through other departments.

Drainage Department.

This department has been engaged chiefly in gathering data regarding stream flows and in establishing gauging stations on various streams in connection with the U. S. Geological survey. In addition, assistance has been rendered the Executive Council and the Department of Fish and Game in surveying lakes and making plans for their improvement.

Equipment and Supplies.

The outlay for equipment and supplies for all departments as a whole has been greatly in excess of that for the preceding two years. In making surveys and plans for Federal Aid Projects a great deal of new equipment was required. The sum of $2,766.14 was expended for transits and $2,384.42 for other field equipment and drafting room supplies and equipment. In supervising and inspecting construction work it became necessary for engineers of the Highway Commission to be provided with auto transportation. Two Ford cars were purchased which with equipment cost $1,018.45. One was assigned for the use of District Engineer L. M. Martin at Atlantic, Iowa, and the other for use of engineers at headquarters.

From the total expenditure of $21,621.50 for equipment and supplies for the year, can be deducted $6,773.09 the cost price of permanent equipment alone purchased during the year. The total value of equipment belonging to the Highway Commission on July 1, 1918 was $13,729.49.

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.

Federal Aid Engineering Expense.

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 provision 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 and equipment used by the Highway Commission are purchased through the purchasing department of the Iowa State College or through the Secretary of the State Executive Council. On all larger jobs of printing, bids are taken from a number of firms in the State. Office rooms, heat, light and janitor service are furnished free by the Iowa State College.

SCHEDULE TWELVE.

SUMMARY OF EXPENDITURES—JULY 1, 1917 TO JULY 1, 1918.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
Commissioners	$ 1,670.00	$ 1,041.57	$ 2,711.57	$ 295.00	$ 289.30	$ 584.30
Administrative Dept.	13,386.59	1,065.78	14,453.16	902.34	133.17	1,035.51
Road Department	30,156.49	3,330.39	33,486.92	15,316.85	1,726.02	17,042.87
Bridge Department	19,482.15	741.54	20,183.69	495.51	57.10	552.61
Testing and Experimental Work	2,211.95	179.22	2,391.17	198.27		198.27
Drainage Department	2,446.87	338.24	2,785.11			
C. Coykendall—Dist. Engr.	1,400.00	547.06	1,947.06	272.08	158.62	430.70
W. F. Beard—Dist. Engr.	2,100.00	876.77	2,976.77	205.15	99.26	304.41
W. H. Root—Dist. Engr.	2,400.00	951.37	3,351.37	329.66	130.37	460.03
E. W. Dunn—Dist. Engr.	767.91	279.92	1,047.83	26.66	10.89	37.55
L. M. Martin—Dist. Engr.	1,890.32	653.51	2,543.83	247.12	237.00	484.12
J. S. Morrison—Dist. Eng.	2,400.00	732.99	3,132.99	319.26	107.74	427.00
H. L. Phelps—Dist. Engr.	598.40	257.12	855.52	80.50	43.57	124.07
Equip. & Sup., All Depts.			21,621.50	1,392.47		1,392.47
Totals	$ 80,910.68	$ 10,935.48	$ 113,488.49	$20,080.87	$ 2,993.04	$23,073.91

SCHEDULE THIRTEEN.

COMMISSIONERS—JULY 1, 1917 TO JULY 1, 1918.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
H. C. Beard, Chairman	$ 990.00	$ 596.75	$ 1,586.75	$ 135.00	$ 117.49	$ 252.49
J. W. Holden	680.00	313.90	993.90	160.00	102.44	262.44
S. W. Beyer, ex officio		130.92	130.92		69.37	69.37
Totals	$ 1,670.00	$ 1,041.57	$ 2,711.57	$ 295.00	$ 289.30	$ 584.30

SCHEDULE FOURTEEN.

ADMINISTRATIVE DEPARTMENT.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
Thos. H. MacDonald	$ 4,200.00	$ 656.52	$ 4,856.52	$ 402.50	$ 100.25	$ 502.75
F. W. Parrott	2,349.99	201.15	2,551.14	177.29	32.92	210.21
J. W. Eichinger	2,100.00	148.11	2,248.11			
Beryl Bogue	432.59		432.59	151.20		151.20
Mrs. Donald C. Elder	760.00		760.00	81.80		81.80
Edith Voorhees	219.03		219.03	36.92		36.92
Thora Tallman	900.00		900.00	43.13		43.13
May Vanderlinden	900.00		900.00	4.50		4.50
Maude Spence	447.79		447.79			
Grant L. Hayes	72.21		72.21			
Anna S. Lynch	316.75		316.75			
Extra help—Mailing Bultn.	344.99		344.99			
Extra help—Annual Report	245.79		245.79			
Extra help—Stenographic	48.95		48.95	5.00		5.00
Extra help—Road School	48.50	60.79	109.29			
Totals	$ 13,386.59	$ 1,005.78	$ 14,453.16	$ 902.34	$ 133.17	$ 1,035.51

SCHEDULE FIFTEEN.

ROAD DEPARTMENT.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
General Office—						
F. R. White, Road Engr.	$ 3,300.00	$ 574.83	$ 3,874.83	$ 1,000.80	$ 141.77	$ 1,142.57
J. S. Dodds, Asst. Engr.	366.66	65.43	432.09	29.31	14.51	43.82
Anne Vanderlinden, Steno.	1,140.00		1,140.00	97.86		97.86
Totals	$ 4,806.66	$ 640.26	$ 5,446.92	$ 1,127.97	$ 156.28	$ 1,284.25
Plans—						
W. E. Jones, Asst. Rd. Engr.	$ 2,200.00	$ 111.58	$ 2,311.58	$ 939.54	$ 62.53	$ 1,002.07
H. S. Leicht, Asst. Rd. Engr.	1,600.00	184.66	1,784.66	1,416.47	175.20	1,591.67
W. M. MacGibbon, Rd. Engr.	1,366.65	244.64	1,611.29	1,084.32	244.64	1,328.96
W. A. Reeves, Draftsman	1,473.28	17.58	1,490.86	838.94		838.94
B. E. Brevik, Draftsman	322.19		322.19	322.19		322.19
M. H. Bryant, Draftsman	375.00		375.00	375.00		375.00
E. H. Irwin, Draftsman	487.97		487.97	304.21		304.21
D. M. Finley, Draftsman	910.00	253.79	1,163.79	875.60	253.79	1,129.39
W. J. Smith, Draftsman	558.07		558.07	507.00		507.00
H. W. Fleming, Draftsman	272.60		272.60	254.00		254.00
Oscar Trueblood, Drafts'n	300.00		300.00	295.25		295.25
T. J. Medicielo, Draftsm'n	207.00		207.00	190.80		190.80
H. P. Hertz, Draftsman	124.84	6.08	130.92	113.85	6.08	119.93
D. C. Elder, Draftsman	11.25		11.25	9.37		9.37
R. D. Demirjean, Drafts'n	49.35		49.35	50.40		50.40
H. Uhlig, Draftsman	88.00		88.00	72.00		72.00
Wm. Behrens, Draftsman	88.00		88.00	86.25		86.25
H. E. Crosby, Draftsman	104.50		104.50	59.40		59.40
H. G. Singer, Draftsman	84.00		84.00	85.50		85.50
U. Bozzi, Draftsman	63.00		63.00	32.85		32.85
Totals	$ 10,685.70	$ 818.33	$ 11,504.03	$ 7,912.94	$ 742.24	$ 8,655.18
Tracing Department—						
W. T. Ide, Superintendent	$ 87.50		$ 87.50	$ 87.50		$ 87.50
Jennie Coventry, Tracer	52.50		52.50	52.50		52.50
Doris Ambrose, Tracer	31.50		31.50	31.50		31.50
Carita McCarroll, Tracer	31.50		31.50	31.50		31.50
Jessie Brooks, Tracer	31.50		31.50	31.50		31.50
Hazel Brandt, Tracer	31.50		31.50	31.50		31.50
Marie Haskamp, Tracer	31.50		31.50	31.50		31.50
Frances McCall, Tracer	28.00		28.00	28.00		28.00
Dorothy Twitchell, Tracer	24.50		24.50	24.50		24.50
Belle Courtney, Tracer	24.50		24.50	24.50		24.50
Florence Clark, Tracer	24.50		24.50	24.50		24.50
Florence Porterfield, Trac.	24.50		24.50	24.50		24.50
Belle Hamilton, Tracer	24.50		24.50	24.50		24.50
Mildred Iliff, Tracer	24.50		24.50	24.50		24.50
Totals	$ 472.50		$ 472.50	$ 472.50		$ 472.50
Surveys—						
S. A. Schackle	$ 1,600.00	$ 319.14	$ 1,919.14	$ 1,002.63	$ 307.84	$ 1,310.47
E. L. Kaser	1,079.58	152.11	1,231.69	1,053.31	152.11	1,205.42
P. F. Hopkins	226.66	88.65	315.31	184.00	88.65	272.65
Ernest Nelson	508.33	145.31	653.64	402.00	145.31	547.31
H. H. Howie	131.13	40.98	172.11	131.13	40.98	172.11
J. G. Dean	207.50	21.64	229.14	93.94		93.94
Extra help	173.98	12.50	186.48	173.98	12.50	186.48
Transportation	35.55		35.55	9.30		9.30
Traffic Census	1,976.32	41.00	2,017.32	1,922.42	30.28	1,952.70
Totals	$ 5,939.05	$ 821.33	$ 6,760.38	$ 4,972.71	$ 777.67	$ 5,750.38

SCHEDULE FIFTEEN—(CONT.)
ROAD DEPARTMENT.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
Construction—						
F. H. Mann, Con. Engr.	$ 2,349.99	$ 167.27	$ 2,517.26			
E. A. Zack, Res. Engr.	1,166.95		1,166.95	$ 208.00		$ 208.00
LeRoy Brown, Res. Engr.	1,076.60	294.17	1,370.77	347.50		347.50
A. S. Miller, Res. Engr.	1,400.00	379.88	1,779.88	110.82		110.82
L. S. Gates, Res. Engr.	399.99	37.98	437.97	58.66	25.83	84.49
W. P. Hall, Inspr.	176.80		176.80			
O. M. Briley, Inspr.	222.00	14.85	236.85			
A. F. Miller, Inspr.	145.16	52.72	197.88			
J. D. Kaser, Inspr.	104.00	25.67	129.67			
Perry J. Preston, Inspr.	711.13		711.13			
A. A. Baustian, Inspr.	500.00	77.93	577.93	105.75	24.00	129.75
Totals	$ 8,252.62	$ 1,050.47	$ 9,303.09	$ 830.73	$ 49.83	$ 880.56
Grand Total, Road Dept.	$ 30,256.53	$ 3,330.39	$ 33,486.92	$15,316.85	$ 1,726.02	$17,042.87

SCHEDULE SIXTEEN.
BRIDGE DEPARTMENT.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
J. H. Ames, Bridge Engr.	$ 2,700.00	$ 294.54	$ 2,994.54	$ 49.50	$ 57.10	$ 106.60
E. F. Kelley, Asst. Bridge Engr.	2,600.00	135.00	2,735.00			
E. W. Blumenschein, St. Engr.	2,300.00	63.77	2,363.77			
J. A. Paulsen, Con. Engr.	2,100.00	189.38	2,289.38	8.75		8.75
S. J. Bell, Designer	1,145.97	16.61	1,162.58			
E. Williams, R. R. Cross-Engr.	240.00	4.59	244.59			
H. J. Bowman, R. R. Engr.	165.00	27.60	192.60			
J. E. Kirkham, Con. Eng.	500.08	5.65	505.73			
W. N. Adams, Draftsman	1,733.28		1,733.28			
V. Enslow, Draftsman	1,010.68		1,010.68	15.16		15.16
J. C. Nichols, Draftsman	306.25		306.25	31.00		31.00
R. J. Freshour, Draftsm'n	721.94		721.94	5.46		5.46
C. H. Cook, Draftsman	407.42	1.75	409.17	139.64		139.64
H. B. Collins, Draftsman	599.68		599.68			
R. E. Braun, Draftsman	245.67		245.67			
L. E. Richardson, Drafts'n	86.18		86.18			
H. A. Hanson, Clerk	1,500.00	2.65	1,502.65	231.70		231.70
Mrs. J. A. Paulsen, Steno.	1,080.00		1,080.00	14.30		14.30
Totals	$ 19,442.15	$ 741.54	$ 20,183.69	$ 495.51	$ 57.10	$ 552.61

SCHEDULE SEVENTEEN.
TESTS AND EXPERIMENTAL DEPARTMENT.

Department	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
Bert Meyer, Asst. Engr.	$ 808.00	$ 94.15	$ 902.15	$ 79.00		$ 79.00
Velda Rowland, Steno.	900.00		900.00	119.27		119.27
R. W. Crum, Asst. Engr.	343.20	33.28	376.48			
L. Kirschbraun, Con. Eng.	150.00	51.79	201.79			
Foster Preston, Asst. Eng.	4.90		4.90			
Clyde Mason, Asst. Engr.	2.60		2.60			
Elmer Reed, Asst. Engr.	1.25		1.25			
Henry W. Brandt, Asst. Engr.	2.00		2.00			
Totals	$ 2,211.95	$ 179.22	$ 2,391.17	$ 198.27		$ 198.27

SCHEDULE EIGHTEEN.
DRAINAGE DEPARTMENT.

	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
R. W. Clyde, Drain. Engr.	$ 2,000.00	$ 310.06	$ 2,310.06			
A. E. Holmes, Asst. Engr.	165.75		165.75			
Wm. Pellersells, Foreman.	16.80		16.80			
John Cooper, Laborer	6.30		6.30			
D. P. Weeks, Jr., Asst. Engr.	135.00	28.18	163.18			
F. J. Olbrich, Rodman	75.00		75.00			
E. H. Worrell, Gauge Rdr.	6.58		6.58			
C. F. Peckenpaugh, Gauge Reader	5.81		5.81			
C. N. Hammock, Gauge Reader	6.29		6.29			
Glenn Briggs, Gauge Rdr.	6.77		6.77			
G. S. Dunn, Gauge Reader	7.09		7.09			
Floyd Kelley, Gauge Rdr.	7.58		7.58			
W. L. Severe, Gauge Rdr.	7.90		7.90			
Totals	$ 2,446.87	$ 338.24	$ 2,785.11			

SCHEDULE NINETEEN.
DISTRICT ENGINEERS.

	Total Amount Paid			Federal Aid Engr. Exp.		
	Salary	Expense	Total	Salary	Expense	Total
C. Coykendall	$ 1,400.00	$ 547.06	$ 1,947.06	$ 272.08	$ 158.62	$ 430.70
W. F. Beard	2,100.00	876.77	2,976.77	205.15	99.26	304.41
W. H. Root	2,400.00	951.37	3,351.37	329.66	130.37	460.03
E. W. Dunn	767.91	279.92	1,047.83	26.66	10.89	37.55
L. M. Martin	1,890.32	653.51	2,543.83	247.12	237.00	484.12
J. S. Morrison	2,400.00	732.99	3,132.99	319.26	107.74	427.00
H. L. Phelps	598.40	257.12	855.52	80.50	43.57	124.07
Totals	$ 11,556.63	$ 4,298.74	$ 15,855.37	$ 1,480.43	$ 787.45	$ 2,267.88

SCHEDULE TWENTY.
EQUIPMENT AND SUPPLIES—ALL DEPARTMENTS.

Description	Total Amount Paid	Federal Aid Eng. Expense
Freight and Drayage	$ 167.94	
Express	227.46	
Telephone	630.02	
Telegraph	177.37	
Postage	2,563.16	
Photos, Slides and Cuts	876.53	
Bulletins and Specifications	3,183.25	$ 139.25
Blanks	1,474.68	176.12
Stationery and Office Supplies	1,935.11	168.75
Road Department	3,552.13	248.95
Drafting Department	1,598.43	
Tests and Experimental Department	32.00	
Drainage Department	16.93	
Furniture and Fixtures	1,408.03	
State Fair Exhibit	150.00	
Maps	2,155.46	
Motor Vehicle Transportation—No. 1 Car and Equipment	461.10	
Repairs	65.35	
Supplies	282.89	
No. 2 Car and Equipment	563.85	
Repairs	10.10	
Supplies	89.71	
		719.40
Balance charged to Federal Aid	$ 21,621.50	$ 1,392.47
Totals		

SCHEDULE TWENTY-ONE.

ROAD DEPARTMENT—SPECIAL ASSIGNMENTS.

	Salary	Expense	Total
State Institution Roads—			
F. H. Mann	$ 458.32		$ 458.32
	$ 458.32		$ 458.32
Hawkeye Highway, Dubuque County—			
L. S. Gates	$ 240.85	$ 7.62	$ 248.47
	$ 240.85	$ 7.62	$ 248.47
Dubuque-Sageville Road, Dubuque County—			
F. H. Mann	$ 440.00	$ 167.27	$ 607.27
A. S. Miller	669.96	337.30	1,037.26
Leroy Brown	659.93	234.94	894.87
A. A. Baustian	187.10	55.33	242.43
A. F. Miller	130.16	52.72	182.88
J. D. Kaser	104.00	25.67	129.67
	$ 2,221.15	$ 873.23	$ 3,094.38
Merle Hay Road, Polk County—			
F. H. Mann	$ 611.83		$ 611.83
E. A. Zack	800.23		800.23
Perry Preston	711.13		711.13
S. A. Schackle	399.99		399.99
J. G. Dean	21.78	$ 13.41	35.19
W. P. Hall	176.80		176.80
Ernest Nelson	111.33		111.33
O. M. Briley	125.00		125.00
A. A. Baustian	125.00		125.00
A. F. Miller	15.00		15.00
	$ 3,098.09	$ 13.41	$ 3,111.50
State Capitol Graunds Improvement—			
F. H. Mann	$ 454.84		$ 454.84
	$ 454.84		$ 454.84

SCHEDULE TWENTY-TWO.

COMPARISON OF EXPENDITURES FOR FOUR YEARS.

	1914-15	1915-16	1916-17	1917-18
Commissioners	$ 3,407.65	$ 2,593.22	$ 2,839.63	Note 1 $ 2,127.27
Administrative Department	14,834.87	12,137.98	12,479.78	13,417.65
Road Department	10,308.53	11,186.35	11,139.89	16,444.05
Bridge Department	16,064.47	7,944.33	9,139.02	19,631.08
Drafting Department		10,309.20	12,633.25	Note 2
District Engineers	13,053.59	13,711.09	14,386.51	13,587.49
Remodel'g and Repr. Offices and Drft. Dept.	4,622.42			
T. and E. W. Department		5,300.07	3,886.58	3,192.90
Bridge Patent Litigation		1,855.90		Note 3
State Institution Roads		3,226.54	2,032.37	Note 4
Railroad Crossing				
Surveys and Plans		2,031.30	2,076.58	Note 5
Lake Bed Survey		5,535.00	4,814.19	
Drainage Department			882.31	2,785.11
Equipment and Supplies	18,643.65	14,990.36	13,476.73	20,229.03
Totals	$ 80,935.18	$ 90,821.34	$ 89,786.84	$ 90,414.58

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 TWENTY-THREE.

APPROPRIATION—STATE HIGHWAY COMMISSION.

JULY 1, 1917 TO JUNE 30, 1918.

STATEMENT, JUNE 30, 1918.

Debits.

Unexpended appropriation on July 1, 1917	$ 47,681.19
Tax Collected July, 1917	4,859.52
Tax Collected August, 1917	6,013.60
Tax Collected September, 1917	2,959.10
Tax Collected October, 1917	2,004.46
Tax Collected November, 1917	1,100.79
Tax Collected December, 1917	5,010.77
Tax Collected January, 1918	10,348.33
Tax Collected February, 1918	9,288.79
Tax Collected March, 1918	18,259.34
Tax Collected, April, 1918	16,131.34
Tax Collected May, 1918	16,408.74
Tax Collected June, 1918	13,156.31
Refunds—Miscellaneous	366.56
Fees—Registration of Routes	30.00
Federal Aid Engineering Expense	19,796.12
	$ 173,314.96

Credits.

Warrants issued in July, 1917	$ 9,329.13
Warrants issued in August, 1917	7,873.02
Warrants issued in September, 1917	10,181.66
Warrants issued in October, 1917	9,799.25
Warrants issued in November, 1917	7,738.83
Warrants issued in December, 1917	10,042.75
Warrants issued in January, 1918	8,428.03
Warrants issued in February, 1918	8,255.51
Warrants issued in March, 1918	8,554.21
Warrants issued in April, 1918	10,605.46
Warrants issued in May, 1918	7,560.56
Warrants issued in June, 1918	15,120.09
Balance July 1, 1918	59,826.46
	$ 173,314.96

STATEMENT SHOWING DISTRIBUTION OF FEDERAL AID ENGINEERING EXPENSE,

JULY 1, 1917—JUNE 30, 1918.

COST BY MONTHS.

July, 1917	$ 566.82
August, 1917	1,102.39
September, 1917	2,038.01
October, 1917	1,430.69
November, 1917	1,502.46
December, 1917	2,280.62
January, 1918	2,030.15
February, 1918	2,176.96
March, 1918	1,349.59
April, 1918	2,071.16
May, 1918	3,247.27
June, 1918	3,277.79
	$23,073.91

FEDERAL AID ENGINEERING FUND.

Debits.

Appropriation August 1, 1917	$35,000.00

Credits.

Engineering Expense July 4, 1917-June 30, 1918	23,073.91
Balance June 30, 1918	11,926.09
	$35,000.00

SUMMARY CLASSIFICATION.

Reconnaissance	$ 3,493.37
Traffic Census	2,399.66
Survey	5,722.30
Plans and Estimates	9,217.63
Specifications	449.03
Conferences	922.58
Records	869.34
Total	$23,073.91

County	Reconnaissance	Traffic census	Survey	Plans	Specifications	Conferences	Records	Total
Adair	$ 5.66						$ 7.75	$ 13.41
Adams	66.19	$ 89.39		$ 6.55			12.64	174.77
Allamakee								
Appanoose	22.92	123.14		6.62			5.17	157.85
Audubon	5.11						7.75	12.86
Benton	84.33					$ 45.84	11.96	142.13
Black Hawk	80.93	34.44	257.88	2.94		50.38	20.96	447.53
Boone								
Bremer								
Buchanan	72.67	4.18	318.52	687.29	$ 38.81		23.36	1,144.83
Buena Vista								
Butler						22.90	.42	23.32
Calhoun	74.12	77.08		13.07		14.68	8.06	187.01
Carroll								
Cass								
Cedar	59.79						9.35	69.14
Cerro Gordo	18.88	6.16		50.10	157.46	52.11	7.76	292.47
Cherokee	12.52						7.76	20.28
Chickasaw								
Clarke								
Clay								
Clayton								
Clinton	148.05	91.57		11.40		35.38	12.85	299.25
Crawford								
Dallas	106.85	58.96	278.88	278.07			28.40	751.16
Davis						5.05	7.76	12.81
Decatur	69.31	126.38	377.35	552.56		13.82	41.97	1,181.29
Delaware	181.91	38.88	272.61	927.69	42.88		22.91	1,486.88
Des Moines	165.09	7.18					6.14	178.41
Dickinson								
Dubuque	137.76	47.04		7.81		57.62	8.72	258.95
Emmet								
Fayette								
Floyd								
Franklin	24.83						.89	25.72
Fremont								
Greene	21.75						7.76	29.51
Grundy	82.48	93.82		8.81		18.70	10.20	214.01
Guthrie	5.67					1.41	7.75	14.83
Hamilton	12.11						7.76	19.87
Hancock								
Hardin								
Harrison	70.73	231.08		5.18		17.30	8.03	332.32
Henry	60.94					26.15	7.76	94.85
Howard	12.32						.44	12.76
Humboldt								
Ida	12.71						7.76	20.47
Iowa								
Jackson	38.15	81.66		12.82		34.43	8.86	175.92
Jasper						12.25	7.75	20.00
Jefferson	132.76	77.29	1,115.95	1,347.04	38.80		79.61	2,791.45
Johnson	50.03	82.10	11.78	112.21		93.26	12.11	361.49
Jones	11.61						.41	12.02
Keokuk	44.04						9.07	53.11
Kossuth								
Lee								
Linn	125.57	155.10		16.02		87.88	17.02	402.59
Louisa	14.65						.52	15.17
Lucas								
Lyon								
Madison								
Mahaska	22.55					9.35	7.94	39.84
Marion	81.70	103.57	624.92	1,345.30	15.61		54.40	2,225.50
Marshall	18.70	83.41		6.96			11.22	120.29
Mills	104.88	144.73	105.59	22.68		33.15	17.81	428.84
Mitchell								
Monona								
Monroe	129.71	57.04		4.88		9.31	8.72	209.66
Montgomery	223.26	57.19	383.46	140.34			31.54	835.79
Muscatine						26.94	7.75	34.69
O'Brien	6.01						.21	6.22
Osceola	16.76					13.53	7.76	38.05
Page	11.78						.42	12.20
Palo Alto	22.82						.82	23.64

County	Reconnaissance	Traffic census	Survey	Plans	Specifications	Conferences	Records	Total
Plymouth	6.11						.22	6.33
Pocahontas								
Polk	56.59	51.24		3.85		11.65	3.37	106.70
Pottawattamie	5.37						7.75	13.12
Poweshiek	26.10						7.76	33.86
Ringgold	96.73	16.19	291.44	676.30	38.81	22.60	41.44	1,183.51
Sac								
Scott								
Shelby								
Sioux	42.06			2.75			7.76	52.57
Story		18.96					7.75	26.71
Tama	110.67					45.84	12.22	168.73
Taylor						3.95	7.75	11.70
Union	19.46					19.72	8.45	47.63
Van Buren						4.61	7.75	12.36
Wapello	44.94					64.56	8.86	118.36
Warren	132.42	104.15	442.67	181.22			15.88	876.34
Washington								
Wayne								
Webster	103.79	41.15	601.37	187.42		62.25	30.55	1,026.53
Winnebago	15.17	64.60				5.96	10.45	96.18
Winneshiek				3.20			.12	3.32
Woodbury	158.71	116.14	639.88	2,230.68	116.66		92.67	3,354.74
Worth								
Wright	24.64	114.84					4.71	144.19
Gen. Tracings				365.87				365.87
Totals	$3,493.37	$2,399.66	$5,722.30	$9,217.63	$449.03	$922.58	$869.34	$23,073.91

STATEMENT FEDERAL AID GENERAL ACCOUNTS.

JULY 4, 1917-JUNE 30, 1918.

		Debits
Secretary of the Treasury of the U. S.		
Allotment, 1916-17	$ 146,175.60	
Allotment, 1917-18	292,351.20	$ 438,526.80
Certified Federal Allotments.		
Allotment, 1918-19 (available July 1, 1918)		434,653.61
Treasurer of State.		
Apportionment, 1916-17	$ 146,175.60	
Apportionment, 1917-18	292,351.20	
Apportionment, 1918-19 (½)	217,326.81	
	$ 655,853.61	
Expended on Project No. 1	18,100.62	$ 637,752.99
Certified State Apportionment.		
Apportionment, 1918-19 (½) (available Aug. 1, 1918)		217,326.80
County Appropriations.		
Estimated cost of projects exceeds Federal and State funds on projects, approved by O. P. R.	$ 426,068.58	
Expended on Project No. 1	13,270.26	412,798.32
Total Project Funds Expended		30,808.38
		$2,171,856.90
		Credits.
Federal Allotment, 1917-18.		
For which project statements have not yet been approved by O. P. R.		$ 75,010.35
Federal Allotment, 1918-19.		
For which project statements have not yet been approved by O. P. R.		434,653.61
State Apportionment, 1917-18.		
For which project statements have not yet been approved by O. P .R.		75,010.35
State Apportionment, 1918-19.		
For which project statements have not yet been approved by O. P. R.		434,653.61
Project Statements Approved (Est. Cost)		569,872.60
Project Agreements Signed (Est. Cost)		582,756.38
		$2,171,856.90

STATEMENT FEDERAL AID PROJECT ACCOUNTS.
JULY 4, 1917–JUNE 30, 1918.

Project No. 1—Cerro Gordo County.

DEBITS.

Allotment Federal Funds	$ 22,453.75
Federal County Co-operation Fund (State)	22,453.75
County Funds	54,634.31
	$ 99,541.81

CREDITS.

Expenditures, Federal County Co-operative Fund (State)	$ 18,100.62
County Funds	13,270.26
Balance, Federal-County Co-operative Fund (State)	26,806.88
County Funds	41,364.05
	$ 99,541.81

Note: The full county allotment of Federal and State funds is to be paid out by the Treasurer of State from the Federal-County Co-operation Road Fund and the state is to be reimbursed by the Federal Treasury for one-half the sum thus paid out.

PART II

County Engineers' Report

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 1613 townships, reports were secured from 1412 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 financial 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, 1918, to January 1, 1919.

Total Expenditure:

From January 1, 1918, to January 1, 1919, the counties and townships spent $14,095,752.61 for road and bridge work on the 104,082 miles of road in the county and township road systems. This total expenditure for both and bridge work is an average of $135.43 per mile on the total mileage above named. The total expenditure is $1,069,723.15 or 7.05 per cent less than the total expenditure reported for 1917. The expenditures are classified as follows:

Bridge work on both county and township roads	$ 6,808,818.16
Road work on county roads	3,856,051.88
Road work on township roads	3,430,882.57
Total	$14,095,752.61

The expenditure for bridge work alone averaged $67.24 per mile on county and township roads together.

The expenditure for road work proper on the 16,185.53 miles in the county road system averaged $238.24 per mile and for road work on the township road system, $44.58 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.

	1914	1915	1916	1917	1918
Bridge work on both county and township roads	5,027,000.00	$ 6,629,252.24	$ 7,172,246.02	$ 7,466,796.69	$ 6,808,818.16
Road work on county roads	3,403,000.00	3,396,364.97	3,276,025.71	4,140,340.56	3,856,051.88
Road work on township roads	3,171,000.00	2,676,736.03	3,072,022.92	3,558,338.51	3,430,882.57
Totals	$11,601,000.00	$12,702,353.22	$13,520,294.65	$15,165,475.76	$14,095,752.61

TOTAL EXPENDITURE FROM SEVERAL FUNDS.

	1914	1915	1916	1917	1918
County bridge fund	$ 4,006,000.00	$ 6,629,252.24	$ 6,130,409.81	$ 6,549,024.03	$ 5,808,300.46
County road cash fund	4,424,000.00	3,396,364.95	3,236,318.71	3,710,383.02	3,514,575.87
Motor vehicle road fund	----------	----------	998,292.37	1,223,746.06	1,215,931.72
Township road fund	3,171,000.00	2,260,339.65	2,508,459.13	2,886,652.93	2,969,987.83
Township drag fund	----------	416,396.38	563,563.79	671,685.58	726,281.67
Federal-county road f'nd	----------	----------	----------	18,100.62	75,853.12
All other sources	----------	----------	83,250.84	105,883.62	84,822.24
Totals	$11,601,000.00	$12,702,353.22	$13,520,294.65	$15,165,475.76	$14,095,752.61

Cash Balances January 1, 1919.

On January 1, 1919, there were cash balances on hand in the county and township road and bridge funds amounting to $1,666,406.69 as follows:

County bridge fund	$ 44,813.02
County road cash fund	140,471.91
County motor vehicle road fund	525,761.81
Total county balance	711,056.74
Township road, drag and drainage funds	955,349.95
Total	$1,666,406.69

Indebtedness.

There were outstanding funding bonds, for road and bridge work, amounting to $10,008,301.08 as follows:

Bridge bonds outstanding	$ 7,954,280.13
Road bonds outstanding	2,054,020.95
Total bonds outstanding	$10,008,301.08

During the year funding bonds were issued as follows:

Bridge bonds	$1,979,767.29
Road bonds	1,103,760.63
Total	$3,083,527.92

Bonds were retired during the year as follows:

Bridge bonds	$231,962.50
Road bonds	14,000.00
Total	$245,962.50

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, 44 counties being bonded for road work and 75 for bridge work. Of the total bonded indebtedness, 79.5 per cent is for bridge work and 20.5 per cent for road work.

The total indebtedness of the ninety-nine counties as reported January 1, 1919, and as compared with previous years is as follows:

TOTAL INDEBTEDNESS FOR ROAD AND BRIDGE WORK.

COUNTY BRIDGE FUND.

	January 1, 1917	January 1, 1918	January 1, 1919
Outstanding bills	$ 216,253.16	$ 152,426.34	$ 157,910.05
Outstanding warrants	2,556,460.00	2,414,748.15	2,081,701.72
Outstanding bonds	3,872,817.27	6,308,041.35	7,954,280.13
Total Bridge Indebtedness	$ 6,645,530.43	$ 8,875,215.84	$ 10,193,891.90

COUNTY ROAD FUND.

	January 1, 1917	January 1, 1918	January 1, 1919
Outstanding bills	$ 125,475.25	$ 86,709.12	$ 114,530.96
Outstanding warrants	809,506.17	1,174,430.27	837,137.99
Outstanding bonds	454,457.03	1,054,645.79	2,054,020.95
Total road indebtedness	1,389,438.45	2,315,785.18	3,005,689.90
Total Indebtedness	$ 8,034,968.88	$ 11,191,001.02	$ 13,199,581.80

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, 1919, at $597,293.96. A summary of the principal items and equipment reported is as follows:

Items	Number	Estimated Value
Tractors	106	$ 159,339.41
Trucks	38	52,107.07
Concrete mixers	137	22,580.93
Pile drivers	84	10,070.85
Blade graders	787	163,882.38
Wheeled scrapers	1,143	25,684.06
Slip scrapers	1,123	6,474.90
Road drags	3,103	33,113.71
Fresnos	137	1,832.90
Road Planers	46	8,492.25
Plows	433	5,417.81
Gas engines	23	3,772.95
Small tools and miscellaneous		104,575.74
Total		$ 597,293.96

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.

The total expenditure for bridges and culverts in the State during 1918 was $6,808,818.16, or $657,978.53 less than the total expenditure for like purpose in 1917.

Below is a comparison of the classified expenditures for each of the past five years including 1918, a comparison of permanent and temporary construction and a statement of the amounts spent for the various types of construction for the past four years. The amounts given were expended on work classified as shown.

Permanent bridges and culverts include only structures composed entirely of masonry or steel construction. If a part of the work is of a temporary nature, the structure is classified under the heading of temporary construction. Pipe culverts not provided with masonry bulk heads are classified as temporary construction.

The item of filling bridges and culverts is not included in the totals for the year of 1914. The item of culvert material purchased for townships appears only for the years of 1917 and 1918 as the law providing that such material shall be furnished became effective in 1917. Prior to that time the counties not only furnished the material for temporary culverts on the township road system but installed same, so that for the years 1914, 1915 and 1916 this item is included under temporary bridges and culverts constructed.

COMPARISON OF CLASSIFIED BRIDGE EXPENDITURES.

AMOUNTS.

Classification	1914	1915	1916	1917	1918	Total Five Year Period
Permanent bridges and culverts	$2,655,000.00	$4,079,000.00	$4,026,309.01	$4,485,781.23	$3,578,451.05	$18,824,541.29
Temporary bridges and culverts	445,000.00	1,091,000.00	1,222,023.37	603,490.24	598,426.88	3,959,940.49
Repairs	1,160,000.00	1,212,000.00	1,026,735.79	1,039,391.95	1,027,526.00	5,465,653.74
Culverts purchased for townships				463,553.59	410,171.73	873,725.32
Equipment and unused material	310,000.00	247,000.00	318,140.67	356,255.98	650,984.96	1,882,381.61
Filling bridges and culverts		249,000.00	386,626.82	362,319.27	385,118.02	1,383,064.11
Special cases	457,000.09		192,410.36	156,004.43	158,139.52	963,554.31
Totals	$5,027,000.00	$6,878,000.00	$7,172,246.02	$7,466,796.69	$6,808,818.16	$33,352,860.87

PERCENTAGES.

Classification	1914	1915	1916	1917	1918	Total Five Year Period
Permanent bridges and culverts	$ 52.85	$ 59.30	$ 56.20	$ 60.08	$ 52.60	$ 56.49
Temporary bridges and culverts	8.85	15.85	17.03	8.08	8.78	11.87
Repairs	23.03	17.63	14.30	13.91	15.08	16.39
Culverts purchased for townships				6.20	6.02	2.60
Equipment and unused material	6.17	3.60	4.42	4.78	9.55	5.65
Filling bridges and culverts			5.40	4.86	5.65	4.15
Special cases	9.10	3.62	2.65	2.09	2.32	2.86
Totals	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00

COMPARISON OF EXPENDITURES FOR PERMANENT AND TEMPORARY BRIDGE CONSTRUCTION.

	1914			1915			1916		
	No.	Expenditures	%	No.	Expenditures	%	No.	Expenditures	%
Permanent bridges and culverts	6,587	$ 2,655,000.00	85.65	7,131	$ 4,079,000.00	78.9	11,116	$ 4,026,309.01	76.7
Temporary bridges and culverts	5,002	445,000.00	14.35	34,233*	1,091,000.00*	21.1	33,500*	1,222,023.37*	23.3
Totals	11,589	$ 3,100,000.00	100.00	41,364	$ 5,170,000.00	100.00	44,616	$ 5,248,332.38	100.00

*Includes temporary culverts for townships.

	1917			1918			Five Year Period		
	No.	Expenditures	%	No.	Expenditures	%	No.	Expenditures	%
Permanent bridges and culverts	7,166	$ 4,485,781.23	80.77	5,698	$ 3,578,451.05	78.00	37,698	$ 18,824,541.29	79.52
Temporary bridges and culverts	8,572	603,490.24	10.88	4,539	598,426.88	13.05	85,846	3,959,940.49	16.78
*Culvert materials furnished townships		463,553.59	3.35		410,171.73	8.95		873,725.32	3.70
Totals	15,738	$ 5,552,825.06	100.00	10,237	$ 4,587,049.66	100.00	123,544	$ 23,658,207.10	100.00

*Included under temporary bridges and culverts for 1914, 1915, and 1916.

COMPARISON OF CLASSIFIED BRIDGE CONSTRUCTION.

No.	Type	1915 No.	1915 Cost	1916 No.	1916 Cost	1917 No.	1917 Cost
1	Concrete box culvert	4,886	$ 1,675,889.00	5,136	$ 1,883,066.05	4,330	$ 1,982,831.14
2	Circular concrete culvert	708	68,155.00	880	105,754.11	782	96,223.43
3	Concrete arch culverts	123	23,300.00	147	16,238.93	61	7,382.53
4	Concrete pipe culverts	2,531	129,835.00	2,768	89,614.24	1,816*	209,154.28
5	Corrugated pipe culverts	27,768	537,464.00	30,486	721,334.58	5,330*	540,498.95
6	Masonry arch culverts	3	803.00	56	7,006.71	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 culvert	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	220,271.61
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	54,576.09
14	Concrete thru girders	16	35,668.00	23	45,142.53	22	50,986.38
15	Concrete deck girders	55	167,273.00	79	187,566.90	64	179,046.34
16	Retaining walls	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	46,092.00	68	86,339.73	35	41,955.07
22	Pony trusses with concrete abutments	214	566,449.00	185	545,555.91	201	727,498.19
23	High steel trusses—concrete abutments	23	82,309.00	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	41,464	$ 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 and total of four year period on next page.

COMPARISON OF CLASSIFIED BRIDGE CONSTRUCTION.

No.	Type	1918 No.	1918 Cost	Total for Four Years No.	Total for Four Years Cost
1	Concrete box culvert	3,312	$ 1,741,751.62	17,664	$ 7,283,537.81
2	Circular concrete culverts	617	84,903.78	2,987	355,026.32
3	Concrete arch culverts	69	7,201.96	400	54,132.42
4	Concrete pipe culverts	1,211	168,572.25	8,326	597,175.77
5	Corrugated pipe culverts	2,360	81,089.74	65,944	1,880,387.27
6	Masonry arch culverts	4	1,820.49	65	10,408.10
7	Boiler pipe culverts	363	23,092.13	4,312	244,036.55
8	Cast iron pipe culverts	78	6,737.39	999	86,443.00
9	Masonry box culverts	13	5,448.98	90	30,689.89
10	Headwalls on culverts	198	27,933.17	2,085	195,908.00
11	Concrete slab bridges	164	260,548.84	545	819,410.17
12	Concrete arch bridges	10	90,904.29	75	444,169.64
13	Concrete abutments	33	51,151.36	228	258,519.71
14	Concrete through girders	15	33,240.83	76	165,037.74
15	Concrete deck girder	55	226,727.35	253	760,613.59
16	Retaining walls	15	5,421.17	93	39,767.88
17	Masonry abutments	16	5,204.91	34	17,080.48
18	I-beam spans on piling abutments	40	33,644.66	348	201,521.60
19	I-beam spans on concrete abutments	253	380,078.16	1,524	2,062,615.05
20	Steel girders—concrete abutments	3	4,693.29	15	40,920.19
21	Pony trusses on piling—wood floor	26	55,648.41	168	229,945.21
22	Pony trusses with concrete abutments	135	442,932.94	735	2,282,436.04
23	High steel trusses—concrete abutments	18	64,475.66	91	449,079.92
24	Deck trusses—concrete abutments	0	000.00	7	47,775.34
25	Wood pile bridges	807	355,142.69	3,315	1,020,394.24
26	Concrete cantilever	1	749.81	1	749.81
27	Miscellaneous bridges and culverts	331	17,762.05	2,139	287,129.63
	Totals	10,237	$ 4,176,877.93	112,519	$ 19,864,921.37

CULVERT MATERIAL PURCHASED FOR TOWNSHIPS.

Operating under the law which provides that counties may furnish townships 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 and in 1918 is as follows:

	1917	1918
Corrugated pipe	$ 360,912.72	$ 320,010.96
Concrete pipe	47,262.28	47,558.33
Boiler pipe	26,204.49	7,654.12
Cast iron pipe	1,883.40	2,433.97
Lumber	23,411.94	27,589.07
Miscellaneous material	3,878.76	4,925.28
Totals	$ 463,553.59	$ 410,171.73

Summary of Road Work and Expenditures for Entire State.

January, 1, 1918, to January, 1, 1919[1]

County Road Expenditures.

During the period covered by this report, the total expenditures for road work on the county system was $3,856,051.88. 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 does not include the expenditures from the county motor vehicle road fund for permanent culverts amounting to $574,807.15, nor the expenditures from the county road cash fund of $391,552.52 of which $385,118.02 was spent for filling bridges and culverts. These expenditures are listed under the bridge work.

Of the above county road expenditures of $3,856,051.88, $1,567,-094.46 or 40.6% was spent for permanent work; $395,085.72 or 10.2% was spent for temporary work; $1,376,480.17 or 35.7% was spent for repairs and maintenance; $298,840 or 7.8% was spent for equipment and unused material, and $218,551.53 or 5.7% 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 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 road expenditures which went for permanent work in 1918 decreased 8.4% from that of 1917. Likewise the repairs and maintenance increased 9.4%.

During 1918 repairs and maintenance cost $85.04 per mile, against $67.64 per mile for this work in 1917.

"Temporary Work" includes "oiling roads," and "tractor grading." No tractor grading is included in this classification unless the cost was 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 and 1918 reports.

During 1918 there were 508.33 miles of road built to permanent grades at a cost of $830,161.10, or an average of $1,633.11 per mile. This includes 38.27 miles constructed as Federal Aid projects at a cost of $135,559.71. There were 29.51 miles built to temporary grade at a cost of $52,248.66 or an average of $1,770.54 per mile. 2,185.19 miles of road were constructed to natural grade at a cost of $335,739.35, or an average cost of $153,64 per mile. 354.99 miles were surfaced at a cost of $617,298.80. Of this amount $250,444.87 or 41.3% was spent on 7.87 miles as follows: $56,770.61 was spent on the remaining 2.6 miles of the 4.07 miles of the Iowa Federal Aid project No. 1 between Mason City and Clear Lake; $44,877.21 was spent on the remaining 1.67 miles of the Sageville road out of Dubuque; $127,138.34 was spent on the remaining 2.8 miles of the Merle Hay road extending from the city limits of Des Moines toward Camp Dodge; $21,663.71 was spent for surfacing with concrete 0.8 mile of the Lincoln Highway between Cedar Rapids and Mt. Vernon. The remaining amount, $366,853.93 or 58.7%, was spent for surfacing 335.52 miles with gravel at an average cost of $1,093.38 per mile. Nearly all of this surfacing was single course gravel conforming to the class B, standard cross section, which requires 880 cubic yards per mile.

Of the total expenditure for repairs and maintenance amounting to $1,376,480.17, $489,024.21, or 35.5% was spent for dragging which includes the dragging done by patrolmen; $418,972.25 or 30.4% was spent for repairs and maintenance by patrolmen; $468,483.71 or 34.1% was spent for repairs not done by patrolmen. 15,765 miles, or 97.5% of the county road system were regularly dragged an average number of 30 times at an average cost of $0.87 per one mile round trip. The average cost per mile for dragging was $31.02. The county engineers' reports show that 11,792 miles, or 72.9% of the county road system were under patrol. Seven counties, Calhoun, Clarke, Grundy, Jackson, Lyon, Madison, and Van Buren have not reported any patrol system and several counties report that their patrol systems are not fully organized. There were 683 patrol districts, or an average of 7.4 per county having an average length of 17 miles. The patrolmen are paid an average salary of $143.43 per month. Their work consists of dragging, repairs and general maintenance. Deducting the cost of dragging which is included under dragging, the total average cost of repairs and general maintenance by patrolmen was $35.53 per mile.

The total expenditures for repairs and maintenance in 1918 averaged $85.05 per mile. In 1917 this expenditure averaged $67.64 per mile. The total county road expenditure in 1917 averaged $251.12 per mile. In 1918 the total expenditure averaged $238.24 per mile.

Since April 1913, surveys have been made on 6,234.21 miles or about 38.6% of the county road system. 8,818.90 miles or 54.5% of the county road system has been built to natural grade. 1,904.46 miles or 11.8% have been built to permanent grade but not surfaced and 1,116.43 miles or 6.9% have been surfaced.

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

Township Road Expenditures.

Reports from 1,412 of the 1,613 townships were received in time to be included in this report. Two counties, Cherokee and Wright, had not submitted any report of township expenditures when this report was completed. Several counties were unable to secure reports from all townships in the county in time to include same in their reports. In all 201 townships are not included in this report.

The 1,412 townships reporting show a total road expenditure of $3,430,882.57 as compared with a total expenditure of $3,558,338.51 reported by 1,521 townships in 1917. The average expenditure per township for those reporting in 1918 is $2,429.80 as compared with an average of $2,339.50 per township for the townships reported in 1917. The township expenditures for 1918 are distributed as follows:

TOTALS.

Permanent work	$ 345,644.55
Temporary work	623,701.73
Repairs	1,024,603.19
Maintenance	729,644.96
Equipment and unused material	332,232.63
Special cases	375,055.51
Total	$3,430,882.57

PERCENTAGES.

Permanent work	10.1%
Temporary work	18.1%
Repairs	29.9%
Maintenance	21.3%
Equipment and unused material	9.7%
Special cases	10.9%
Total	100.0%

The above percentages show that 80% 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 1,412 townships reporting in 1918 is 76,954 so that the average expenditure per mile is $44.58.

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

COMPARISON OF CLASSIFIED ROAD EXPENDITURES.

	1914	1915	1916	1917	1918
Permanent work	$ 895,000.00	$1,159,764.00	$1,309,884.00	$2,028,625.08	$ 1,567,094.46
Repairs and mainte'nce	969,000.00	1,143,382.00	932,142.00	1,088,050.58	1,376,480.17
Temporary work—					
(a) Tractor grading	161,000.00	359,205.00	513,600.00	426,552.17	373,699.80
(b) Oiling roads	----------	----------	28,003.00	51,063.96	21,385.92
Filling bridges and culverts	----------	249,061.00	----------	----------	----------
Machinery and unused material	182,000.00	227,920.00	242,962.00	264,192.98	298,840.00
Miscellaneous	1,292,000.00	257,078.00	249,435.00	281,855.79	218,551.53
Total	$3,403,000.00	$3,396,365.00	$3,276,026.00	$4,140,340.56	$ 3,856,051.88

PERCENTAGES.

	1914	1915	1916	1917	1918
Permanent work	25.3%	34.1%	40.0%	49.0%	40.6%
Repairs and maintenance	28.6%	33.7%	28.5%	26.3%	35.7%
Temporary work—					
(a) Tractor grading	2.9%	10.6%	15.7%	10.3%	9.7%
(b) Oiling roads	------	------	0.8%	1.2%	0.5%
Filling bridges and culverts	------	7.3%	------	------	------
Machinery and unused material	5.3%	6.7%	7.4%	6.4%	7.8%
Miscellaneous	37.9%	7.6%	7.6%	6.8%	5.7%

A COMPARISON OF ROAD CONSTRUCTION DURING 1914, 1915, 1916, 1917, AND 1918.

NUMBER OF MILES CONSTRUCTED.

Classification	1914	1915	1916	1917	1918	Total Five-year Period
Built to permanent grade	418.0	462.7	625.2	858.44	471.06	2,835.40
Built to temporary grade	416.0	355.9	107.83	213.11	22.71	1,115.55
Tractor grading	1,210.0	2,358.8	3,680.9	2,467.58	2,127.60	11,844.88
Surfaced	75.6	182.0	277.0	424.58	347.70	1,306.88
Total mileage constructed	2,119.6	3,359.4	4,690.93	3,963.71	2,969.07	17,102.71*

PERCENTAGE OF COUNTY ROAD SYSTEM CONSTRUCTED.

Classification	1914	1915	1916	1917	1918	Total Five-year Period
Built to permanent grade	2.5	2.9	3.9	5.3	2.9	17.5
Built to temporary grade	2.5	2.2	0.6	1.3	0.1	6.7
Tractor grading	7.5	14.5	22.8	15.3	13.1	73.2
Surfaced	0.4	1.1	1.7	2.6	2.1	7.9
Total percentage constructed	12.9	20.7	29.0	24.5	18.2	105.3*

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, 6,185.53 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.

CHART SHOWING COMPARATIVE MILEAGE OF ROADS IMPROVED DURING PAST FIVE YEARS

(Scale—1 inch=400 miles)

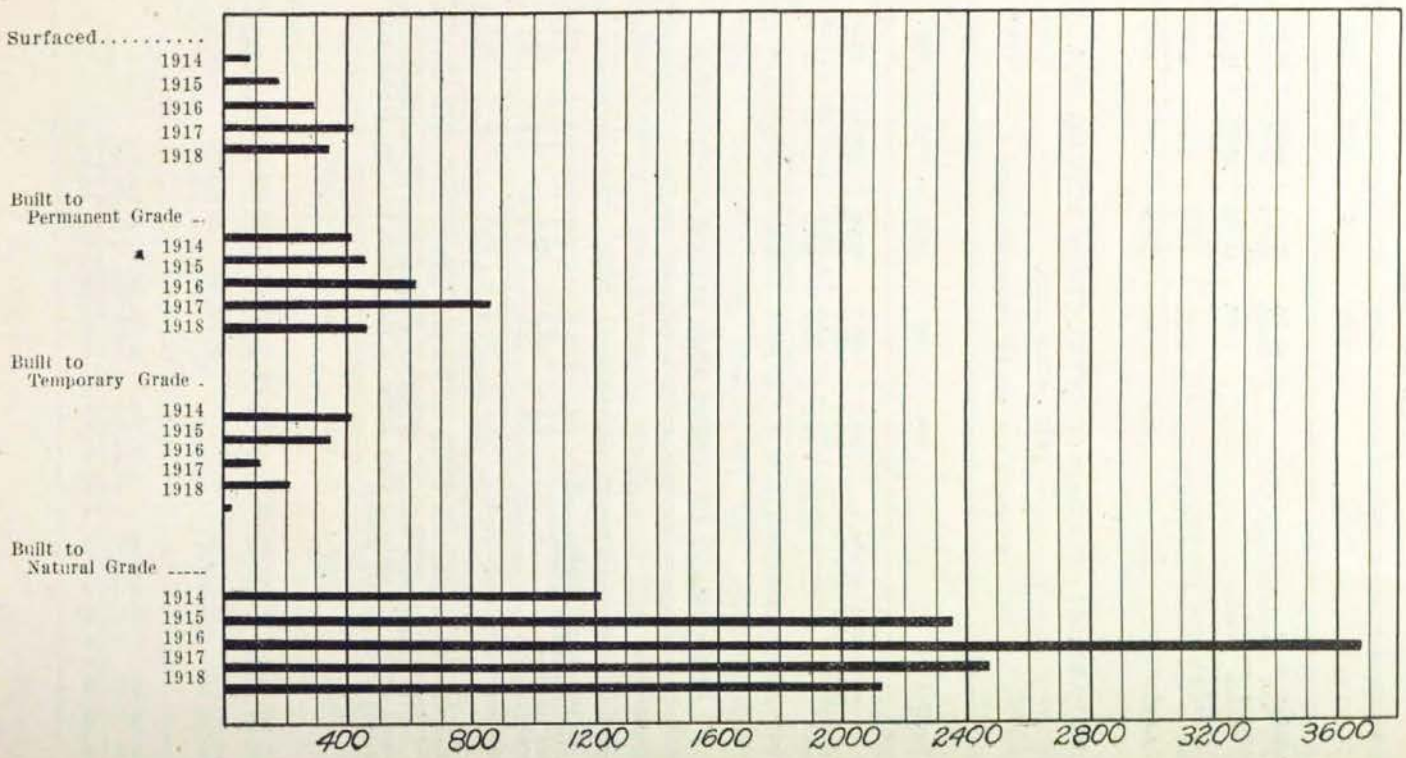


CHART SHOWING COMPARATIVE MILEAGE OF ROADS SURFACED OF ALL TYPES

January 1, 1919.

(Scale—1 inch—8 miles)

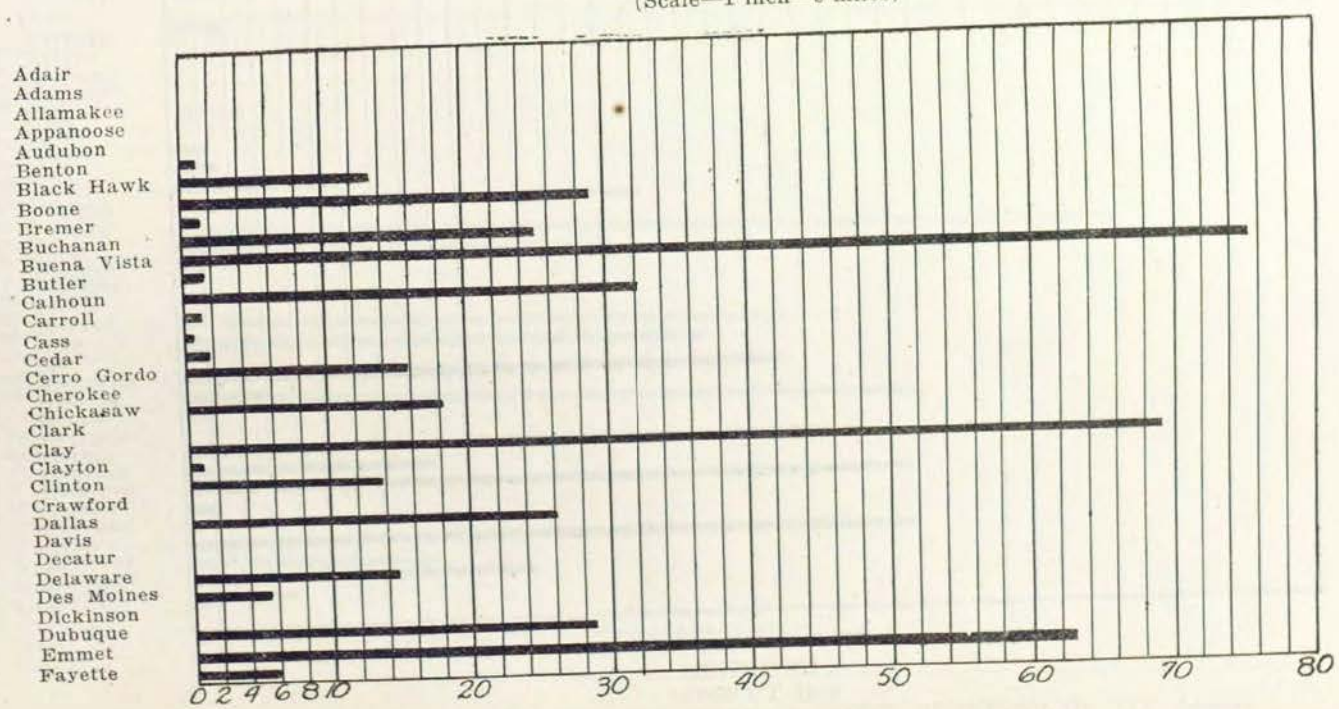


CHART SHOWING COMPARATIVE MILEAGE OF ROADS SURFACED OF ALL TYPES
January 1, 1919.
(Continued)
(Scale—1 inch—8 miles)

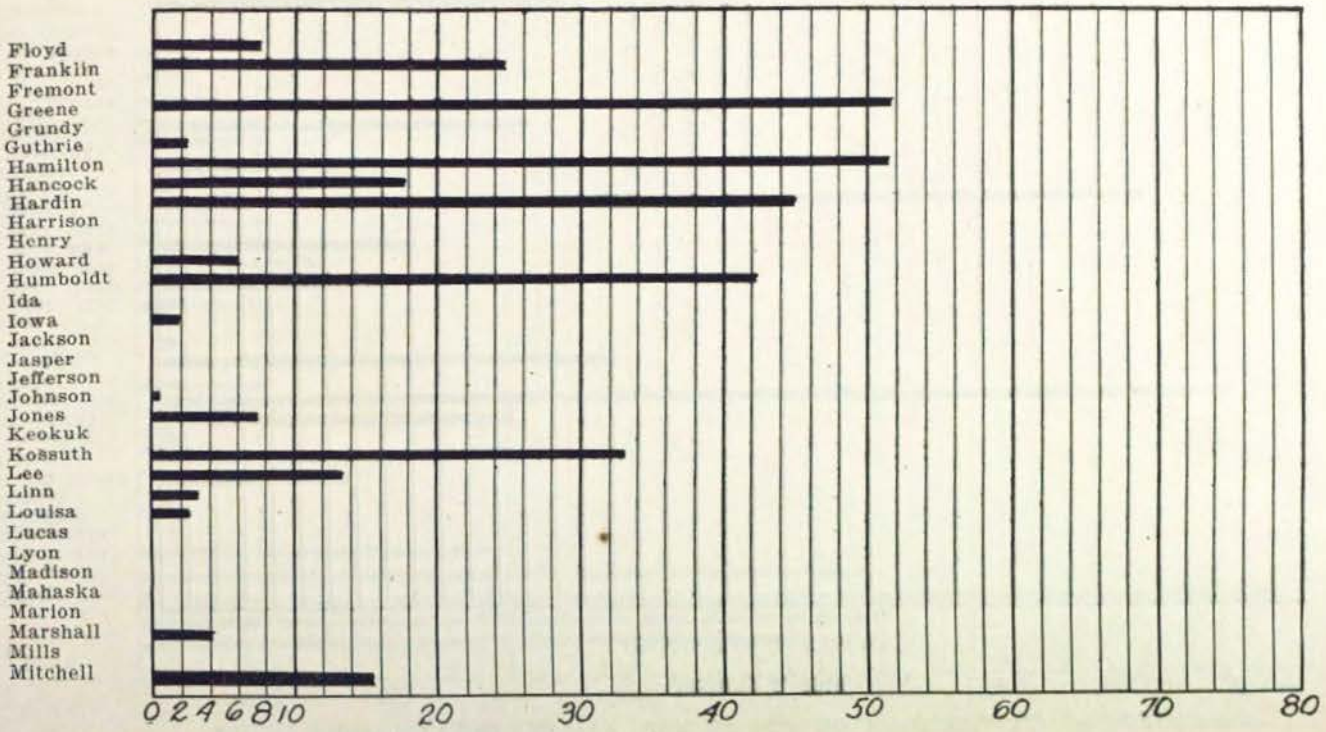


CHART SHOWING COMPARATIVE MILEAGE OF ROADS SURFACED OF ALL TYPES
January 1, 1919
(Continued)
(Scale—1 inch—8 miles)

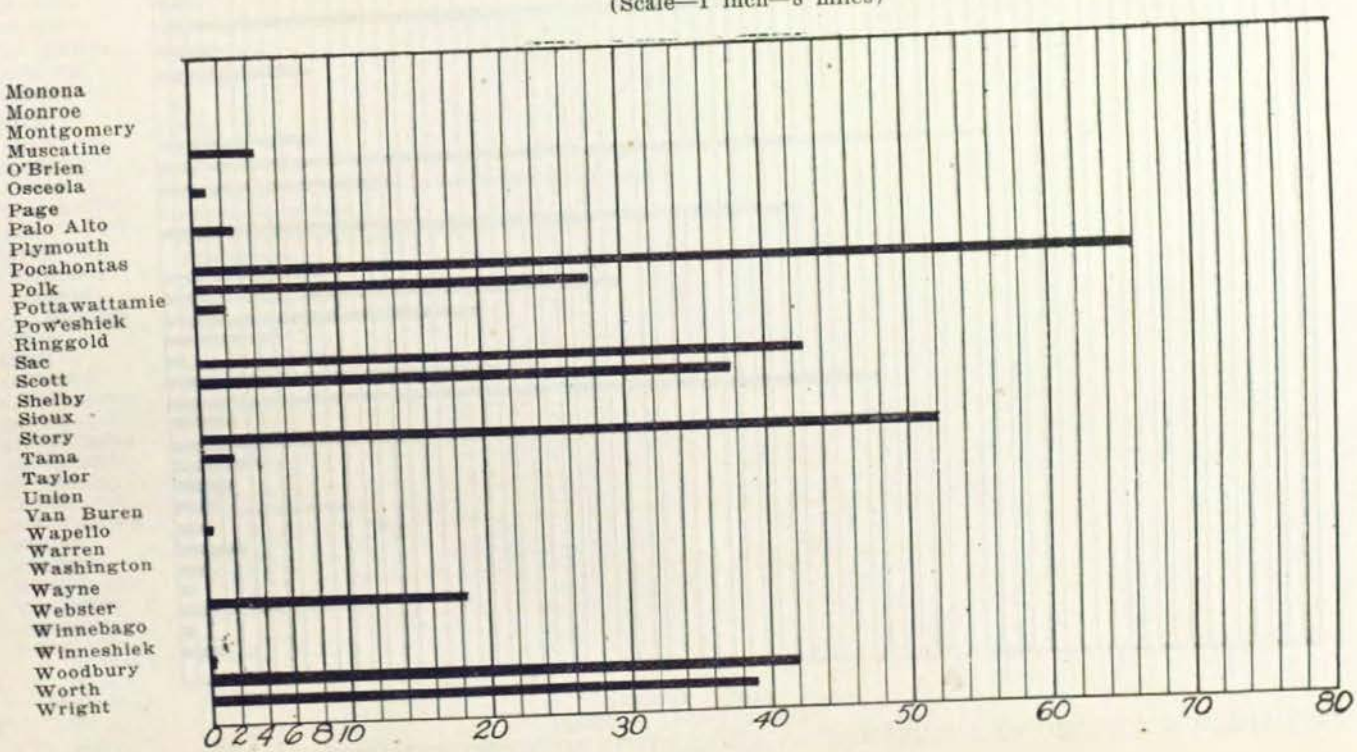


CHART SHOWING COMPARATIVE MILEAGE OF ROADS BUILT TO PERMANENT GRADE, BUT NOT SURFACED
(Scale—1 inch—16 miles)
January 1, 1919

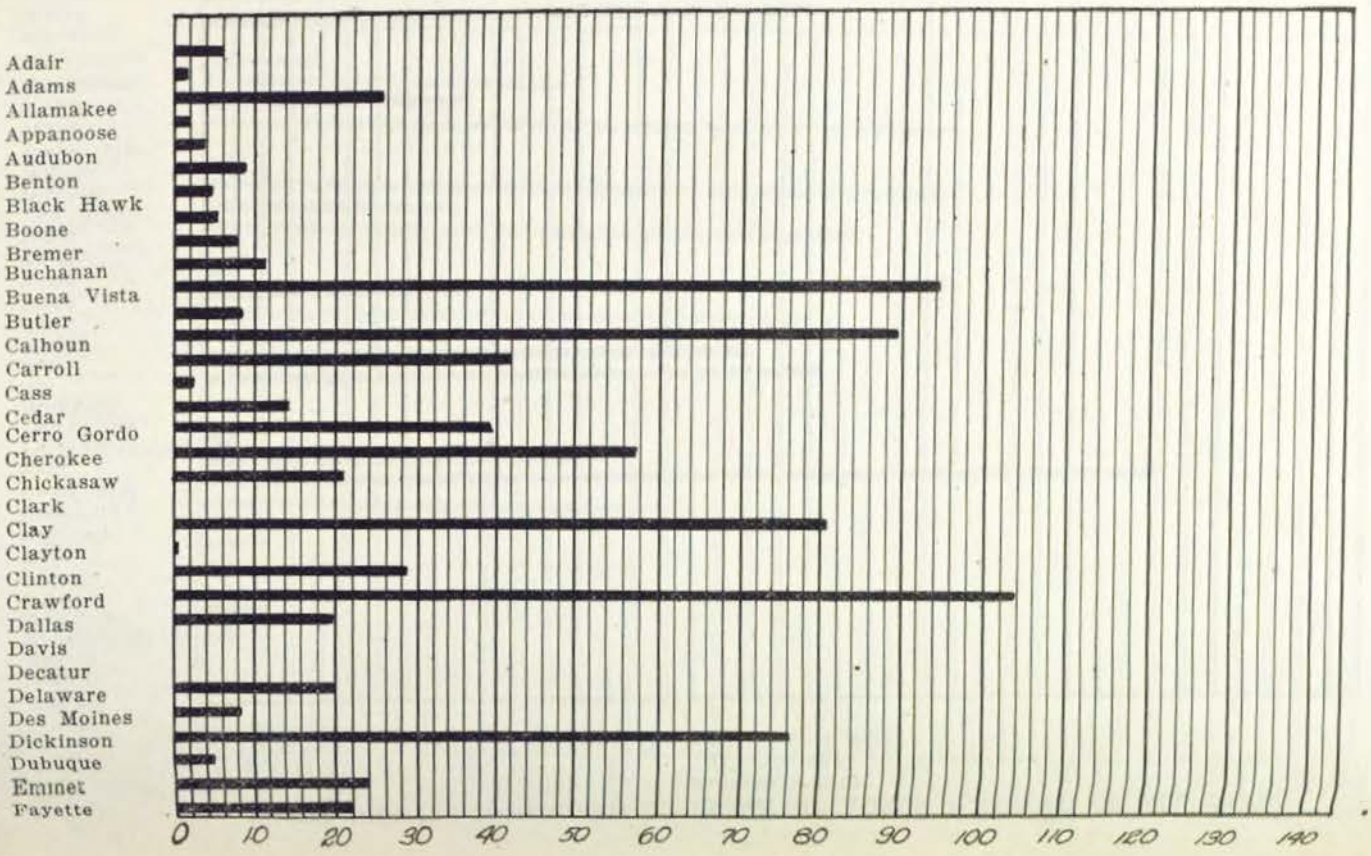


CHART SHOWING COMPARATIVE MILEAGE OF ROADS BUILT TO PERMANENT GRADE, BUT NOT SURFACED
(Scale—1 inch—16 miles)
January 1, 1919

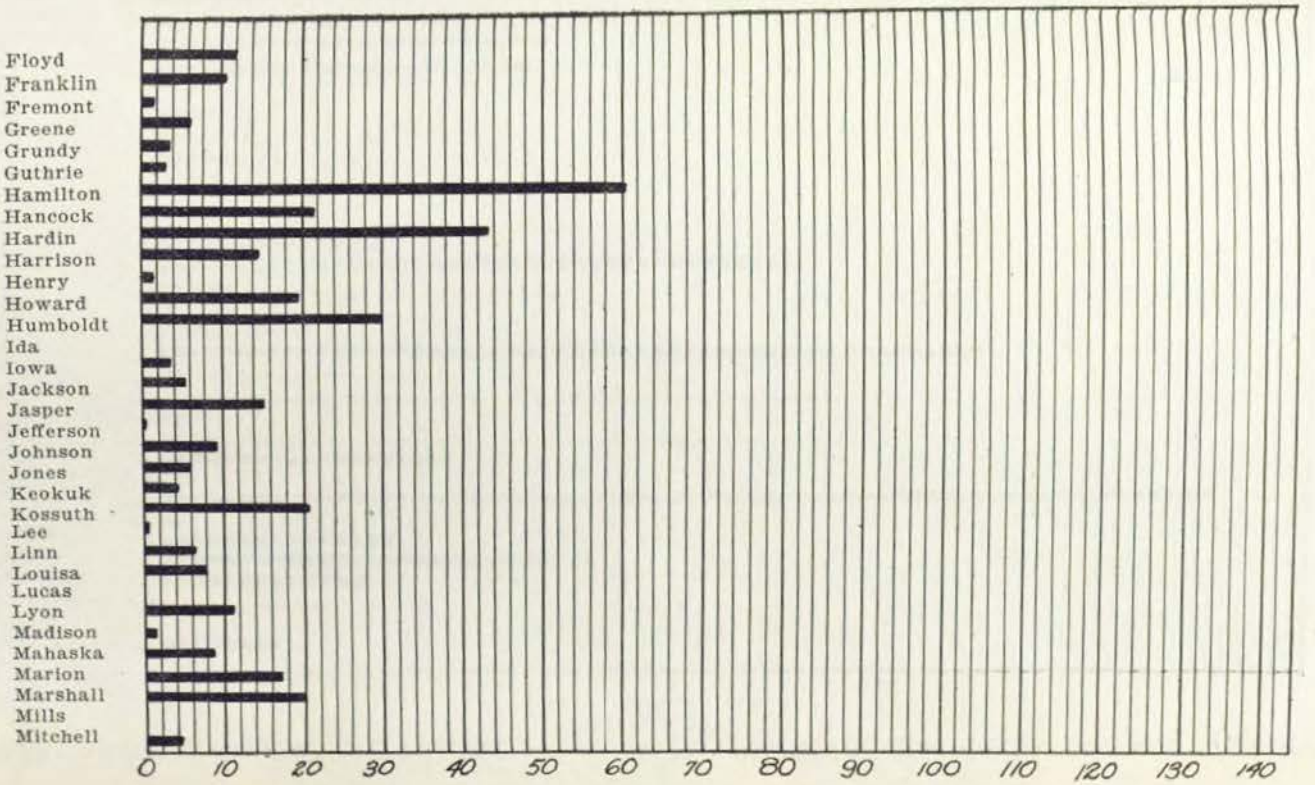
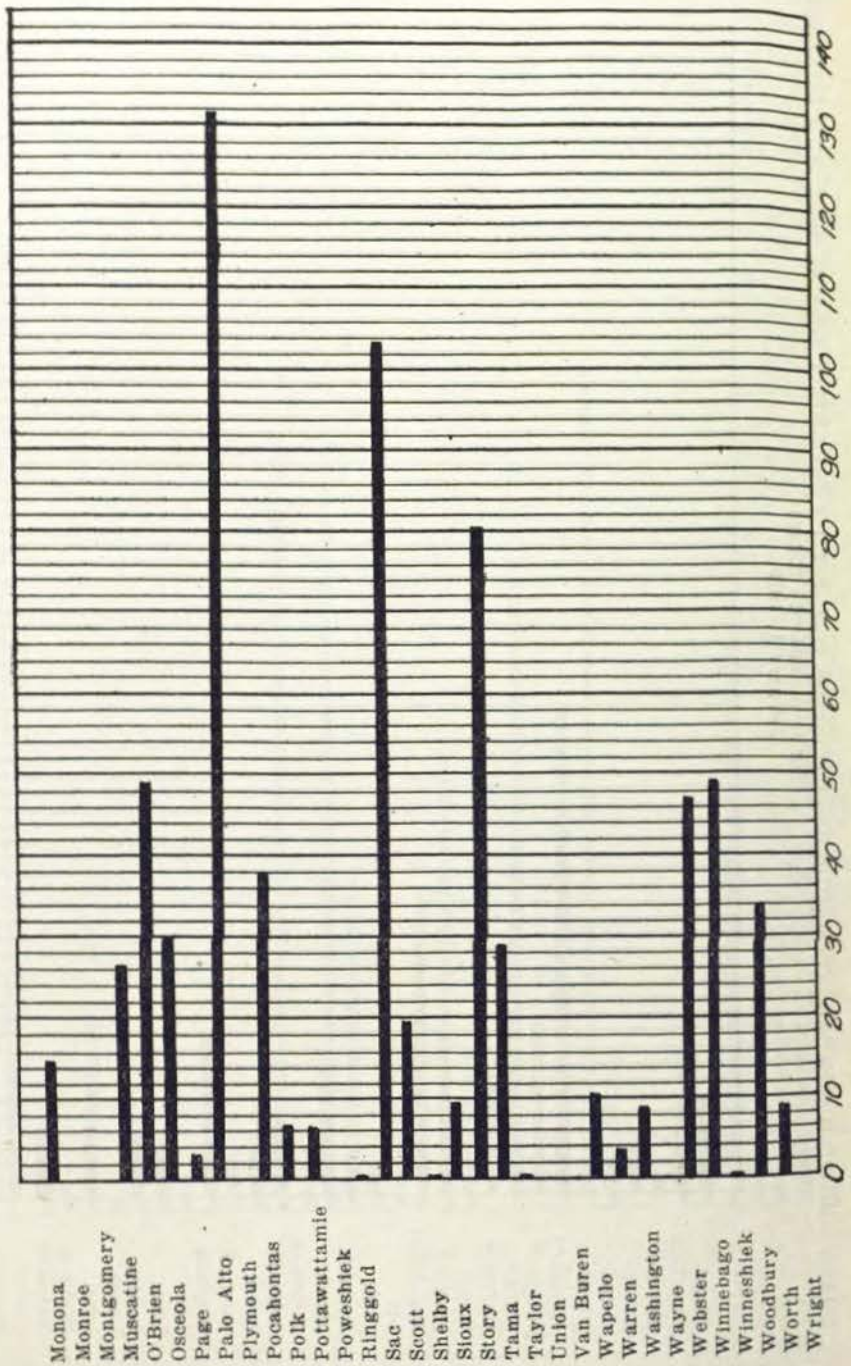


CHART SHOWING COMPARATIVE MILEAGE OF ROADS BUILT TO PERMANENT GRADE, BUT NOT SURFACED
January 1, 1919
(Scale—1 inch—16 miles)



Summary of Road and Bridge Expenditures by Counties.

January 1, 1918, to January 1, 1919.

ADAIR COUNTY.

Roads.

The total county road expenditure was $22,590.86, of which $1,067.68, or 4.72%, was spent for permanent work; $2,988.89, or 13.22%, was spent for temporary work; $2,451.87, or 10.86%, was spent for repairs; $9,506.04,

Of the 172 miles in the county road system, 81 were patrolled, there being 5 districts with an average length of 16 miles.

The total township road expenditure as shown by reports from all of the 18 townships was $37,267.41.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $59,356.53, of which $33,735.37, or 56.8%, was spent for permanent bridges and culverts; $9,106.38, or 15.3%, was spent for temporary bridges and culverts; $8,068.94, or 13.6%, was spent for repairs; $930.84, or 1.6%, was spent for culvert material for townships; $349.37, or 0.6%, was spent for equipment and unused material; $7,075.63, or 11.9%, was spent for filling bridges and culverts; $90.00, or 0.2%, was spent for special cases.

Of the total amount, $42,841.75 was spent for new bridges and culverts; $33,735.37, or 78.8%, was spent for permanent work; and $9,106.38, or 21.2%, was spent for temporary work.

The amounts last above referred to were spent on the following construction:

Fourteen concrete box culverts, costing $15,748.58; 65 concrete pipe (with headwalls), costing $16,489.93; 1 masonry arch culvert, costing $50.29; 22 headwalls on culverts previously constructed, costing $1,328.53; retaining walls, costing $118.04; 192 concrete pipe (without headwalls), costing $8,477.14; 1 wood pile bridge, costing $629.24.

or 42.10%, was spent for maintenance; $5,672.80, or 25.10%, was spent for equipment and unused material; $903.58, or 4.00%, was spent for special cases; 0.4 miles were built to permanent grade at a cost of $997.50 no roads were built to temporary grade; 41.75 miles were built to natural grade at a cost of $2,988.89; no roads were surfaced.

The county road system was dragged an average of 34 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $69.52 per mile of county road. The total average expenditure per mile of county road was $131.20.

ADAMS COUNTY.

Roads.

The total county road expenditure was $11,997.95, of which $55.35, or 0.4%, was spent for permanent work; $196.50, or 1.6%, was spent for temporary work; $4,477.68, or 37.3%, was spent for repairs; $4,818.40, or 40.3%, was spent for maintenance; $1,923.82, or 16.0%, was spent for equipment and unused material, and $526.20, or 4.4%, was spent for special cases.

No roads were built to permanent or temporary grade or surfaced. Three miles were built to natural grade at a cost of $196.50.

The county road system was dragged an average of 42 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $73.34 per mile of county road. The total average expenditure per mile of county road was $95.20.

Of the 126 miles in the county road system, 50 were patrolled, there being 1 district with an average length of 50 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $22,051.42.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $37,673.18, of which $9,227.45, or 24.6%, was spent for permanent bridges and culverts; $4,526.64, or 12.1%, was spent for temporary bridges and culverts; $7,786.10, or 20.6%, was spent for repairs; $2,953.67, or 7.8%, was spent for culvert material for townships; $5,416.58, or 14.4%, was spent for equipment and unused material; $7,525.32, or 19.9%, was spent for filling bridges and culverts, and $237.42, or 0.6% was spent for special cases.

Of the total amount, $13,754.09 was spent for new bridges and culverts; $9,227.45, or 67.2%, was spent for permanent work; $4,526.64, or 32.8%, was spent for temporary work.

The amounts last above referred to were spent on the following construction: Forty concrete pipe culverts with headwalls, costing $9,190.93; 1 headwall on culvert, costing $36.52; 14 concrete pipe culverts without headwalls, costing $466.57, and 14 wood pile bridges, costing $4,060.07.

ALLAMAKEE COUNTY.

Roads.

The total county road expenditure was $43,674.46, of which $2,617.14, or 6.0%, was spent for permanent work; $17,931.90, or 41.0%, was spent for temporary work; $11,493.72, or 26.3%, was spent for repairs; $5,700.30, or 13.0%, was spent for maintenance; $5,064.15, or 11.6%, was spent for equipment and unused material; $867.25, or 2.1%, was spent for special cases. 1.3 miles were built to permanent grade at a cost of $2,617.14. No roads were built to temporary grade. 35.5 miles were built to natural grade at a cost of $17,931.90. 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 $132.01 per mile of county road. The total average expenditure per mile of county road was $335.00.

Of the 130 miles in the county road system, 33 were patrolled, there being 3 districts with an average length of 11 miles.

The total township road expenditure, as shown by reports from all of the 18 townships, was $29,817.25.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $43,218.53, of which $12,530.41, or 29.0%, was spent for permanent bridges and culverts; $9,465.70, or 21.9%, was spent for temporary bridges and culverts; $11,776.29, or 27.2%, was spent for repairs; $2,500.11, or 5.8%, was spent for culvert material for townships; $4,180.47, or 9.7%, was spent for equipment and unused material; $495.75, or 1.1%, was spent for filling bridges and culverts; $2,269.80, or 5.3%, was spent for special cases.

Of the total amount, $21,996.11 was spent for new bridges and culverts; $12,530.41, or 57%, was spent for permanent work; $9,465.70, or 43%, was spent for temporary work. The amounts last above referred to were spent on the following construction: 10 concrete box culverts, costing $4,828.93; 2 masonry arch culverts, costing $1,402.35; 4 masonry box culverts, costing $1,117.65; 3 concrete slab bridges, costing $3,521.03; 2 concrete arch bridges, costing $810.45; 1 I-beam span on concrete abutments, costing $850.00; 24 concrete pipe (without headwalls), costing $1,475.60; corrugated pipe (without headwalls), costing $29.25; 1 I-beam span on piling abutments, costing $311.61; 1 pony truss on piling, costing $970.35; 8 wood pile bridges, costing $6,480.39; miscellaneous bridges and culverts, costing $198.50.

APPANOOSE COUNTY.

Roads.

The total county road expenditure was $28,561.20 of which $12,045.62 or 42.2% was spent for repairs; $8,036.06 or 28.0% was spent for maintenance; $6,209.05 or 21.9% was spent for equipment and unused material, and $2,270.47 or 7.9% was spent for special cases.

The county road system was dragged an average of 37 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $120.60 per mile of county road. The total average expenditure per mile of county road was $171.90.

Of the 166 miles in the county road system, 69 were patrolled, there being 2 districts with an average length of 34.5 miles.

The total township road expenditure as shown by reports from all of the 17 townships was $28,992.45.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $50,398.79 of which $13,771.80 or 27.2% was spent for permanent bridges and culverts; $3,770.81 or 7.5% was spent for temporary bridges and culverts; $10,592.59 or 21.1% was spent for repairs; $8,454.06 or 16.8% was spent for culvert material for townships; $3,884.40 or 7.7% was spent for equipment and unused material; $9,559.25 or 19.0% was spent for filling bridges and culverts, and $365.88 or 0.7% was spent for special cases.

Of the total amount $17,542.61 spent for new bridges and culverts, $13,771.80 or 78.5% was spent for permanent work and $3,770.81 or 21.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 2 concrete box culverts, costing $1,770.00; 1 concrete deck girder costing $9,955.00; 2 I-beam spans on concrete abutments, costing $2,046.80; 2 corrugated pipe without headwalls costing $69.60; 71 boiler pipe culverts without headwalls, costing $3,653.21 and 1 cast iron pipe without headwalls, costing $48.00.

AUDUBON COUNTY.

Roads.

The total county road expenditure was $13,263.74 of which $11.25 or 0.1% was spent for permanent work; $5,511.95 or 41.5% was spent for repairs; $6,507.03 or 49.1% was spent for maintenance; $879.51 or 6.6% was spent for equipment and unused material, and $354.00 or 2.7% was spent for special cases.

The county road system was dragged an average of 27 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $85.85 per mile of county road. The total average expenditure per mile of county road was $94.75.

Of the 140 miles in the county road system, 140 were patrolled, there being 3 districts with an average length of 46⅔ miles.

The total township road expenditure as shown by reports from 8 of the 12 townships was $21,165.90.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $59,231.63 of which $27,792.16 or 47.0% was spent for permanent bridges and culverts; $14,664.81 or 24.5% was spent for temporary bridges and culverts; $6,098.09 or 10.4% was spent for repairs; $4,086.76 or 6.9% was spent for culvert material for townships; $2,924.21 or 4.9% was spent for equipment and unused material; $2,976.02 or 5.1% was spent for filling bridges and culverts, and $689.58 or 1.2% was spent for special cases.

Of the total amount $42,456.97 spent for new bridges and culverts, $27,792.16 or 65.5% was spent for permanent work and $14,664.81 or 34.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 19 concrete box culverts costing $23,058.64; 4 concrete pipe with headwalls, costing $1,027.07; 1 concrete slab bridge costing $3,683.55; 1 I-beam span on concrete abutments costing $22.90; 16 concrete pipe without headwalls costing $750.72; 5 corrugated pipe without headwalls costing $154.68 and 37 wood pile bridges costing $13,759.41.

BENTON COUNTY.

Roads.

The total county road expenditure was $41,726.63 of which $2,233.65 or 5.3% was spent for permanent work; $8,901.06 or 21.3% was spent for temporary work; $14,035.77 or 33.7% was spent for repairs; $5,962.35 or 14.3% was spent for maintenance; $10,378.80 or 24.9% was spent for equipment and unused material and $215.00 or 0.5% was spent for special cases.

0.36 of a mile was built to permanent grade at a cost of $1,714.56, and 92.5 miles were built to natural grade at a cost of $8,901.06. There were no roads surfaced or built to temporary grade.

The county road system was dragged an average of 26.3 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $93.23 per mile of county road. The total average expenditure per mile of county road was $195.00.

Of the 214 miles in the county road system, 214 were patrolled, there being 1 district with an average length of 214 miles.

The total township road expenditure as shown by reports from all of the 20 townships was $60,344.77.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $106,331.64 of which $75,431.68 or 70.9% was spent for permanent bridges and culverts; $2,263.04 or 2.1% was spent for temporary bridges and culverts; $12,522.47 or 11.8% was spent for repairs; $4,361.73 or 4.1% was spent for culvert material for townships; $2,980.14 or 2.8% was spent for equipment and unused material; $7,258.14 or 6.9% was spent for filling bridges and culverts and $1,514.44 or 1.4% was spent for special cases.

Of the total amount $77,694.72 spent for new bridges and culverts, $75,431.68 or 97.1% was spent for permanent work and $2,263.04 or 2.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 95 concrete box culverts costing $48,237.51; 5 concrete slab bridges costing $10,246.59; 6 concrete thru girder bridges costing $12,925.34; 2 pony trusses on concrete abutments, costing $3,272.43; 1 concrete cantilever girder costing $749.81; and 95 corrugated pipe culverts without headwalls, costing $2,263.04.

BLACK HAWK COUNTY.

Roads.

The total county road expenditure was $28,127.99, of which $1,037.33 or 3.7% was spent for permanent work; $8,528.28 or 30.4% was spent

for temporary work; $2,686.70 or 9.5% was spent for repairs; $12,646.09 or 44.9% was spent for maintenance; $1,516.74 or 5.4% was spent for equipment and unused material; and $1,712.85 or 6.1% was spent for special cases.

There were no roads built to permanent or temporary grade, and none were surfaced. 40.8 miles were built to natural grade at a cost of $8,528.28.

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 $82.24 per mile of county road. The total average expenditure per mile of county road was $151.00.

Of the 186 miles in the county road system, 186 were patrolled, there being 14 districts with an average length of 13.3 miles.

The total township road expenditure as shown by reports from 18 of the 18 townships was $35,246.56.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $54,074.56, of which $13,400.75 or 24.8% was spent for permanent bridges and culverts; $2,454.19 or 4.5% was spent for temporary bridges and culverts; $13,980.48 or 25.8% was spent for repairs; $3,368.03 or 6.2% was spent for culvert material for townships; $9,149.06 or 17% was spent for equipment and unused material; $8,219.90 or 15.2% was spent for filling bridges and culverts, and $3,502.15 or 6.5% was spent for special cases.

Of the total amount $15,854.94 spent for new bridges and culverts, $13,400.75 or 84.5% was spent for permanent work; $2,454.19 or 15.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 57 concrete box culverts costing $12,532.43; 1 corrugated pipe culvert with headwalls costing $139.88; 1 retaining wall costing $728.44; 117 corrugated pipe culverts without headwalls costing $2,302.81; and 18 miscellaneous bridges and culverts costing $151.38.

BOONE COUNTY.

Roads.

The total county road expenditure was $25,220.18 of which $7,446.46 or 29.5% was spent for permanent work; $5,063.85 or 20.1% was spent for temporary work; $379.41 or 1.5% was spent for repairs; $9,213.73 or 36.6% was spent for maintenance; $990.93 or 3.9% was spent for equipment and unused material, and $2,125.80 or 8.4% was spent for special cases.

0.25 miles were built to permanent grade at a cost of $1,854.58. 55.5 miles were built to natural grade at a cost of $5,063.85. 2.65 miles were surfaced with gravel at a cost of $3,980.14. There were no roads built to temporary grade.

The county road system was dragged an average of 30 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $61.10 per mile of county road. The total average expenditure per mile of county road was $160.30.

Of the 157 miles in the county road system, 157 were patrolled, there being 4 districts with an average length of 39.25 miles.

The total township road expenditure as shown by reports from 14 of the 17 townships was $49,148.67.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $82,729.43 of which $63,952.64 or 77.3% was spent for permanent bridges and culverts; $3,156.51 or 3.8% was spent for temporary bridges and culverts; $3,407.72 or 4.1% was spent for repairs; $3,478.49 or 4.2% was spent for culvert material for townships; $4,545.48 or 5.5% was spent for equipment and unused material; $3,655.69 or 4.4% was spent for filling bridges and culverts; $532.90 or 0.7% was spent for special cases.

Of the total amount $67,109.15 spent for new bridges and culverts, $63,952.64 or 95.3% was spent for permanent work and $3,156.51 or 4.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 32 concrete box culverts costing $39,438.93; 1 circular concrete culvert costing $133.72; 1 concrete slab bridge costing $1,853.62; 3 concrete arch bridges costing $8,308.20; 3 concrete deck girders costing $8,276.75; 3 I-beam spans on concrete abutments costing $5,941.42 and corrugated pipe without headwalls, costing $2,196.72.

BREMER COUNTY.

Roads.

The total county road expenditure was $20,734.55 of which $4,213.02 or 20.3% was spent for permanent work; $4,048.63 or 19.5% was spent for temporary work; $2,099.18 or 10.2% was spent for repairs; $5,449.66 or 26.3% was spent for maintenance; $2,554.42 or 12.3% was spent for equipment and unused material, and $2,369.64 or 11.4% was spent for special cases.

1.25 miles were built to permanent grade at a cost of $2,909.47 and 19.25 miles were built to natural grade at a cost of $4,048.63. There were no roads built to temporary grade, and none were surfaced.

The county road system was dragged an average of 32 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $60.15 per mile of county road. The total average expenditure per mile of county road was $165.50.

Of the 125 miles in the county road system, 51 were patrolled, there being 3 districts with an average length of 17 miles.

The total township road expenditure as shown by reports from 9 of the 14 townships was $24,740.98.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $41,018.54 of which $23,646.59 or 57.7% was spent for permanent bridges and culverts; $497.90 or 1.2% was spent for temporary bridges and culverts; $5,025.98 or 12.2% was spent for repairs; $1,000.00 or 2.5% was

spent for culvert material for townships; $7,677.18 or 18.7% was spent for equipment and unused material and $3,170.89 or 7.7% was spent for filling bridges and culverts.

Of the total amount $24,144.49 spent for new bridges and culverts, $23,646.59 or 97.9% was spent for permanent work and $497.90 or 2.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 23 concrete box culverts costing $9,072.79; 2 concrete deck girders costing $8,862.80; 2 pony trusses with concrete abutments, costing $5,711.00 and 17 corrugated pipe culverts without headwalls, costing $497.90.

BUCHANAN COUNTY.

Roads.

The total county road expenditure was $38,391.48, of which $18,788.63 or 48.9% was spent for permanent work; $4,553.49 or 11.9% was spent for temporary work; $225.49 or 0.6% was spent for repairs; $7,197.59 or 18.7% was spent for maintenance; $5,337.72 or 13.9% was spent for equipment and unused material, and $2,288.56 or 6.0% was spent for special cases.

There were no roads built to permanent grade. 0.1 mile was built to temporary grade at a cost of $161.55. 24 miles were built to natural grade at a cost of $4,553.49. 15 miles were surfaced with gravel at a cost of $15,167.77.

The county road system was dragged an average of 49 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $42,32 per mile of county road. The total average expenditure per mile of county road was $219.80.

Of the 175 miles in the county road system, all were patrolled, there being 13 districts with an average length of 13.4 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was $32,407.59.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $37,468.87, of which $23,505.00 or 62.8% was spent for permanent bridges and culverts; $1,406.81 or 3.8% was spent for temporary bridges and culverts; $6,004.89 or 16% was spent for repairs; $6,215.77 or 16.5% was spent for culvert material for townships; $32.33 or 0.1% was spent for equipment and unused material; $304.07 or .8% was spent for special cases.

Of the total amount $24,911.81 spent for new bridges and culverts, $23,505.00 or 94.4% was spent for permanent work; and $1,406.81 or 5.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 48 concrete box culverts costing $17,695.75; 1 concrete abutment costing $1,511.65; 2 concrete deck girders costing $4,297.60; and 60 corrugated pipe culverts without headwalls costing $1,406.81.

BUENA VISTA COUNTY.

Roads.

The total county road expenditure was $60,794.88, of which $28,794.73 or 47.4% was spent for permanent work; $251.25 or 0.4% was spent for temporary work; $5,319.34 or 8.8% was spent for repairs; $12,427.71 or 20.4% was spent for maintenance; $5,652.73 or 9.3% was spent for equipment and unused material, and $8,349.12 or 13.7% was spent for special cases.

There were no roads built to permanent, temporary or natural grade. 25 miles were surfaced with gravel at a cost of $28,521.15.

The county road system was dragged an average of 39 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $104.15 per mile of county road. The total average expenditure per mile of county road was $357.00.

Of the 170 miles in the county road system, all were patrolled, there being 5 districts with an average length of 34 miles.

The total township road expenditure as shown by reports from 16 of the 18 townships was $46,240.38.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $28,519.95, of which $25,630.17 or 89.9% was spent for permanent bridges and culverts; $83.02 or .2% was spent for temporary bridges and culverts; $776.64 or 2.7% was spent for repairs; $105.60 or .4% was spent for equipment and unused material; $1,142.30 or 4% was spent for filling bridges and culverts, and $782.22 or 2.8% was spent for special cases.

Of the total amount $25,713.19 spent for new bridges and culverts $25,630.17 or 99.7% was spent for permanent work, and $83.02 or .3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 55 concrete box culverts costing $16,129.77; 9 headwalls on culverts costing $1,755.47; 1 retaining wall costing $191.43; 19 I-beam spans on concrete abutments costing $7,553.50; 2 corrugated pipe culverts without headwalls costing $3.90, and 2 miscellaneous bridges and culverts costing $79.12.

BUTLER COUNTY.

Roads.

The total county road expenditure was $19,301.04 of which $248.86 or 1.3% was spent for permanent work; $614.57 or 3.2% was spent for temporary work; $2,646.39 or 13.7% was spent for repairs; $12,773.48 or 66.2% was spent for maintenance and $3,017.74 or 15.6% was spent for equipment and unused material.

3 miles were built to natural grade at a cost of $614.57. There were no roads built to permanent or temporary grade and none were surfaced

The county road system was dragged an average of 27 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $83.04 per mile of county road. The total average expenditure per mile of county road was $104.40.

Of the 185 miles in the county road system, 185 were patrolled, there being 13 districts with an average length of 14.2 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was $38,205.90.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $57,906.11 of which $15,667.27 or 27.17% was spent for permanent bridges and culverts; $6,384.00 or 11% was spent for temporary bridges and culverts; $23,745.31 or 40.8% was spent for repairs; $8,020.10 or 14.0% was spent for equipment and unused material; $4,069.43 or 7% was spent for filling bridges and culverts and $20.00 or .03% was spent for special cases.

Of the total amount $22,051.27 spent for new bridges and culverts, $15,667.27 or 71% was spent for permanent work and $6,384.00 or 29% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 4 concrete box culverts costing $872.54; 1 concrete slab bridge costing $496.81; 2 concrete through girders costing $5,664.80; 1 steel girder on concrete abutments costing $1,634.24; 3 pony trusses on concrete abutments costing $6,998.88 and 8 wood pile bridges costing $6,384.00.

CALHOUN COUNTY.

Roads.

The total county road expenditure was $43,138.37, of which $26,953.09 or 6.3% was spent for permanent work; $1,807.20 or 4.2% was spent for temporary work; $2,073.12 or 4.8% was spent for repairs; $4,048.19 or 9.4% was spent for maintenance; $4,911.54 or 11.4% was spent for equipment and unused material, and $3,345.23 or 7.9% was spent for special cases.

There were no roads built to a temporary grade. 8.5 miles were built to permanent grade at a cost of $13,859.12. 16 miles were built to natural grade at a cost of $1,807.20. 6.25 miles were surfaced with gravel at a cost of $12,318.00.

The average cost of repairs and maintenance was $35.26 per mile of county road. The total average expenditure per mile of county road was $249.00.

Of the 173 miles in the county road system, no mileage was reported as being patrolled.

The total township road expenditure as shown by reports from all of the 16 townships was $43,830.22.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $47,902.49, of which $22,294.85 or 46.8% was spent for permanent bridges and culverts; $1,727.36 or 3.6% was spent for temporary bridges and culverts; $4,768.53 or 9.9% was spent for repairs; $3,783.68 or 7.9% was spent for culvert material for townships; $12,788.26 or 26.6% was spent for equipment and unused material; $843.35 or 1.7% was spent for filling bridges and culverts, and $1,696.46 or 3.5% was spent for special cases.

Of the total amount $24,022.21 spent for new bridges and culverts, $22,294.85 or 92.9% was spent for permanent work, and $1,727.36 or 7.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 10 concrete box culverts costing $7,769.29; 17 circular concrete culverts costing $2,447.85; 1 concrete abutment costing $2,399.00; 1 concrete deck girder costing $2,878.80; 2 I-beam spans on concrete abutments costing $3,915.61; 1 high steel truss on concrete abutments costing $2,884.30; 5 concrete pipe culverts without headwalls costing $151.36; 34 corrugated pipe culverts without headwalls, $593.56; 1 I-beam span on piling costing $201.24, and 13 miscellaneous bridges and culverts costing $781.20.

CARROLL COUNTY.

Roads.

The total county road expenditure was $51,241.13 of which $24,071.64 or 47.0% was spent for permanent work; $13,061.80 or 25.5% was spent for temporary work; $7,446.33 or 14.5% was spent for repairs; $5,229.47 or 10.2% was spent for maintenance; $1,092.19 or 2.1% was spent for equipment and unused material and $339.70 or 0.7% was spent for special cases.

6 miles were built to permanent grade at a cost of $23,681.35; 41.5 miles were built to natural grade at a cost of $13,035.60; 0.5 of a mile was surfaced with gravel at a cost of $187.40. There were no roads built to temporary grade.

The county road system was dragged at an average cost of $1.70 per mile one round trip. The average cost of repairs and maintenance was $72.43 per mile of county road. The total average expenditure per mile of county road was $292.20.

Of the 175 miles in the county road system, 22 were patrolled, there being 1 district with an average length of 22 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was $34,393.40.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $69,203.79 of which $28,903.35 or 41.9% was spent for permanent bridges and culverts; $4,095.53 or 5.9% was spent for temporary bridges and culverts; $9,846.63 or 14.2% was spent for repairs; $5,731.38 or 8.2% was spent for culvert material for townships; $5,269.00 or 7.6% was spent for equipment and unused material; $867.93 or 1.3% was spent for filling bridges and culverts and $14,489.97 or 20.9% was spent for special cases.

Of the total amount $32,998.88 spent for new bridges and culverts, $28,903.35 or 87.7% was spent for permanent work and $4,095.53 or 12.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 40 concrete box culverts costing $17,529.30; 4 circular concrete culverts costing $736.72; 1 concrete pipe culvert with headwalls costing $95.45; 1 corrugated pipe culvert with headwalls costing $115.95; 1 cast iron pipe with headwalls costing $13.04; 4 concrete deck girders

costing $9,766.89; 2 retaining walls costing $446.00; 1 I-beam span on concrete abutments costing $200.00; concrete pipe culvert without headwalls costing $30.00; corrugated pipe culvert without headwalls costing $1,495.25; wood pile bridges costing $2,315.27, and miscellaneous bridges and culverts costing $255.01.

CASS COUNTY.

Roads.

The total county road expenditure was $19,196.46, of which $219.42 or 1.1% was spent for permanent work; $60.00 or 0.3% was spent for temporary work; $5,977.56 or 31.2% was spent for repairs; $6,448.99 or 33.6% was spent for maintenance; $925.56 or 4.8% was spent for equipment and unused material, $5,564.93 or 29% was spent for special cases.

The final cost of $219.42 was paid on permanent grade built in 1917. There were no roads built to temporary or natural grade and none were surfaced.

The county road system was dragged at an average cost of $0.80 per mile one round trip. The average cost of repairs and maintenance was $87.05 per mile of county road. The total average expenditure per mile of county road was $135.40.

Of the 142 miles in the county road system, no mileage was reported as being patrolled.

The total township road expenditure as shown by reports from all of the 16 townships was $37,216.27.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $83,701.40, of which $36,702.85 or 44% was spent for permanent bridge and culverts; $10,037.54 or 12% was spent for temporary bridges and culverts; $11,686.58 or 13.9% was spent for repairs; $5,655.50 or 6.6% was spent for culvert material for townships; $8,852.26 or 10.6% was spent for equipment and unused material; and $10,766.67 or 12.9% was spent for filling bridges and culverts.

Of the total amount $46,740.39 was spent for new bridges and culverts, $36,702.85 or 78.6% was spent for permanent work, and $10,037,54 or 21.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 28 concrete box culverts costing $30,498.71; 1 boiler pipe culvert with headwalls costing $336.90; 1 I-beam span on concrete abutments costing $569.00; 1 pony truss with concrete abutments costing $5,298.24; 27 concrete pipe culverts with no headwalls costing $3,856.34; 5 boiler pipe culverts with no headwalls costing $258.05; 17 wood pile bridges costing $5,666.59, and 8 miscellaneous bridges and culverts costing $256.56.

CERRO GORDO COUNTY.

Roads.

The total county road expenditure was $109,773.83 of which $82,167.03 or 74.8% was spent for permanent work; $2,698.02 or 2.5% was spent for temporary work; $12,796.79 or 11.6% was spent for repairs; $9,117.05

or 8.3% was spent for maintenance; $1394.40 or 1.3% was spent for equipment and unused material and $1,600.54 or 1.5% was spent for special cases.

10.9 miles were built to permanent grade at a cost of $5,553.44. No roads were built to temporary grade. 10.4 miles were built to natural grade at a cost of $2,698.02. 3.2 miles were surfaced with gravel at a cost of $3,372.25; .25 miles was surfaced with asphalt at a cost of $7,888.11; and 2.60 miles were surfaced with concrete at a cost of $56,770.61.

The county roads system was dragged an average of 22 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $141.06 per mile of county road. The total average expenditure per mile of county road was $70.90.

Of the 155 miles in the county road system, 128 were patrolled, there being 9 districts with an average length of 14.2 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was $40,941.16.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $69,178.67 of which $51,883.92 or 75.0% was spent for permanent bridges and culverts; $682.89 or .99% was spent for temporary bridges and culverts; $7,335.71 or 10.5% was spent for repairs; $1,769.15 or 2.6% was spent for culvert material for townships; $6,480.00 or 9.4% was spent for equipment and unused material; $927.00 or 1.35% was spent for filling bridges and culverts and $100.00 or .16% was spent for special cases.

Of the total amount $52,566.81 spent for new bridges and culverts $51,883.92 or 98.7% was spent for permanent work and ..682.89 or 1.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction; 30 concrete box culverts, costing $10,066.81; 46 circular concrete culverts costing $5,195.14; 7 concrete slab bridges costing $8,701.22; 4 concrete deck girders costing $14,621.60; 3 I-beam spans concrete abutments costing $4,845.05; 2 pony trusses concrete abutments costing $8,454.10; 25 boiler pipe culverts without headwalls costing $580.10; 1 wood pile bridge costing $47.44 and 6 miscellaneous bridges and culverts costing $55.35.

CHEROKEE COUNTY.

Roads.

The total county road expenditure was $18,430.22 of which $4,349.14 or 23.6% was spent for permanent work; $1,171.06 or 6.4% was spent for temporary work; $3,983.03 or 21.6% was spent for repairs; $5,352.11 or 29% was spent for maintenance; $2,416.78 or 13.1% was spent for equipment and unused material; $1,158.10 or 6.3% was spent for special cases.

2 miles were built to permanent grade at a cost of $4,349.14. No roads were built to temporary grade and none were surfaced. 6 miles were built to natural grade at a cost of $1,171.06.

The county road system was dragged an average of 29 times, the average cost of dragging being $.90 per mile one round trip. The average cost of repairs and maintenance was $60.32 per mile of county road. The total average expenditure per mile of county road was $119.50.

Of the 154 miles in the county road system, 33 were patrolled, there being 3 districts with an average length of 11 miles.

No report of township expenditures was received.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $96,271.36 of which $67,229.64 or 69.8% was spent for permanent bridges and culverts; $65.20 or .01% was spent for temporary bridges and culverts; $6,155.42 or 6.4% was spent for repairs; $7,344.03 of 7.6% was spent for culvert material for townships; $6,323.01 or 6.6% was spent for equipment and unused material; $3,560.19 or 3.7% was spent for filling bridges and culverts, and $5,593.87 or 5.8% was spent for special cases.

Of the total amount $67,294.84 spent for new bridges and culverts, $67,229.64 or 99.9% was spent for permanent work, and $65.20 or .1% was spent for temporary work.

The amount last above referred to was spent on the following construction; 59 concrete box culverts, costing $25,837.06; 5 concrete slab bridges, costing $2,723.55; 1 Retaining wall, costing $983.50; 32 I-beam spans on concrete abutments costing $14,960.17; 7 pony trusses on concrete abutments, costing $1,702.17; 1 high steel truss, concrete abutment, costing $5,698.19; 1 woodpile bridge costing $52.80; 1 miscellaneous bridge or culvert costing $12.40.

CEDAR COUNTY.

Roads.

The total road expenditure was $15,237.83 of which $570.25 or 3.7% was spent for permanent work; 2,938.15 or 19.3% was spent for temporary work; $1,574.94 or 10.3% was spent for repairs; $7,751.10 or 50.9% was spent for maintenance; $2,227.34 or 14.6% was spent for equipment and unused material; and $176.05 or 1.2% was spent for special cases.

There were no roads built to permanent or temporary grades and no surfacing work was done. 33.23 miles were built to natural grade at a cost of $2,848.14.

The county road system was dragged an average of 40 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $58.91 per mile of county road. The total average expenditure per mile of county road was $96.50.

Of the 158 miles in the county road system, 126 were patrolled, there being 4 districts with an average of 31.5 miles.

The total township road expenditure as shown by reports from all of the 17 townships was $40,626.40.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $29,553.88 of which $13,323.22 or 45.2% was spent for permanent bridges and culverts; $94.80 or .3% was spent for temporary bridges and culverts; $9,230.67 or 31.2% was spent for repairs; $21.60 or .1% was spent for culvert material for townships; $6,106.63 or 20.6% was spent for equipment and unused material; $145.88 or .5% was spent for filling bridges and culverts, and $631.08 or 2.1% was spent for special cases.

Of the total amount $13,418.02 spent for new bridges and culverts, $13,323.22 or 99.3% was spent for permanent work and $94.80 or .7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 25 concrete box culverts, costing $10,919.44; 1 I-beam span on concrete abutments, costing $2,403.28; corrugated pipe culverts, no headwalls, costing $52.50 and 1 boiler pipe culvert, no headwalls, costing $42.30.

CHICKASAW COUNTY.

Roads.

The total road expenditure was $25,209.48 of which $13,162.38 or 52.2% was spent for permanent work; $2,488.22 or 9.9% was spent for temporary work; $837.80 or 3.3% was spent for repairs; $5,741.27 or 22.8% was spent for maintenance; $2,444.36 or 9.7% was spent for equipment and unused material, and $535.45 or 2.1% was spent for special cases.

11.44 miles were built to permanent grade at a cost of $7,712.78 There were no roads built to temporary grade. 7½ miles were built to natural grade at a cost of $2,488.22. 9.87 miles were surfaced with gravel at a cost of $5,311.75.

The county road system was dragged an average of 22 times, the average cost of dragging being $1.01 per mile one round trip. The average cost of repairs and maintenance was $42.04 per mile of county road. The total average expenditure per mile of county road was $161.75.

Of the 156 miles in the county road system, 152 were patrolled, there being 16 districts with an average length of 9.5 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $31,023.04.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $57,267.36 of which $28,659.39 or 50.3% was spent for permanent bridges and culverts; $12,310.39 or 21.2% was spent for temporary bridges and culverts; $7,969.79 or 13.9% was spent for repairs; $369.60 or .6% was spent for culvert material for townships; $5,791.13 or 10.2% was spent for equipment and unused material; $1,868.41 or 3.3% was spent for filling bridges and culverts, and $298.65 or .5% was spent for special cases.

Of the total amount $40,969.78 spent for new bridges and culverts, $28,659.39 or 69.9% was spent for permanent work, and $12,310.39 or 30.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 5 concrete box culverts, costing $1,512.19; 1 concrete slab costing $2,912.07; 1 masonry abutment costing $120.28; 2 I-beam spans concrete abutments costing $4,558.31; 3 pony trusses concrete abutments, costing $19,556.54 and 43 wood pile bridges, costing $12,310.39.

CLARK COUNTY.

Roads.

The total county road expenditure was $14,466.67 of which $2,317.95 or 16% was spent for temporary work; $7,496 or 51.8% was spent for repairs; $2,933.98 or 20.3% was spent for maintenance; $1,162.98 or 8.1% was spent for equipment and unused material, and $555.00 or 3.8% was spent for special cases.

There were no roads built to permanent or temporary grades and no surfacing was done. 22 miles were built to natural grade at a cost of $2,317.95.

The county road system was dragged an average of 35 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $90.01 per mile of county road. The total average expenditure of county road was $125.60.

Of the 115 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from 5 of the 12 townships was $9,194.00.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $43,963.56 of which $15,074.11 or 34.2% was spent for permanent bridges and culverts; $5,329.16 or 12.2% was spent for temporary bridges and culverts; $5,587.95 or 12.8% was spent for repairs; $4,796.68 or 10.9% was spent for culvert material for townships; $5,110.50 or 11.6% was spent for equipment and unused material; $7,223.30 or 16.4% was spent for filling bridges and culverts, and $841.86 or 1.9% was spent for special cases.

Of the total amount $20,403.27 spent for new bridges and culverts $15,074.11 or 73.5% was spent for permanent work, and $5,329.16 or 26.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 22 concrete box culverts, costing $12,888.14; 1 pony truss concrete abutment, costing $2,185.97; 1 concrete pipe culvert, no headwalls, costing $225.60; 66 corrugated pipe culverts, no headwalls, costing $2,753.07; 2 I-beam spans on piling, costing $1,421.59; 3 woodpile bridges, costing $928.90.

CLAY COUNTY.

Roads.

The total county road expenditure was $45,787.32 of which $25,580.65 or 55.9% was spent for permanent work; $1,272.60 or 2.8% was spent for repairs; $7,969.16 or 17.4% was spent for maintenance; $2,127.46 or 4.6% was spent for equipment and unused material and $8,837.45 or 19.3% was spent for special cases.

1.25 miles were built to permanent grade at a cost of $889.97. No roads were built to temporary or natural grade. 24¼ miles were surfaced with gravel at a cost of $23,116.34.

The county road system was dragged an average of 21 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $61.61 per mile of county road. The total average expenditure per mile of county road was $305.00.

Of the 150 miles in the county road system, 75 were patrolled, there being 5 districts with an average length of 15 miles.

The total township road expenditure as shown by reports from 11 of the 16 townships was $24,035.60.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $60,842.70 of which $46,141.55 or 75.9% was spent for permanent bridges and culverts; $1,944.96 or 3.2% was spent for temporary bridges and culverts; $1,428.37 or 2.3% was spent for repairs; $2,324.78 or 3.8% was spent for culvert material for townships; $7,110.31 or 11.8% was spent for equipment and unused material; $1,360.45 or 2.2% was spent for filling bridges and culverts, and $532.28 or .8% was spent for special cases.

Of the total amount $48,086.51 spent for new bridges and culverts, $46,141.55 or 96% was spent for permanent work, and $1,944.96 or 4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 57 concrete box culverts costing $28,711.79; 1 circular concrete culvert costing $72.84; 14 I-beam spans on concrete abutments costing $15,992.52; 3 pony trusses, concrete abutments costing $1,364.40; corrugated pipe, no headwalls costing $1,787.91; 2 woodpile bridges costing $106.00, and 1 miscellaneous bridge or culvert costing $51.05.

CLAYTON COUNTY.

Roads.

The total county road expenditure was $29,782.82, of which $4,967.95 or 16.6% was spent for permanent work; $4,234.39 or 14.2% was spent for temporary work; $416.35 or 1.4% was spent for repairs; $18,674.29 or 62.8% was spent for maintenance; $1,439.84 or 4.8% was spent for equipment and unused material, and $50.00 or 0.2% was spent for special cases.

0.45 mile was built to permanent grade at a cost of $2,774.00. .35 mile was built to temporary grade at a cost of $2,193.95. 36.25 miles were built to natural grade at a cost of $4,234.39. There were no roads surfaced.

The county road system was dragged an average of 49 times, the average cost of dragging being $0.72 per mile one round trip. The average cost of repairs and maintenance was $94.83 per mile of county road. The total average expenditure per mile of county road was $148.30.

Of the 201 miles in the county road system, all were patrolled, there being 38 districts with an average length of 5.3 miles.

The total township road expenditure as shown by reports from all of the 22 townships was $44,377.02.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $63,971,13 of which $46,949.47 or 73.6% was spent for permanent bridges and culverts; $2,631.88 or 4.1% was spent for temporary bridges and culverts; $6,342.95 or 9.9% was spent for repairs; $3,314.34 or 5.2% was spent for culvert material for townships; $949.36 or 1.5% was spent for equipment and unused material; $3,187.23 or 4.8% was spent for filling bridges and culverts, and $595.90 or .9% was spent for special cases.

Of the total amount $49,581.35 spent for new bridges and culverts, $46,949.47 or 94.7% was spent for permanent work, and $2,631.88 or 5.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts costing $6,423.00; 8 concrete slab bridges costing $8,210.85; 1 concrete arch costing $18,473.92; 2 concrete abutments costing $1,969.60; 1 masonry abutment costing $30; 5 I-beam spans with concrete abutments, $2,692.10; 2 high steel trusses with concrete abutments costing $9,150.00; 41 corrugated pipe culverts with no headwalls costing $1,383.57, and 5 wood pile bridges costing $1,248.31.

CLINTON COUNTY.

Roads.

The total county road expenditure was $27,868.96 of which $6,749.26 or 24.3% was spent for permanent work; $1,853.23 or 6.7% was spent for temporary work; $5,134.30 or 18.6% was spent for repairs; $8,615.50 or 30.6% was spent for maintenance; $2,706.12 or 9.7% was spent for equipment and unused material, and $2,810.55 or 10.1% was spent for special cases.

0.91 miles were built to permanent grade at a cost of $2,218.36. No roads were built to temporary grade. 5.05 miles were built to natural grade at a cost of $587.45. 1.66 miles were surfaced with gravel at a cost of $4,530.90.

The county road system was dragged an average of 35 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $68.32 per mile of county road. The total average expenditure per mile of county road was $138.00.

Of the 201 miles in the county road system, 43 were patrolled, there being 6 districts with an average length of 7.16 miles.

The total township road expenditure as shown by reports from 19 of the 20 townships was $48,050.81.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $51,858.65 of which $37,440.58 or 72.2% was spent for permanent bridges and culverts; $526.65 or 1.1% was spent for temporary bridges and culverts; $4,492.87 or 8.6% was spent for repairs; $5,006.95 or 9.8% was spent for culvert material for townships; $896.07 or 1.7% was spent for equipment and unused material; $2,386.33 or 4.5% was spent for filling bridges and culverts, and $1,109.20 or 2.1% was spent for special cases.

Of the total amount $37,967.23 spent for new bridges and culverts $37,440.58 or 98.6% was spent for permanent work, and $526.65 or 1.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 41 concrete box culverts costing $16,640.11; 1 headwall costing $126.00; 1 I-beam span concrete abutment costing $3,307.21; 4 pony trusses concrete abutments costing $17,367.26; 6 corrugated pipe culverts without headwalls costing $54.05; 1 boiler pipe culvert costing $65.60, and 5 woodpile bridges costing $407.00.

CRAWFORD COUNTY.

Roads.

The total county road expenditure was $77,641.29 of which $48,129.08 or 62% was spent for permanent work; $16,856.72 or 21.7% was spent for repairs; $8,491.85 or 11.0% was spent for maintenance; $1,247.99 or 1.6% was spent for equipment and unused material, and $2,915.65 or 3.7% was spent for special cases.

9.61 miles were built to permanent grade at a cost of $48,129.08. There were no roads built to temporary or natural grade, and none were surfaced.

The county road system was dragged an average of 44 times, the average cost of dragging being $0.76 per mile one round trip. The average cost of repairs and maintenance was $168.43 per mile of county road. The total average expenditure per mile of county road was $517.50.

Of the 150 miles in the county road system, all were patrolled, there being 5 districts with an average length of 30 miles.

The total township road expenditure as shown by reports from all of the 20 townships was $59,798.11.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $178,265.74 of which $119,283.86 or 67.0% was spent for permanent bridges and culverts; $2,653.42 or 1.5% was spent for temporary bridges and culverts; $28,198.15 or 15.7% was spent for repairs; $10,160.96 or 5.7% was spent for culvert material for townships; $8,000.00 or 4.5% was spent for equipment and unused material; $8,343.60 or 4.7% was spent for filling bridges and culverts, and $1,625.75 or 0.9% was spent for special cases.

Of the total amount $121,937.28 spent for new bridges and culverts, $119,283.86 or 97.8% was spent for permanent, and $2,653.42 or 2.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 99 concrete box culverts costing $96,118.09; 3 I-beam spans with concrete abutments costing $7,590.77; 6 pony trusses with concrete abutments costing $15,575.00; 15 corrugated pipe culverts without headwalls costing $826.32; 3 cast iron pipe culverts without headwalls costing $323.00, and 13 wood pile bridges costing $1,504.10.

DALLAS COUNTY.

Roads.

The total county road expenditure was $39,036.87 of which $14,542.17 or 37.2% was spent for permanent work; $9,661.51 or 24.9% was spent for temporary work; $561.79 or 1.40% was spent for repairs; $6,223.24 or 15.9% was spent for maintenance; $3,919.06 or 10% was spent for equipment and unused material and $4,129.10 or 10.6% was spent for special cases.

3.3 miles were built to permanent grade at a cost of $8,401.87. No roads were built to temporary grade. 52.65 miles were built to natural grade at a cost of $9,661.51. 2.75 miles were surfaced with gravel at a cost of $5,117.16.

The county road system was dragged an average of 14 times, the average cost of dragging being $.85 per mile one round trip. The average cost of repairs and maintenance was $39.42 per mile of county road. The total average expenditure per mile of county road was $226.50.

Of the 172 miles in the county road system, 172 were patrolled, there being 3 districts with an average length of 57.33 miles.

The total township road expenditure as shown by reports from all of the 16 townships was $50,067.01.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $76,646.06 of which $47,653.16 or 61.8% was spent for permanent bridges and culverts; $1,929.03 or 2.5% was spent for temporary bridges and culverts; $7,085.04 or 9.2% was spent for repairs; $9,703.14 or 12.9% was spent for culvert material for townships; $5,422.48 or 7.2% was spent for equipment and unused material; $4,343.08 or 5.7% was spent for filling bridges and culverts, and $510.13 or .7% was spent for special cases.

Of the total amount $49,582.19 spent for new bridges and culverts $47,653.16 or 96.1% was spent for permanent work, and $1,929.03 or 3.9% was spent for temporary work.

The last amount above referred to was spent on the following construction: 32 concrete box culverts costing $19,266.96; 3 circular concrete culverts costing $732.12; 2 concrete slab bridges costing $6,679.20; 3 concrete abutments costing $17,278.88; 1 concrete deck girder costing $3,696.00, and 28 corrugated pipe, no headwalls, costing $1,929.03.

DAVIS COUNTY.

Roads.

The total county road expenditure was $7,853.27 of which $379.35 or 4.8% was spent for temporary work; $1,986.32 or 25.3% was spent for repairs; $5,242.70 or 66.8% was spent for maintenance, and $244.90 or 3.1% was spent for equipment and unused material.

There were no roads built to permanent or temporary grade and none were surfaced. 2.25 miles were built to natural grade at a cost of $379.35.

The county road system was dragged an average of 25 times, the average cost of dragging being $.70 per mile one round trip. The average cost of repairs and maintenance was $46.40 per mile of county road. The total average expenditure per mile of county road was $507.00.

Of the 155 miles in the county road system, all were patrolled, there being 20 districts with an average length of 7.75 miles.

The total township road expenditure as shown by reports from 15 of the 15 townships was $25,232.02.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $31,767.58 of which $9,914.27 or 31.3% was spent for permanent bridges and culverts; $5,142.72 or 16.2% was spent for temporary bridges and culverts; $13,456.11 or 42.3% was spent for repairs; $142.08 or .4% was spent for culvert material for townships; $1,143.32 or 3.6% was spent for equipment and unused material; $1,331.85 or 4.2% was spent for filling bridges and culverts, and $637.23 or 2% was spent for special cases.

Of the total amount $15,056.99 spent for new bridges and culverts, $9,914.27 or 65.7% was spent for permanent work, and $5,142.72 or 34.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts costing $2,965.21; 4 circular concrete culverts costing $257.18; 55 concrete pipe culverts with headwalls costing $5,973.74; 16 headwalls costing $718.14; 2 I-beam spans on piling costing $2,232.78, and 20 wood pile bridges costing $2,909.94.

DECATUR COUNTY.

Roads.

The total county road expenditure was $27,668.03 of which $3,355.25 or 12.1% was spent for permanent work; $3,451.97 or 12.5% was spent for temporary work; $1,364.76 or 5% was spent for repairs; $12,047.77 or 43.5% was spent for maintenance; $5,073.21 or 18.3% was spent for equipment and unused material, and $2,375.07 or 8.6% was spent for special cases.

No roads were built to permanent grade and no surfacing was done. 1.75 miles were built to temporary grade at a cost of $3,355.25. 16.75 miles were built to natural grade at a cost of $2,185.61.

The county road system was dragged an average of 30 times, the average cost of dragging being $0.40 per mile one round trip. The average cost of repairs and maintenance was $88.23 per mile of county road. The total average expenditure per mile of county road was $179.00.

Of the 152 miles in the county road system, 152 were patrolled, there being 8 districts with an average length of 19 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was $22,976.91.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,141.05 of which $14,372.09 or 28.6% was spent for permanent bridges and culverts; $4,796.14 or 9.7% was spent for temporary bridges and culverts; $7,760.41 or 15.5% was spent for repairs; $3,029.25 or 6% was spent for culvert material for townships; $10,743.92 or 21.4% was spent for equipment and unused material; $5,978.03 or 11.9% was spent for filling bridges and culverts, and $3,461.21 or 6.9% was spent for special cases.

Of the total amount $19,168.23 spent for new bridges and culverts, $14,372.09 or 75% was spent for permanent work and $4,796.14 or 25% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts costing $5,537.13; 36 concrete pipe with headwalls costing $8,180.57; 4 boiler pipe culverts with headwalls costing $654.39; 14 concrete pipe without headwalls costing $959.76; 1 corrugated pipe without headwalls costing $55.50, and 26 woodpile bridges costing $3,780.88.

DELAWARE COUNTY.

Roads.

The total county road expenditure was $39,393.57 of which $13,477.78 or 34.1% was spent for permanent work; $5,688.11 or 14.5% was spent for temporary work; $16,734.72 or 42.5% was spent for maintenance; $2,835.46 or 7.2% was spent for equipment and unused material, and $657.50 or 1.7% was spent for special cases.

4.75 miles were built to permanent grade at a cost of $6,211.70. No roads were built to temporary grade. 29.5 miles were built to natural grade at a cost of $5,688.11. 7.75 miles were surfaced with gravel at a cost of $6,948.00.

The county road system was dragged an average of 37.5 times, the average cost of dragging being $0.78 per mile one round trip. The average cost of repairs and maintenance was $94.92 per mile of county road. The total average expenditure per mile of county road was $223.90.

Of the 176 miles in the county road system, 176 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 $37,174.26.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $36,808.01 of which $19,625.36 or 53.3% was spent for permanent bridges and culverts; $1,943.58 or 5.3% was spent for temporary bridges and culverts; $6,884.72 or 18.7% was spent for repairs; $3,230.26 or 8.8% was spent for culvert material for townships; $3,847.09 or 10.4% was spent for equipment and unused material; $1,067.60 or 2.9% was spent for filling bridges and culverts, and $209.40 or .6% was spent for special cases.

Of the total amount $21,568.94 spent for new bridges and culverts, $19,625.36 or 91% was spent for permanent work and $1,943.58 or 9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 47 concrete box culverts costing $13,007.47; 8 circular concrete culverts costing $1,288.25; 4 concrete slab bridges costing $5,329.64; 37 corrugated pipe culverts no headwalls costing $1,422.73; 2 woodpile bridges costing $520.85.

DES MOINES COUNTY.

Roads.

The total county road expenditure was $23,355.79 of which $8,160.94 or 35% was spent for permanent work; $2,103.65 or 9% was spent for temporary work; $1,737.56 or 7.3% was spent for repairs; $5,143.11 or 22.1% was spent for maintenance; $4,989.55 or 21.4% was spent for equipment and unused material, and $1,220.98 or 5.2% was spent for special cases.

2.12 miles were built to permanent grade at a cost of $7,160.60. No roads were built to temporary grade. 30.7 miles were built to natural grade at a cost of $2,095.25. 2 miles were surfaced with gravel at a cost of $356.69.

The county road system was dragged an average of 26 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $84.16 per mile of county road. The total average expenditure per mile of county road was $289.00.

Of the 81 miles in the county road system, 81 were patrolled, there being 5 districts with an average length of 16.20 miles.

The total township road expenditure as shown by reports from all of the 13 townships was $28,284.54.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $30,665.98 of which $19,114.60 or 62.3% was spent for permanent bridges and culverts; $1,858.13 or 6.1% was spent for repairs; $4,126.43 or 13.44% was spent for culvert material for townships; $2,520.14 or 8.2% was spent for equipment and unused material; $19.05 or .06% was spent for filling bridges and culverts, and $3,027.63 or 9.9% was spent for special cases.

Of the total amount $19,114.60 spent for new bridges and culverts, $19,114.60 or 100% was spent for permanent work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts costing $3,837.07; 2 circular concrete culverts costing $487.56; 20 concrete pipe culverts, headwalls, costing $3,418.56; 1 cast iron pipe culvert, headwalls, costing $194.48, 2 concrete deck girders costing $4,251.42; 2 pony trusses concrete abutments costing $6,925.51.

DICKINSON COUNTY.

Roads.

The total county road expenditure was $44,110.05 of which $21,025.70 or 47.7% was spent for permanent work; $7,677.47 or 17.4% was spent for repairs; $11,817.31 or 26.8% was spent for maintenance; $1,024.97 or 2.3% was spent for equipment and unused material, and $2,564.60 or 5.8% was spent for special cases.

5.9 miles were built to permanent grade at a cost of $5,624.27. There were no roads built to temporary or natural grade. 7.6 miles were surfaced with gravel at a cost of $11,065.76.

The county road system was dragged an average of 30 times, the average cost of dragging being $2.00 per mile one round trip. The average cost of repairs and maintenance was $174.95 per mile of county road. The total average expenditure per mile of county road was $397.00.

Of the 111 miles in the county road system, 110 were patrolled, there being 11 districts with an average length of 10 miles.

The total township road expenditure as shown by reports from 9 of the 12 townships was $23,057.61.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $41,951.54 of which $33,750.99 or 80.4% was spent for permanent bridges and culverts; $1,157.25 or 2.8% was spent for temporary bridges and culverts; $2,711.15 or 6.5% was spent for repairs; $2,192.93 or 5.2% was spent for culvert material for townships; $500.00 or 1.2% was spent for equipment and unused material; $1,391.72 or 3.3% was spent for filling bridges and culverts, and $247.50 or 0.6% was spent for special cases.

Of the total amount $34,908.24 spent for new bridges and culverts, $33,750.99 or 96.7% was spent for permanent work, and $1,157.25 or 3.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 25 concrete box culverts costing $9,661.92; 86 circular concrete culverts costing $10,078.15; 1 concrete abutment costing $476.66; 4 I-beam spans with concrete abutments costing $6.567.00; 3 pony trusses with concrete abutments costing $6,967.26, and 2 wood pile bridges costing $1,157.25.

DUBUQUE COUNTY.

Roads.

The total county road expenditure was $106,682.40 of which $72,649.19 or 68.0% was spent for permanent work; $3,270.02 or 3.1% was spent for temporary work; $17,541.46 or 16.4% was spent for repairs; $6,664.90 or 6.3% was spent for maintenance; $5,282.49 or 5.0% was spent for equipment and unused material, and $1,274.34 or 1.2% was spent for special cases.

6 miles were built to permanent grade at a cost of $2,410.25. No roads were built to temporary grade. 8 miles were built to natural grade at a cost of $1,763.60. 5 miles were surfaced with gravel at a cost of $33,361.97 and 1.8 miles were surfaced with brick at a cost of $34,297.41.

The brick surfacing referred to above was started in 1917 and consisted of 3.23 miles of monolithic brick pavement 18 feet wide on what is known as the Dubuque, Sageville and Luxumberg road extending from the city limits of Dubuque to the town of Sageville. During 1917 an amount of $42,650.85 was expended, all the grading and tiling being completed together with approximately 8,000 feet of the paving.

The project was completed in October, 1918, and final estimates given which will show a total cost of $98,710.88. Approximately ten per cent of this amount has been withheld to cover the cost of replacing some defective work done in 1917.

The gravelling and permanent grading referred to above includes the cost of finishing the improvement of the Hawkeye Highway between Dubuque and Dyersville.

This work was started in 1915 but on account of advanced prices due to war conditions work by the contractor was abandoned in the fall of 1917.

In 1918 the work was finished on the basis of cost plus profit fee.

Five miles of road were gravelled and about three miles reshaped and graded at a total cost of $39,298.85.

With the completion of this work there is now between Dubuque and Dyersville a 28-mile stretch of permanently graded road with a two course gravel surface which will allow traffic for 365 days a year.

The county road system was dragged an average of 50 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $140.23 per mile of county road. The total average expenditure per mile of county road was $620.00.

Of the 172 miles in the county road system no portion was reported as under patrol.

The township road expenditure as shown by reports from 4 of the 17 townships was $12,471.90.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $84,119.99 of which $48,860.35 or 58.1% was spent for permanent bridges and culverts; $927.23 or 1.1% was spent for temporary bridges and culverts; $15,535.95 or 18.5% was spent for repairs; $385.98 or 0.4% was spent for

culvert material for townships; $8,759.27 or 10.4% was spent for equipment and unused material; $7,160.92 or 8.5% was spent for filling bridges and culverts, and $2,490.29 or 3.0% was spent for special cases.

Of the total amount of $49,787.58 spent for new bridges and culverts $48,860.35 or 98.1% was spent for permanent work and $927.23 or 1.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 28 concrete box culverts costing $12,914.64; 1 corrugated pipe culvert with headwalls costing $95.00; 1 concrete arch costing $32,086.84; 3 concrete abutments costing $3,763.87; 8 corrugated pipe culverts without headwalls costing $228.86; 1 wood pile bridge costing $669.37; and 1 miscellaneous bridge or culvert costing $29.00.

EMMET COUNTY.

Roads.

The total county road expenditure was $48,456.87 of which $41,223.43 or 85.0% was spent for permanent work; $1,479.20 or 3.1% was spent for repairs; $5,344.52 or 11.0% was spent for maintenance; $184.89 or 0.4% was spent for equipment and unused material; $224.83 or 0.5% was spent for special cases. 20.15 miles were built to permanent grade at a cost of $22,389.70. 18.8 miles were surfaced with gravel at a cost of $18,638.99.

The county road system was dragged an average of 16 miles, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $64.37 per mile of county road. The total average expenditure per mile of county road was $457.00.

Of the 106 miles in the county road system, 68 were patrolled, there being 6 districts with an average length of 11.33 miles.

The total township road expenditure as shown by reports from 12 of the 12 townships was $32,734.79.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $19,900.75. of which $8,296.83 or 41.7% was spent for bridges and culverts; $2,242.85 or 11.5% was spent for temporary bridges and culverts; $1,245.83 or 6.1% was spent for repairs; $527.86 or 2.6% was spent for culvert material for townships; $5,967.62 or 30.0% was spent for equipment and unused material; $840.85 or 4.2% was spent for filling bridges and culverts; $778.91 or 3.9% was spent for special cases.

Of the total amount $10,539.68 spent for new bridges and culverts, $8,296.83 or 78.7% was spent for permanent work; $2,242.85 or 21.3% was spent for temporary work. The amounts last referred to were spent on the following construction:

10 concrete box culverts costing $3,312.15; 25 circular concrete culverts costing $2,919.58; 1 concrete slab bridge costing $1,788.89; 1 concrete deck girder costing $276.21; 5 wood pile bridges costing $1,590.29; miscellaneous bridges and culverts costing $652.56.

FAYETTE COUNTY.

Roads.

The total county road expenditure was $51,379.45 of which $7,645.95 or 14.9% was spent for permanent work; $8,464.51 or 16.5% was spent for temporary work; $2,904.01 or 5.6% was spent for repairs; $11,002.96 or 21.4% was spent for maintenance; $11,655.79 or 22.7% was spent for equipment and unused material; $9,706.23 or 18.9% was spent for special cases. Twenty-five hundredths of a mile was built to a permanent grade at a cost of $337.65. 1 mile was built to temporary grade at a cost of $5,143.08. 35 miles were built to natural grade at a cost of $8,464.51. 3 miles were surfaced with gravel at a cost of $1,799.12.

The county road system was dragged an average of 26 times, the average cost of dragging being $0.70 per mile the round trip. The average cost of repairs and maintenance was $68.84 per mile of county road. The total average expenditure per mile of county road was $254.00.

Of the 202 miles in the county road system, all were patrolled, there being 10 districts with an avverage length of 20.2 miles.

The total township road expenditures as shown by reports from all of the 20 townships was $48,047.80.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $60,521.75, of which $35,031.91 or 57.9% was spent for permanent bridges and culverts; $656.44 or 1.1% was spent for temporary bridges and culverts; $14,796.54 or 24.5% was spent for repairs; $4,046.11 or 6.7% was spent for culvert materials for townships; $1,209.98 or 2.0% was spent for equipment and unused material; $446.35 or 0.7% was spent for filling bridges and culverts; $4,324.42 or 7.1% was spent for special cases. Of the total amount $35,688.35 spent for new bridges and culverts,$35,031.91 or 98.2% was spent for permanent work; $656.44 or 1.8% was spent for temporary work. The amounts last referred to were spent on the following construction:

22 concrete box culverts costing $9,780.36; 1 concrete slab bridge costing $1,542.15; 1 concrete deck girder costing $12,913.16; 1 I-beam span on concrete abutments costing $5,709.60; 1 high steel truss on concrete abutments costing $5,086.64; 32 corrugated pipe culverts without headwalls costing $656.44.

FLOYD COUNTY.

Roads.

The total county road expenditure was $34,047.27 of which $12,716.55 or 37.3% was spent for permanent work; $1,226.54 or 3.6% was spent for temporary work; $5,690.76 or 16.7% was spent for repairs; $8,273.38 or 24.3% was spent for maintenance; $5,597.26 or 16.5% was spent for equipment and unused material; $542.78 or 1.6% was spent for special cases.

7½ miles were built to permanent grade at a cost of $6,444.00. No roads were built to temporary grade. 6 miles were built to natural grade

at a cost of $1,226.54. 4.28 miles were surfaced with gravel at a cost of $3,472.50.

The county road system was dragged an average of 44 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $96.71 per mile of county road. The total average expenditure per mile of county road was $236.00.

Of the 144 miles in the county road system, 144 miles were patrolled, there being 8 districts with an average length of 18 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $35,828.45.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $42,671.61 of which $22,670.90 or 53.1% was spent for permanent bridges and culverts; $7,945.54 or 18.7% was spent for temporary bridges and culverts; $3,9566.55 or 9.3% was spent for repairs; $1,000.00 or 2.3% was spent for culvert material for townships; $5,350.21 or 12.5% was spent for equipment and unused material; $1,341.25 or 3.1% was spent for filling bridges and culverts, and $407,16 or 1% was spent for special cases.

Of the total amount $30,616.44 spent for new bridges and culverts, $22,670.90 or 74% was spent for permanent work, and $7,945.54 or 26% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 53 concrete box culverts costing $16,809.63; 1 corrugated pipe culvert, headwalls, costing $184.32; 5 concrete slab bridges costing $3,267.56; 1 concrete deck girder costing $72.90; 3 I-beam spans concrete abutments costing $2,258.29; 1 pony truss concrete abutment costing $78.20; 1 pony truss on piling costing $576.63, and 20 wood pile bridges costing $7,368.91.

FRANKLIN COUNTY.

Roads.

The total county road expenditure was $49,080.48 of which $21,796.94 or 44.4% was spent for permanent work; $3,223.75 or 6.6% was spent for temporary work; $8,121.88 or 16.6% was spent for repairs; $4,453.14 or 9.2% was spent for maintenance; $1,392.03 or 2.8% was spent for equipment and unused material, and $10,092.74 or 20.4% was spent for special cases.

11.37 miles were built to permanent grade at a cost of $10,055.66. No roads were built to temporary grade. 14 miles were built to natural grade at a cost of $3,223.75. 10.25 miles were surfaced with gravel at a cost of $11,470.40.

The county road system was dragged an average of 32 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $68.07 per mile of county road. The total average expenditure per mile of county road was $267.00.

Of the 184 miles in the county road system, 9 were patrolled, there being 1 district with an average length of 9 miles.

The total township expenditure as shown by reports from all of the 16 townships was $47,783.17.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $54,159.95 of which $32,384.32 or 59.8% was spent for permanent bridges and culverts; $364.06 or .7% was spent for temporary bridges and culverts; $7,456.09 or 13.8% was spent for repairs; $4,051.46 or 7.5% was spent for culvert material for townships; $7,180.40 or 13.3 was spent for equipment and unused material; $1,827.27 or 3.3% was spent for filling bridges and culverts, and $896.35 or 1.6% was spent for special cases.

Of the total amount $32,748.38 spent for new bridges and culverts, $32,384.32 or 98.9% was spent for permanent work and $364.06 or 1.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 29 concrete box culverts costing $16,528.72; 2 concrete slab bridges costing $6,214.51; 1 concrete abutment and floor costing $211.41; 2 I-beam spans concrete abutments costing $1,749.19; 8 pony trusses concrete abutments costing $7,680.49, and 13 corrugated pipe culverts, no headwalls, costing $364.06.

FREMONT COUNTY.

Roads.

The total county road expenditure was $25,010.50 of which $9,145.36 or 36.5% was spent for repairs; $12,961.07 or 51.8% was spent for maintenance; $555.81 or 2.3% was spent for equipment and unused material; $2,348.26 or 9.4% 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 2 times, the average cost of dragging being $0.80 per mile the round trip. The average cost of repairs and maintenance was $143.20 per mile of county road. The total average expenditure per mile of county road was $162.00.

Of the 154 miles in the county road system, 154 were patrolled, there being 3 districts with an average length of 51.3 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $34,188.38.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $90,520.32 of which $19,245.41 or 21.3% was spent for permanent bridges and culverts; $24,854.46 or 27.5% was spent for temporary bridges and culverts; $14,543.42 or 16% was spent for repairs; ;$5,619.00 or 6.2% was spent for culvert material for townships; $20,472.45 or 22.6% was spent for filling bridges and culverts, and $231.70 or .3% was spent for special cases.

Of the total amount $44,099.87 spent for new bridges and culverts, $19,245.41 or 43.6% was spent for permanent work, and $24,854.46 or 56.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 15 concrete box culverts costing $15,486.12; 19 concrete pipe culverts with headwalls costing $3,373.45; 4 headwalls costing $385.84; 57 wood pile bridges costing $23,858.63, and 18 miscellaneous bridges and culverts costing $995.83.

GREENE COUNTY.

Roads.

The total county road expenditure was $24,057.95 of which $11,548.23 or 48.1% was spent for permanent work; $2,056.80 or 8.6 was spent for temporary work; $2,635.08 or 10.9% was spent for repairs; $4,478.03 or 18.6% was spent for equipment and unused material, and $1,338.06 or 5.5% was spent for special cases.

1.5 miles were built to permanent grade at a cost of $1,257.36. 9.75 miles were built to natural grade at a cost of $2,056.80, and 10.5 miles were surfaced with gravel at a cost of $9,359.53. There were no roads built to temporary grade.

The county road system was dragged an average of 17.3 times, the avverage cost of dragging being $0.85 per mile one round trip. The average cost of repairs and maintenance was $53.69 per mile of county road. The total average expenditure per mile of county road was $181.75.

Of the 132 miles in the county road system, 38 were patrolled, there being 4 districts with an average length of 9.5 miles.

The total township road expenditure as shown by reports from all of the 15 townships was $55,707.38.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $66,793.86 of which $39,491.24 or 59.2% was spent for permanent bridges and culverts; $949.15 or 1.4% was spent for temporary bridges and culverts; $12,126.04 or 18.1% was spent for repairs; $1,455.08 or 2.2% was spent for culvert material for townships; $10,564.53 or 15.8% was spent for equipment and unused material; $1,777.69 or 2.7% was spent for filling bridges and culverts, and $430.13 or 0.6% was spent for special cases.

Of the total amount $40,440.39 spent for new bridges and culverts, $39,491.24 or 97.7% was spent for permanent work, and $949.15 or 2.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts costing $9,172.39; 59 circular concrete culverts costing $7,647.34; 14 concrete pipe culverts with headwalls costing $720.31; 2 headwalls costing $123.34; 1 concrete slab bridge costing $2,509.68; 4 concrete deck girders costing $19,318.18; 5 concrete pipe culverts without headwalls cotsing $48.18; 2 corrugated pipe culverts without headwalls costing $32.02, and 1 wood pile bridge costing $868.95.

GRUNDY COUNTY.

Roads.

The total county road expenditure was $19,063.75 of which $1,119.27 or 5.9% was spent for permanent work! $3,810.96 or 20.0% was spent

for temporary work; $4,252.04 or 22.3% was spent for repairs; $4,255.56 or 22.3% was spent for maintenance, and $5,625.92 or 29.5% was spent for equipment and unused material.

.5 miles were built to permanent grade at a cost of $234.60, and 18 miles were built to natural grade at a cost of $3,810.96. There were no roads built to temporary grade and none were surfaced.

The county road system was dragged an average of 33 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $53.85 per mile of county road. The total average expenditure per mile of county road was $120.50.

Of the 158 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from 9 of the 14 townships was $35,287.08.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $100,094.43 of which $52,897.08 or 52.9% was spent for permanent bridges and culverts; $9,950.94 or 10.0% was spent for temporary bridges and culverts; $8,299.38 or 8.3% was spent for repairs; $3,325.60 or 3.3% was spent for culvert material for townships; $14,345.61 or 14.3% was spent for equipment and unused material; $4,035.25 or 4.0% was spent for filling bridges and culverts, and $7,240.57 or 7.2% was spent for special cases.

Of the total amount $62,848.02 spent for new bridges and culverts, $52,897.08 or 84.1% was spent for permanent work, and $9,950.94 or 15.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 68 concrete box culverts costing $32,654.82; 2 circular concrete culverts costing $410.93; 4 concrete slab bridges costing $10,431.61; 3 I-beam spans on concrete abutments costing $9,399.72; 35 corrugated pipe culverts without headwalls costing$1,148.94, and 7 wood pile bridges costing $8,802.00.

GUTHRIE COUNTY.

Roads.

The total county road expenditure was $33,295.26 of which $9,153.07 or 27.5% was spent for permanent work; $5,268.86 15.8% was spent for temporary work; $6,360.08 or 19.1% was spent for repairs; $7,964.43 or 23.9% was spent for maintenance; $3,905.07 or 11.7% was spent for equipment and unused material, and $643.75 or 2.0% was spent for special cases.

1.5 miles were built to permanent grade at a cost of $5,840.01. 0.32 miles were built to temporary grade at a cost of $2,744.04. 11.54 miles were built to natural grade at a cost of $1,124.55. 0.5 miles were surfaced with gravel at a cost of $424.17.

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 $73.08 per mile of county road. The total average expenditure per mile of county road was $170.00.

Of the 196 miles in the county road system, 60 were patrolled, there being 4 districts with an average length of 15 miles.

The total township road expenditure as shown by reports from 14 of the 17 townships was $32,402.65.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $83,499.50 of which $51,228.96 or 61.4% was spent for permanent bridges and culverts; $6,788.56 or 8.1% was spent for temporary bridges and culverts; $7,591.44 or 9.1% was spent for repairs; $4,390.98 or 5.3% was spent for culvert material for townships; $2,468.88 or 2.9% was spent for equipment and unused material; $9,051.79 or 10.8% was spent for filling bridges and culverts, and $1,978.89 or 2.4% was spent for special cases.

Of the total amount $58,017.52 spent for new bridges and culverts, $51,228.96 or 88.3% was spent for permanent work, and $6,788.56 or 11.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 51 concrete box culverts costing $36,184.99; 12 concrete pipe with headwalls costing $1,647.05; 3 headwalls on culverts previously constructed costing $308.80; 2 I-beam spans on concrete abutments costing $557.06; 4 pony trusses with concrete abutments costing $9,254.07; 2 high steel trusses with concrete abutments costing $3,276.99; 1 concrete pipe without headwalls costing $41.00; 8 corrugated pipe culverts without headwalls costing $460.74; 10 wood pile bridges and culverts costing $5,770.68; 45 miscellaneous bridges and culverts costing $516.14.

HAMILTON COUNTY.

Roads.

The total county road expenditure was $105,239.69 of which $83,038.20 or 79.0% was spent for permanent work; $4,519.14 or 4.3% was spent for temporary work; $2,977.97 or 2.8% was spent for repairs; $7,089.10 or 6.7% was spent for maintenance; $4,216.30 or 4.0% was spent for equipment and unused material and $3,398.98 or 3.2% was spent for special cases.

30.47 miles were built to permanent grade at a cost of $35,313.79. 46 miles were built to natural grade at a cost of $4,519.14. 25.81 miles were surfaced with gravel at a cost of $44,665.19. There were no roads built to temporary grade.

The county road system was dragged an average of 31 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $52.06 per mile of county road. The total average expenditure per mile of county road was $54.40.

Of the 193.0 miles in the county road system, 12 were patrolled, there being 1 district with an average length of 12 miles.

The total township road expenditure as shown by reports from 12 of the 17 townships was $36,757.23.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $70,873.73 of which $49,865.51 or 70.3% was spent for permanent bridges and culverts; $2,814.26 or 3.9% was spent for temporary bridges and culverts; $13,624.52 or 19.4% was spent for repairs; $1,092.86 or 1.5% was spent for culvert material for townships, and $3,476.58 or 4.9% was spent for special cases.

Of the total amount $52,679.77 spent for new bridges and culverts, $49,865.51 or 94.7% was spent for permanent work, and $2,814.26 or 5.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 38 concrete box culverts costing $19,370.15; 5 circular concrete culverts costing $724.27; 1 corrugated pipe with headwalls costing $158.30; 3 concrete slab bridges costing $6,291.61; 1 concrete thru girder costing $4,441.80; 4 concrete deck girders costing $8,266.64; 5 I-beam spans with concrete abutments costing $10,545.20; 1 high steel truss with concrete abutments costing $67.54, and 119 corrugated pipe culverts without headwalls costing $2,814.26.

HANCOCK COUNTY.

Roads.

The total county road expenditure was $30,356.93 of which $8,918.29 or 29.0% was spent for permanent work; $1,308.15 or 4.3% was spent for temporary work; $2,090.37 or 6.9% was spent for repairs; $13,723.20 or 45.6% was spent for maintenance; $2,602.12 or 8.6% was spent for aquipment and unused material; $1,714.80 or 5.6% was spent for special cases. 4 miles were built to permanent grade at a cost of $3,661.75. 13 miles were built to natural grade at a cost of $1,308.15. 3.5 miles were surfaced with gravel at a cost of $3,978.76.

The county road system was dragged an average of 37 times, the average cost of dragging being $1.11 per mile one round trip. The average cost of repairs and maintenance was 94.90 per mile of county road. The total average expenditure per mile of county road was $183.00.

Of the 166 miles in the county road system, all were patrolled, there being 7 districts with an average length of 23.6 miles.

The total township road expenditure as shown by reports from 8 of the 16 townships was $23,730.23.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $59,212.60 of which $41,353,81 or 69.8% was spent for permanent bridges and culverts; $2,223.50 or 3.8% was spent for temporary bridges and culverts; $8,422.55 or 14.3% was spent for repairs; $5,240.63 or 8.8% was spent for culvert material for townships; $466.22 or 0.8% was spent for equipment and unused material; $178.90 or 0.3% was spent for filling bridges and culverts; $1,326.99 or 2.2% was spent for special cases. Of the total amount $43,577.31 spent for new bridges and culverts, $41,353.81

or 94.9% was spent for permanent work; $2,223.50 or 5.1% was spent for temporary work. The amounts last above referred to were spent on the following construction:

52 concrete box culverts costing $23,551.85; 6 circular concrete culverts costing $817.20; 1 concrete pipe culvert with headwalls costing $4.65; 6 concrete slab bridges costing $12,777.79; 1 I-beam span with concrete abutments costing $4,194.82; 1 pony truss with concrete abutments costing $750.00; 15 corrugated pipe culverts without headwalls cosing $335.76; 7 wood pile bridges costing $1,887.74.

HARDIN COUNTY.

Roads.

The total county road expenditure was $57,877.13 of which $37,129.12 or 62.4% was spent for permanent work; $285.01 or 0.5% was spent for temporary work; $3,228.28 or 5.6% was spent for repairs; $9,066.69 or 15.6% was spent for maintenance; $1,188.77 or 2.0% was spent for equipment and unused material, and $6,979.26 or 12.1% was spent for special cases.

24.10 miles were built to permanent grade at a cost of $33,927.66. There were no roads built to temporary grade. 2 miles were built to natural grade at a cost of $220.00. 5.25 miles were surfaced with gravel at a cost of $3,147.72.

The county road system was dragged an average of 23 times, the average cost of repairs and maintenance was $68.96 per mile of county road. The total average expenditure per mile of county road was $325.50.

Of the 178 miles in the county road system, all were patrolled, there being 13 districts with an average length of 13.7 miles.

The total township road expenditure as shown by reports from 14 of the 15 townships was $40,889.21.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $104.982.01 of which $83,571.63 or 79.6% was spent for permanent bridges and culverts; $7,379.26 or 6.9% was spent for temporary bridges and culverts; $4,874.85 or 4.7% was spent for repairs; $5,305.40 or 5.1% was spent for culvert material for townships; $3,465.14 or 3.3% was spent for equipment and unused material; $79.68 or 0.1% was spent for filling bridges and culverts, and $306.05 or 0.3% was spent for special cases.

Of the total amount $90,950.89 spent for new bridges and culverts, $83,571.63 or 92% was spent for permanent work, and $7,379.26 or 8.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 68 concrete box culverts costing $33,404.92; 64 circular concrete culverts costing $7,637.25; 5 concrete slab bridges costing $7,414.25; 3 concrete thru girders costing $3,777.99; 5 concrete deck girders costing $24,245.95; 5 I-beam spans on concrete abutments costing $1,199.93; 1 steel girder with concrete abutments costing $72.00; 2 pony trusses with concrete abutments costing $5,819.34; 17 wood pile bridges costing $7,209.45, and 2 miscellaneous bridges and culverts costing $169.81.

HARRISON COUNTY.

Roads.

The total county road expenditure was $31,055.84 of which $2,368.60 or 7.6% was spent for permanent work; $9,547.80 or 30.8% was spent for temporary work; $6,876.86 or 22.1% was spent for repairs; $7,191.38 or 23.1% was spent for maintenance; $995.62 or 3.2% was spent for equipment and unused material, and $4,075.58 or 13.2% was spent for special cases.

1.65 miles were built to permanent grade at a cost of $2,368.60. There were no roads built to temporary grade and none were surfaced. 17.4 miles were built to natural grade at a cost of $9,547.80.

The county road system was dragged an average of 20 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $83.74 per mile of county road. The total average expenditure per mile of county road was $184.50.

Of the 168 miles in the county road system, 168 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 $45,358.54.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $72,698.35 of which $30,297.70 or 41.6% was spent for permanent bridges and culverts; $3,304.62 or 4.5% was spent for temporary bridges and culverts; $24,086.37 or 33.2% was spent for repairs; $1,331.94 or 1.8% was spent for culvert material for townships; $2,400.37 or 3.3% was spent for equipment and unused material; $562.80 or .8% was spent for filling bridges and culverts, and $10,714.55 or 14.8% was spent for special cases.

Of the total amount $33,602.32 spent for new bridges and culverts, $30,297.70 or 90.2% was spent for permanent work; $3,304.62 was spent for temporary work.

The amount last above referred to was spent on the following construction: 1 concrete box culvert costing $1,965.90; 32 concrete pipe culverts with headwalls costing $8,692.27; 2 concrete abutments costing $479.27; 1 I-beam span on concrete abutments costing $245.12; 7 pony trusses with concrete abutments costing $18,915.14; 4 corrugated pipe culverts without headwalls costing $569.50; 2 pony trusses on piling with wood floor costing $1,075.00, and 4 wood pile bridges costing $1,660.12.

HENRY COUNTY.

Roads.

The total county road expenditure was $23,548.18 of which $4,615.32 or 19.6 was spent for permanent work; $3,461.96 or 14.7 was spent for repairs; $13,564.66 or 57.6% was spent for maintenance; $866.69 or 3.7% was spent for equipment and unused material, and $1,039.55 or 4.4% was spent for special cases.

1 mile was built to permanent grade at a cost of $4,418.95. There were no roads built to temporary or natural grade, and none were surfaced.

The county road system was dragged an average of 30 times, the average cost of dragging being $.70 per mile one round trip. The average cost of repairs and maintenance was $119.65 per mile of county road. The total average expenditure per mile of county road was $165.50.

Of the 142 miles in the county road system, all were patrolled, there being 7 districts with an average length of 20.3 miles.

The total township road expenditure as shown by reports from 10 of the 12 townships was $22,877.48.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $53,314.63 of which $45,232.85 or 85% was spent for permanent bridges and culverts; $1,126.48 or 2.1% was spent for temporary bridges and culverts; $2,318.82 or 4.3% was spent for repairs; $407.12 or 0.8% was spent for culvert material for townships; $2,277.76 or 4.2% was spent for equipment and unused material; $1,835.10 or 3.4% was spent for filling bridges and culverts, and $116.50 or 0.2% was spent for speci l cases.

Of the amount $46,359.33 spent for new bridges and culverts, $45,232.85 or 97.5% was spent for permanent work, and $1,126.48 or 2.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 108 concrete box culverts costing $30,424.08; 11 circular concrete culverts costing $1,327.12; 8 concrete slab bridges costing $8,779.84; 1 concrete abutment costing $1,636.50; 3 I-beam spans on concrete abutments costing $3,065.31, and 32 corrugated pipe culverts with headwalls costing $1,126.48.

HOWARD COUNTY.

Roads.

The total county road expenditure was $21,870.99 of which $12,407.14 or 56.7% was spent for permanent work; $1,803.49 or 8.3% was spent for temporary work; $829.35 or 3.8% was spent for repairs; $4.488.49 or 20.5 was spent for maintenance; $1,094.23 or 5.0% was spent for equipment and unused material; $1,248.29 or 5.7% was spent for special cases.

7 miles were built to permanent grade at a cost of $8,646.37. There were no roads built to temporary grade, and none were surfaced. 11 miles were built to natural grade at a cost of $1,803.49.

The county road system was dragged an average of 19 times, the average cost of dragging being $.80 per mile one round trip. The average cost of repairs and maintenance was $43.48 per mile of county road. The total average expenditure per mile of county road was $179.00.

Of the 122 miles in the county road system, all were patrolled, there being 3 districts with an average length of 40.66 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $21,090.44.

Bridges.

The total expenditures for bridge and culvert work during 1918 were $40,465.87 of which $18,290.06 or 45.2% was spent for permanent bridges

and culverts; $9,247.70 or 22.9% was spent for temporary bridges and culverts; $3,550.33 or 8.8% was spent for repairs; $2,987.28 or 7.4% was spent for culvert material for townships; $5,228.31 or 12.9% was spent for equipment and unused material; $1,142.19 or 2.7% was spent for filling bridges and culverts, and $20.00 or 0.1% was spent for special cases.

Of the amount $27,537.76 spent for new bridges and culverts, $18,290.06 or 66.4% was spent for permanent work, and $9,247.70 or 33.6% was spent for temporary work.

The amounts last above referred to were spent in the following construction: 19 concrete box culverts costing $8,256.02; 8 circular concrete culverts costing $1,117.07; 1 concrete slab bridge costing $1,558.86; 2 I-beam spans on concrete abutments costing $6,938.57; 1 high steel truss with concrete abutments costing $419.54; 4 corrugated pipe without headwalls costing $64.34, and 36 wood pile bridges costing $9,183.36.

HUMBOLDT COUNTY.

Roads.

The total county road expenditure was $45,868.25 of which $36,925.17 or 80.5% was spent for permanent work; $815.60 or 1.8% was spent for $6,864.82 or 15% was spent for maintenance; $305.41 or 0.7% was spent for equipment and unused material, and $957.25 or 2.0% was spent for special case.

25.75 miles were built to permanent grade at a cost of $22,709.13. There were no roads built to temporary grade or natural grade. 17.3 miles were surfaced with gravel at a cost of $13,363.65.

The county road system was dragged an average of 28 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $57.53 per mile of county road. The total average expenditure per mile of county road was $345.00.

Of the 133 miles in the county road system, 100 were patrolled, there being 5 districts with an average of 20 miles.

The total township road expenditure as shown by reports from 12 of the 12 townships was $37,867.36.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,518.54 of which $40,074.89 or 78.1% was spent for permanent bridges and culverts; $1,261.97 or 2.5% was spent for repairs; $5,287.26 or 10.4% was spent for culvert material for townships; $2,704.48 or 5.4% was spent for equipment and unused material; $809.54 or 1.6% was spent for filling bridges and culverts, and $380.40 was spent for special cases.

Of the amount $40,074.89 spent for new bridges and culverts, $40,074.89 or 100% was spent for permanent work.

The amounts last above referred to were spent on the following construction: 35 concrete box culverts costing $17,462.40; 6 circular concrete culverts costing $849.60; 3 headwalls costing $180.00; 4 concrete slab bridges costing $7,805.25; 3 concrete abutments costing $3,273.40; 1 con-

crete thru girder costing $440.10; 1 retaining wall costing $100.60; 4 I-beam spans with concrete abutments costing $2,846.79, and 2 pony trusses with concrete abutments costing $7,116.75.

IDA COUNTY.

Roads.

The total county road expenditure was $12,557.52 of which $34.00 or 0.3% was spent for temporary work; $6,362.41 or 50.7% was spent for repairs; $4,324.94 or 34.4% was spent for maintenance; $1,353.66 or 10.8% was spent for equipment and unused material and $482.51 or 3.8% was spent for special cases.

There were no roads built to permanent grade, none to temporary grade and none surfaced. 1 mile was built to natural grade at a cost of $34.00.

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 $80.96 per mile of county road. The total average expenditure per mile of county road was $95.00.

Of the 132 miles in the county road system, 132 were patrolled, there being 5 districts with an average length of 26.4 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $25,470.52.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,292.49 of which $23,022.65 or 45.8% was spent for permanent bridges and culverts; $8,096.40 or 16.1% was spent for temporary bridges and culverts; $9,753.90 or 19.4% was spent for repairs; $2,313.84 or 4.6% was spent for culvert material for townships; $3,129.88 or 6.2% was spent for equipment and unused material; $3,729.63 or 7.4% was spent for filling bridges and culverts, and $246.19 or 0.5% was spent for special cases.

Of the amount $31,119.05 spent for new bridges and culverts, $23,022.65 or 74.1% was spent for permanent work; $8,096.40 or 25.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts costing $20,138.03; 1 pony truss with concrete abutments costing $2,884.62; 1 concrete pipe culvert without headwalls costing $22.80; 36 corrugated pipe culverts without headwalls costing $2,071.10; 3 I-beam spans on piling abutments costing $3,577.33, and 4 wood pile bridges costing $2,425.12.

IOWA COUNTY.

Roads.

The total county road expenditure was $36,424.24 of which $1,034.54 or 2.8% was spent for permanent work; $2,616.71 or 7.2% was spent for temporary work; $8,191.83 or 22.5% was spent for repairs; $18,580.40 or 51% was spent for maintenance; $6,000.66 or 16.5% was spent for equipment and unused material.

0.25 miles were built to permanent grade at a cost of $128.40. No roads were built to temporary grade and none were surfaced. 16.25 miles were built to natural grade at a cost of $2,616.71.

The county road system was dragged an average of 47 times, the average cost of dragging being $.80 per mile one round trip. The average cost of repairs and maintenance was $151.68 per mile of county road. The total average expenditure per mile of county road was $206.80.

Of the 176 miles in the county road system, 176 were patrolled, there being 9 districts with an average length of 19.5 miles.

The total township expenditure as shown by reports from 17 of the 18 townships was $37,514.50.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $161,465.13 of which $109,813.73 or 68.1% was spent for permanent bridges and culverts; $4,596.59 or 2.8% was spent for temporary bridges and culverts; $23,780.66 or 14.7% was spent for repairs; $7,943.73 or 4.9% was spent for culvert material for townships; $13,445.89 or 8.3% was spent for equipment and unused material; $972.86 or .6% was spent for filling bridges and culverts, and $911.67 or .6% was spent for special cases.

Of the amount $114,410.32 spent for new bridges and culverts, $109,813.73 or 96% was spent for permanent work and $4,596.59 or 4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 45 concrete box culverts costing $48,374.50; 1 concrete pipe culvert with headwalls costing $107.40; 1 headwall costing $315.60; 4 concrete slab bridges costing $9,821.79; 1 pair concrete abutments costing $4,940.32; 9 I-beam spans concrete abutments costing $24,659.78; 5 pony trusses concrete abutments costing $21,594.34; 37 corrugated pipe culverts, no headwalls, costing $1,200.69; 1 pony truss on piling costing $3,109.80; one wood pile bridge costing $175.00; 1 miscellaneous bridge or culvert costing $111.10.

JACKSON COUNTY.

Roads.

The total county road expenditure was $22,246.53 of which $3,884.00 or 17.4% was spent for permanent work; $10,933.61 or 49.2 was spent for repairs; $5,023.89 or 22.6% was spent for maintenance; $775.07 or 3.5% was spent for equipment and unused material, and $1,629.96 or 7.3% was spent for special cases.

1.16 miles were built to permanent grade at a cost of $3,884.00. There were no roads built to temporary or natural grade and none were surfaced.

The county road system was dragged an average of 40 times, the average cost of dragging being $.78 per mile one round trip. The average cost of repairs and maintenance was $101.32 per mile of county road. The total average expenditure per mile of county road was $141.50.

Of the 157 miles in the county road system, there was no mileage reported as patrolled.

The total township road expenditure as shown by reports from 14 of the 18 townships was $27,124.99.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $66,698.55 of which $35,066.37 or 52.6% was spent for permanent bridges and culverts; $1,255.21 or 1.8% was spent for temporary bridges and culverts; $27,324.47 or 41.0% was spent for repairs; $70.76 or 0.1% was spent for culvert material for townships; $20.40 or 0.1% was spent for equipment and unused material; $2,128.29 or 3.2% was spent for filling bridges and culverts, and $831.05 or 1.2% was spent for special cases.

Of the total amount $36,321.58 spent for new bridges and culverts, $35,066.37 or 96.6% was spent for permanent work and $1,255.21 or 3.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 45 concrete box culverts costing $20,600.96; 25 circular concrete culverts costing $5,231.69; 2 corrugated pipe culverts with headwalls costing $514.50; 1 masonry arch culvert costing $367.35; 2 headwalls costing $852.00; 1 concrete abutment costing $13.00; 1 retaining wall costing $521.93; 2 masonry abutments costing $1,814.60; 2 I-beam spans on concrete abutments costing $3,184.25; 2 pony trusses on concrete abutments costing $1,965.59; 2 corrugated pipe culverts without headwalls costing $49.60; 3 wood pile bridges costing $840.94, and miscellaneous bridges and culverts costing $364.67.

JASPER COUNTY.

Roads.

The total county road expenditure was $62,132.60 of which $14,225.02 or 22.9% was spent for permanent work; $9,795.38 or 15.8% was spent for temporary work; $14,704.85 or 23.7% was spent for repairs; $13,048.04 or 21.0% was spent for maintenance; $7,676.32 or 12.3% was spent for equipment and unused material, and $2,682.99 or 4.3% was spent for special cases.

2.0 miles were built to permanent grade at a cost of $7,400.00. 3.0 miles were built to temporary grade at a cost of $6,700.00. 52.25 miles were built to natural grade at a cost of $5,599.77. There were no roads surfaced.

The county road system was dragged an average of 18 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $135.51 per mile of county road. The total average expenditure per mile of county road was $304.00.

Of the 204 miles in the county road system, 160 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 townships was $61,799.59.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $156.044.64 of which $80,583.36 or 51.7% was spent for permanent bridges

and culverts; $4,316.43 or 2.8% was spent for temporary bridges and culverts; $36,401.11 or 23.4% was spent for repairs; $17,116.87 or 10.9% was spent for culvert material for townships; $484.14 or 0.3% was spent for equipment and unused material; $16,343.43 or 10.5% was spent for filling bridges and culverts, and $599.30 or 0.4% was spent for special cases.

Of the total amount $84,899.79 spent for new bridges and culverts, $80,583.36 or 94.9% was spent for permanent work and $4,316.43 or 5.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 65 concrete box culverts costing $39,939.77; 3 boiler pipe culverts with headwalls costing $991.66; 16 concrete slab bridges costing $20,466.19; 4 retaining walls costing $792.60; 2 I-beam spans on concrete abutments costing $3,225.86; 3 pony trusses on concrete abutments costing $9,777.78; 1 high steel truss on concrete abutments costing $5,389.50, and 62 corrugated pipe culverts without headwalls costing $4,316.43.

JEFFERSON COUNTY.

Roads.

The total county road expenditure was $22,545.60 of which $2,373.19 or 10.5% was spent for permanent work; $3,773.50 or 16.8% was spent for temporary work; $2,420.63 or 10.7% was spent for repairs; $8,884.08 or 39.4% was spent for maintenance; $5,044.20 or 22.4% was spent for equipment or unused material, and $50.00 or 0.2% was spent for special cases.

There were no roads built to permanent grade, none built to temporary grade and none surfaced. 27.8 miles were built to natural grade at a cost of $3,474.46.

The county road system was dragged an average of 29 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $80.01 per mile of county road. The total average expenditure per mile of county road was $159.20.

Of the 141 miles in the county road system, 141 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 $37,840.33.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $41,628.46 of which $17,393.29 or 41.8% was spent for permanent bridges and culverts; $2,042.26 or 4.9% was spent for temporary bridges and culverts; $7,247.95 or 17.4% was spent for repairs; $5,125.66 or 12.3% was spent for culvert material for townships; $4,714.13 or 11.3% was spent for equipment and unused material; $2,057.05 or 5.0% was spent for filling bridges and culverts, and $3,048.12 or 7.3% was spent for special cases.

Of the total amount $19,435.55 spent for new bridges and culverts, $17,393.29 or 89.5% was spent for permanent work; $2,042.26 or 10.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 22 concrete box culverts costing $11,054.60; 2 headwalls on culverts previously constructed costing $315.69; 1 pony truss with concrete abutments costing $6,023.00; 30 corrugated pipe culverts without headwalls costing $1,608.48, and 3 wood pile bridges costing $433.78.

JOHNSON COUNTY.

Roads.

The total county road expenditure was $31,911.14 of which $120.90 or 0.4% was spent for permanent work; $12,447.70 or 39% was spent for temporary work; $2,981.62 or 9.3% was spent for repairs; $14,342.43 or 45% was spent for maintenance; $1,667.32 or 5.2% was spent for equipment and unused material, and $351.17 or 1.1% was spent for special cases.

There were no roads built to permanent or temporary grade, and none were surfaced. 60.7 miles were built to natural grade at a cost of $12,447.70.

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 $100.14 per mile of county road. The total average expenditure per mile of county road was $184.50.

Of the 173 miles in the county road system, 173 were patrolled, there being 8 districts with an average length of 21.6 miles.

The total township road expenditure as shown by reports from 15 of the 21 townships was $34,700.37.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $60,421.78 of which $27,357.66 or 45.4% was spent for permanent bridges and culverts; $5,510.62 or 9% was spent for temporary bridges and culverts; $10,157.45 or 16.8% was spent for repairs; $7,692.68 or 12.7% was spent for culvert material for townships; $2,934.18 or 4.9% was spent for equipment and unused material; $6,030.19 or 10% was spent for filling bridges and culverts, and $739.00 or 1.2% was spent for special cases.

Of the total amount $32,868.28 spent for new bridges and culverts, $27,357.66 or 83.3% was spent for permanent work, and $5,510.62 or 16.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 27 concrete box culverts costing $11,410.20; 18 circular concrete culverts costing $2,376.02; 1 headwall costing $26.94. 4 I-beam spans with concrete abutments costing $6,981.74; 1 pony truss with concrete abutments costing $6,562.76; 48 corrugated pipe culverts with no headwalls costing $2,686.46, and 139 miscellaneous bridges and culverts costing $2,824.16.

JONES COUNTY.

Roads.

The total county road expenditure was $38,744.46 of which $3.776.89 or 9.8% was spent for permanent work; $11,048.51 or 28.5% was spent for

temporary work; $8,087.56 or 20.8% was spent for repairs; $11,063.04 or 28.5% was spent for maintenance; $3,974.71 or 10.2% was spent for equipment and unused material and $793.75 or 2.2% was spent for special cases.

There were no roads built to permanent grade, and none were surfaced. 1.1 miles were built to temporary grade at a cost of $3,451.54. 82 miles were built to natural grade at a cost of $8,530.70.

The county road system was dragged an average of 29 times, the average cost of dragging being $.90 per mile one round trip. The average cost of repairs and maintenance was $103.51 per mile of county road. The total average expenditure per mile of county road was $209.20.

Of the 185 miles in the county road system, 165 were patrolled, there being 11 districts with an average length of 15 miles.

The total township road expenditure as shown by reports from all of the 16 townships was $41,189.32.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,219.76 of which $25,947.97 or 51.5% was spent for permanent bridges and culverts; $4,951.50 or 9.9% was spent for temporary bridges and culverts; $13,868.03 or 27.7% was spent for repairs; $1,800.31 or 3.6% was spent for culvert material for townships; $3,172.95 or 6.3% was spent for equipment and unused material; $327.50 or 0.7% was spent for filling bridges and culverts, and $151.50 or 0.3% was spent for special cases.

Of the total amount $30,899.47 spent for new bridges and culverts, $25,947.97 or 83.9% was spent for permanent work, and $4,951.50 or 16.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 14 concrete box culverts costing $8,325.08; 1 masonry box culvert costing $105.10; 4 headwalls costing $473.50; 8 I-beam spans with concrete abutments costing $17,044.29; 14 corrugated pipe culverts without headwalls costing $592.00, and 4 wood pile bridges costing $4,359.50.

KEOKUK COUNTY.

Roads.

The total county road expenditure was $16,816.65 of which $101.97 or 0.6% was spent for permanent work; $2,258.43 or 13.4% was spent for temporary work; $3,861.64 or 23% was spent for repairs; $9,383.58 or 55.8% was spent for maintenance; $1,170.98 or 7% was spent for equipment and unused material, and $40.05 or 0.2% was spent for special cases.

There were no roads built to permanent or temporary grade and none were surfaced. 31 miles were built to natural grade at a cost of $2,258.43.

The county road system was dragged an average of 17 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $79.53 per mile of county road. The total average expenditure per mile of county road was $100.50.

Of the 167 miles in the county road system, 162 were patrolled, there being 9 districts with an average length of 18 miles.

The total township road expenditure as shown by reports from 15 of the 17 townships was $35,890.60.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $82,607.09 of which $52,950.89 or 64.1% was spent for permanent bridges and culverts; $1,485.65 or 1.8% was spent for temporary bridges and culverts; $14,098.01 or 17.1% was spent for repairs; $2,088.01 or 2.4% was spent for culvert material for townships; $9,214.98 or 11.2% was spent for equipment and unused material, and $2,769.55 or 3.4% was spent for filling bridges and culverts.

Of the total amount $54,436.54 spent for new bridges and culverts, $52,950.89 or 97.3% was spent for permanent work, and $1,485.65 or 2.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 39 concrete box culverts costing $37,068.90; 13 concrete pipe culverts with headwalls costing $2,880.33; 2 pony trusses with concrete abutments costing $13,001.66; 18 corrugated pipe culverts without headwalls costing $1,405.63, and miscellaneous bridges and culverts costing $80.02.

KOSSUTH COUNTY.

Roads.

The total county road expenditure was $45,253.24, of which $21,041.52 or 46.5% was spent for permanent work; $1,575.50 or 3.5% was spent for temporary work; $6,146.91 or 13.6% was spent for repairs; $13,287.27 or 29.4% was spent for maintenance; $1,300.26 or 2.9% was spent for equipment and unused material, and $1,901.76 or 4.1% was spent for special cases.

No roads were built to temporary grade. 7.41 miles were built to permanent grade at a cost of $12,945.30. 10 miles were built to natural grade at a cost of $1,575.50. 6.53 miles were surfaced with gravel at a cost of $7,363.67.

The county road system was dragged an average of 32 times, the average cost of dragging being $0.97 per mile one round trip. The average cost of repairs and maintenance was $69.41 per mile of county road. The total average expenditure per mile of county road was $161.30.

Of the 280 miles in the county road system, 280 were patrolled, there being 5 districts with an average length of 56 miles.

The total township road expenditure as shown by reports from 14 of the 28 townships was $46,803.53.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $67,620.42 of which $2,400.82 or 3.5% was spent for permanent bridges and culverts; $25,714 or 38.2% was spent for temporary bridges and culverts; $11,321.98 or 16.7% was spent for repairs; $7,088.26 or 10.5% was spent for culvert material for townships; $16,000.00 or 23.7% was spent for

equipment and unused material; $2,483.81 or 3.6% was spent for filling bridges and culverts, and $2,611.45 or 3.8% was spent for special cases.

Of the total amount $28,114.92 spent for new bridges and culverts, $2,400.82 or 8.6% was spent for permanent work, and $25,714.10 or 91.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 3 concrete box culverts, costing $482.30; 16 circular concrete culverts costing $1,918.52; 159 corrugated pipe culverts without headwalls costing $2,703.97; and 35 wood pile bridges costing $23,010.13.

LEE COUNTY.

Roads.

The total county road expenditure was $23,820.38, of which $3,760.71 or 15.8% was spent for permanent work; $7,133.49 or 29.9% was spent for temporary work; $294.12 or 1.2% was spent for repairs; $10,576.33 or 44.5% was spent for maintenance; $2,055.73 or 8.6% was spent for equipment and unused material.

There were no roads built to permanent or temporary grade. 36 miles were built to natural grade at a cost of $2.858.63. 25 miles were surfaced with gravel at a cost of $1,157.89.

The county road system was dragged an average of 10 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $72.67 per mile of county road. The total average expenditure per mile of county road was $158.50.

Of the 150 miles in the county road system, 150 were patrolled, there being 23 districts with an average length of 6.5 miles.

The total township road expenditure as shown by reports from all of the 15 townships was $32,145.94.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $46,342.75 of which $26,870.80 or 58.2% was spent for permanent bridges and culverts; $463.39 or 1% was spent for temporary bridges and culverts; $5,383.80 or 11.5% was spent for repairs; $2,464.56 or 5.3% was spent for culvert material for townships; $11,035.45 or 23.7% was spent for equipment and unused material; $124.75 or 0.3% was spent for filling bridges and culverts.

Of the total amount $27,334.19 spent for new bridges and culverts, $26,870.80 or 98.5% was spent for permanent work, and $463.39 or 1.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 8 concrete box culverts, costing $3,477.09; 17 circular concrete culverts costing $2,638.47; 13 boiler pipe culverts with headwalls costing $1,217.27; 2 pony trusses with concrete abutments costing $16,512.46; 10 corrugated pipe culverts without headwalls costing $208.25; 1 I-beam span on concrete abutments costing $3,025.51; 1 boiler pipe culvert costing $71.60, and 1 wood pile bridge costing $183.54.

LINN COUNTY.

Roads.

The total county road expenditure was $71,400.03, of which $26,562.50, or 37.2% was spent for permanent work; $5,837.68 or 8.1% was spent for temporary work; $10,903.00 or 15.5% was spent for repairs; $21,551.35 or 30.1% was spent for maintenance; $4,402.22 or 6.1% was spent for equipment and unused material; $2,144.28 or 3.0% was spent for special cases; 0.8 miles were built to permanent grade at a cost of $3,042.00. No roads were built to temporary grade. 37.5 miles were built to natural grade at a cost of $5,757.97. 0.8 miles were surfaced with concrete at a cost of $21,663.71.

The concrete paving and permanent grading reported above, the first project of the kind in the state, is located on the Lincoln Highway midway between Marion and Mt. Vernon. The Lincoln Highway Association furnished 3000 barrels of cement for the construction of this pavement, which was started in September 1918, but owing to war conditions was retarded so that the season closed with approximately 1000 ft. unfinished. This pavement is of single course reinforced concrete 16 feet wide.

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 $148.33 per mile of county road. The total average expenditure per mile of county road was $327.50.

Of the 218 miles in the county road system, 168 were patrolled, there being 21 districts with an average length of 8 miles.

The total township road expenditure as shown by reports from all of the 20 townships, was $50,874.17.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $79,864.48, of which $41,640.75 or 52.1% was spent for permanent bridges and culverts; $3,423.10 or 4.3% was spent for temporary bridges and culverts; $17,469.25 or 21.9% was spent for repairs; $3,960.87 or 4.6% was spent for culvert material for townships; $9,764.51 or 12.2% was spent for equipment and unused material; $3,425.00 or 4.3% was spent for filling bridges and culverts; $451.00 or 0.6% was spent for special cases.

Of the total amount $45,063.85 spent for new bridges and culverts, $41,640.75 or 92.4% was spent for permanent work; $3,423.10 or 7.6% was spent for temporary work.

The amounts last above referred to, were spent on the following construction: 29 concrete box culverts, costing $16,458.65; 7 circular concrete culverts, costing $1,109.39; 2 corrugated pipe culverts (with headwalls) costing $276.33; 2 boiler pipe culverts (with headwalls) costing $523.50; 2 concrete slab bridges, costing $6,483.28; 1 concrete deck girder, costing $2,919.20; 4 I-beam spans on concrete abutments, costing $11,498.90; 1 high steel truss-concrete abutment, costing $2,371.50; 8 corrugated pipe (without headwalls) costing $121.60; 1 pony truss on piling-wood floor, costing $744.45; 6 wood pile bridges, costing $2,557.05.

LOUISA COUNTY.

Roads.

The total county road expenditure was $23,303.02 of which $2,767.49 or 11.8% was spent for permanent work; $7,217.80 or 31.1% was spent for temporary work; $458.02 or 1.9% was spent for repairs; $9,085.70 or 39.0% was spent for maintenance; $1,473.30 or 6.3% was spent for equipment and unused material and $2,300.71 or 9.9% was spent for special cases.

0.5 miles were built to permanent grade at a cost of $557.75. There were no roads built to temporary grade. 79 miles were built to natural grade at a cost of $7,187.42. 0.33 miles were surfaced with gravel at a cost of $875.38.

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 $85.20 per mile of county road. The total average expenditure per mile of county road was $208.00.

Of the 112 miles in the county road system, 112 were patrolled, there being 3 districts with an average length of 37⅓ miles.

The total township expenditure as shown by reports from 10 of the 12 townships was $28,086.72.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $30,347.89 of which $7,632.49 or 25.1% was spent for permanent bridges and culverts; $6,887.32 or 22.7% was spent for temporary bridges and culverts; $11,778.80 or 38.8% was spent for repairs; $2,052.39 or 6.8% was spent for culvert material for townships; $1,299.75 or 4.3% was spent for equipment and unused material; $526.80 or 1.7% was spent for filling bridges and culverts and $170.34 or 0.6% was spent for special cases.

Of the total amount $14,519.81 spent for new bridges and culverts $7,632.49 or 52.5% was spent for permanent work and $6,887.32 or 47.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 5 concrete box culverts, costing $4,714.51; 2 circular concrete culverts costing $957.94; 1 cast iron pipe culvert with headwalls costing $590.62; 1 I-beam span on concrete abutments costing $1,265.87; 1 pony truss with concrete abutments costing $103.55; 3 concrete pipe culverts without headwalls costing $145.60; 40 corrugated pipe culverts without headwalls costing $1,007.80; 10 wood pile bridges costing $5,351.12 and miscellaneous bridges and culverts costing $382.80.

LUCAS COUNTY.

Roads.

The total county road expenditure was $15,515.93 of which $4,013.97 or 25.9% was spent for repairs; $7,674.64 or 49.4% was spent for maintenance; $2,326.32 or 15.0% was spent for equipment and unused material and $1,501.00 or 9.7% was spent for special cases.

No work of a permanent or temporary nature was done.

The county road system was dragged an average of 25 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $78.98 per mile of county road. The total average expenditure per mile of county road was $104.75.

Of the 148 miles in the county road system, 148 were patrolled, there being 11 districts with an average length of 13½ miles.

The total township road expenditure as shown by reports from all of the 12 townships was $22,449.66.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $54,044.04 of which $24,435.70 or 45.3% was spent for permanent bridges and culverts; $2,129.59 or 3.8% was spent for temporary bridges and culverts; $4,962.84 or 9.2% spent for repairs; $5,410.09 or 10.0% was spent for culvert material for townships; $2,383.79 or 4.4% was spent for equipment and unused material; $13,018.41 or 24.2% was spent for filling bridges and culverts and $1,703.62 or 3.1% was spent for special cases.

Of the total amount $26,565.29 spent for new bridges and culverts, $24,435.70 or 92.1% was spent for permanent work and $2,129.59 or 7.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 27 concrete box culverts, costing $15,622.34; 52 concrete pipe culverts with headwalls costing $8,171.28; 2 cast iron pipe culverts with headwalls costing $195.52; 1 retaining wall costing $446.56; 34 concrete pipe culverts without headwalls costing $1,503.54; 3 corrugated pipe culverts without headwalls costing $174.53; 1 boiler pipe culvert without headwalls costing $9.00; 4 cast iron pipe culverts without headwalls costing $278.26 and 2 wood pile bridges costing $164.26.

LYON COUNTY.

Roads.

The total county road expenditure was $17,418.11 of which $3,285.75 or 18.9% was spent for permanent work; $4,253.24 or 24.4% was spent for temporary work; $1,672.75 or 9.7% was spent for repairs; $3,362.28 or 19.3% was spent for maintenance; $1,589.56 or 9.1% was spent for equipment and unused material and $3,254.53 or 18.6% was spent for special cases.

0.25 of a mile was built to permanent grade at a cost of $3,285.75. 23.4 miles were built to natural grade at a cost of $4,253.24. There were no roads built to temporary grade and none were surfaced.

The county road system was dragged an average of 20 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $26.50 per mile of county road. The total average expenditure per mile of county road was $91.50.

Of the 190 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from 14 of the 18 townships was $23,076.55.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $60,386.19 of which $35,642.01 or 59.1% was spent for permanent bridges and culverts; $134.90 or 0.2% was spent for temporary bridges and culverts; $13,129.44 or 21.8% was spent for repairs; $2,904.73 or 4.8% was spent for culvert material for townships; $1,634.20 or 2.7% was spent for equipment and unused material; $4,804.48 or 7.9% was spent for filling bridges and culverts, and $2,136.43 or 3.5% was spent for special cases.

Of the total amount $35,776.91 spent for new bridges and culverts, $35,642.01 or 99.6% was spent for permanent work and $134.90 or 0.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts costing $4.417.83; 2 concrete deck girders costing $9,667.42; 6 I-beam spans on concrete abutments costing $4,160.60; 4 pony trusses with concrete abutments costing $8,173.10; 3 high steel trusses on concrete abutments, costing $9,223.06, and corrugated pipe culvert without headwalls, costing $134.90.

MADISON COUNTY.

Roads.

The total county road expenditure was $23,555.46, of which $7,285.79 or 31% was spent for temporary work; $5,993.88 or 25.4% was spent for repairs; $4,243.99 or 18% was spent for maintenance; $4,505.79 or 19.1% was spent for equipment and unused material, and $1,526.01 or 6.5% was spent for special cases.

There were no roads built to permanent or temporary grade and none were surfaced. 47.5 miles were built to natural grade at a cost of $5,783.79.

The county road system was dragged an average of 16 times, the average cost of dragging being $.80 per mile one round trip. The average cost of repairs and maintenance was $63.19 per mile of county road. The total average expenditure per mile of county road was $145.00.

Of the 162 miles in the county road system, there were none reported as being patrolled.

The total township road expenditure as shown by reports from 16 of the 16 townships was $35,960.84.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $68,020.49, of which $22,009.41 or 32.4% was spent for permanent bridges and culverts; $5,869.06 or 8.6% was spent for temporary bridges and culverts; $13,325.75 or 19.7% was spent for repairs; $8,999.88 or 13.2% was spent for culvert material for townships; $5,416.08 or 8% was spent for equipment and unused material; $10,869.80 or 15.9% was spent for filling bridges and culverts, and $1,530.51 or 2.2% was spent for special cases.

Of the total amount $27,878.47 spent for new bridges and culverts, $22,009.41 or 79% was spent for permanent work, and $5,869.06 or 21% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 31 concrete box culverts, costing $20,572.28; 1 concrete pipe culvert costing $524.84; 1 masonry box culvert costing $818.17; 1 concrete abutment costing $94.12; 1 concrete pipe culvert without headwalls costing $225.02; 27 corrugated pipe culverts without headwalls costing $1,902.74; 1 I-beam span on piling abutments costing $498.99 (one-half from Adair county), and 11 wood pile bridges costing $3,442.31.

MAHASKA COUNTY.

Roads.

The total county road expenditure was $38,144.61 of which $8,815.60 or 23% was spent for permanent work; $8,947.05 or 23.4% was spent for temporary work; $4,906.96 or 12.9% was spent for repairs; $11,125.00 or 29.4% was spent for maintenance; $3,873.00 or 10% was spent for equipment and unused material, and $476.20 or 1.3% was spent for special cases.

3.75 miles were built to permanent grade at a cost of $7,782.20. 1 mile was built to temporary grade at a cost of $250.00. 33 miles were built to natural grade at a cost of $3,402.50. No roads were surfaced.

The county road system was dragged an average of 25 times, the average cost of dragging being $.80 per mile one round trip. The average cost of repairs and maintenance was $103.39 per mile of county road. The total average expenditure per mile of county road was $245.50.

Of the 155 miles in the county road system, all were patrolled, there being 6 districts with an average length of 25.8 miles.

The total township road expenditure as shown by reports from all of the 18 townships was $45,896.92.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $65,470.44 of which $31,604.87 or 48.4% was spent for permanent bridges and culverts; $3,250.02 or 4.9% was spent for temporary bridges and culverts; $6,665.40 or 10.4% was spent for repairs; $9,513.81 or 14.5% was spent for culvert material for townships; $9,252.69 or 14% was spent for equipment and unused material; $2,993.74 or 4.6% was spent for filling bridges and culverts, and $2,189.91 or 3.2% was spent for special cases.

Of the total amount $34,854.89 spent for new bridges and culverts, $31,604.87 or 90.7% was spent for permanent work, and $3,250.02 or 9.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 22 concrete box culverts, costing $16,757.49; 3 concrete pipe culverts with headwalls, costing $496.35; 1 boiler pipe culvert costing $90.00; 6 headwalls costing $1,776.18; 2 concrete slab bridges costing $2,982.15; 2 high steel trusses with concrete abutments costing $9,502.70; 54 concrete pipe culverts without headwalls, costing $1,560.09; 39 boiler pipe culverts without headwalls, costing $992.06; 3 wood pile bridges costing $797.87.

MARION COUNTY.

Roads.

The total county road expenditure was $84,426.26 of which $48,432.12 or 57.5% was spent for permanent work; $14,050.80 or 16.6% was spent for temporary work; $3,939.16 or 4.6% was spent for repairs; $8,268.77 or 9.8% was spent for maintenance; $4,750.47 or 5.6% was spent for equipment and unused material and $4,984.94 or 5.9% was spent for special cases.

14.7 miles were built to permanent grade at a cost of $47,961.74. No roads were built to temporary grade or surfaced. 43.9 miles were built to natural grade at a cost of $14,050.80.

The county road system was dragged an average of 31 times, the average cost of dragging being $0.86 per mile one round trip. The average cost of repairs and maintenance was $71.87 per mile of county road. The total average expenditure per mile of county road was $500.00.

Of the 169 miles in the county road system, 47 were patrolled, there being 3 districts with an average length of 15.66 miles.

The total township road expenditure as shown by reports from all of the 15 townships was $34,030.97.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $70,186.34 of which $36,213.24 or 51.5% was spent for permanent bridges and culverts; $812.00 or 1.1% was spent for temporary bridges and culverts; $4,260.52 or 6.1% was spent for repairs; $4,409.88 or 6.3% was spent for culvert material for townships; $11,413.98 or 16.4% was spent for equipment and unused material; $11,961.06 or 17.0% was spent for filling bridges and culverts and $1,115.66 or 1.6% was spent for special cases.

Of the total amount $37,025.24 spent for new bridges and culverts, $36,213.24 or 97.6% was spent for permanent work and $812.00 or 2.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 36 concrete box culverts costing $25,939.59; 17 circular concrete culverts costing $3,533.96; 1 cast iron pipe culvert with headwalls costing $120.90; 1 headwall costing $20.80; 1 I-beam span on concrete abutments costing $1,020.00; 1 pony truss with concrete abutments costing $5,577.99; 2 concrete pipe culverts without headwalls costing $632.00; 10 corrugated pipe culverts without headwalls costing $180.00.

MARSHALL COUNTY.

Roads.

The total county road expenditure was $69,018.66, of which $48,290.60 or 70.0% was spent for permanent work; $1,728.14 or 2.5% was spent for temporary work; $2,197.10 or 3.2% was spent for repairs; $13,655.26 or 19.8% was spent for maintenance, and $3,147.51 or 4.5% was spent for equipment and unused material.

14.0 miles were built to permanent grade at a cost of $47,722.00. No roads were built to temporary grade. 23.5 miles were built to natural grade at a cost of $1,728.14. 0.74 miles were surfaced with gravel at a cost of $471.40.

The county road system was dragged an average of 42 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $83.85 per mile of county road. The total average expenditure per mile of county road was $364.50.

Of the 189 miles in the county road system, 189 were patrolled, there being 11 districts with an average length of 17.2 miles.

The total township road expenditure as shown by reports from all of the 18 townships was $44,718.75.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $165,334.99, of which $134,929.22 or 81.6% was spent for permanent bridges and culverts; $1,810.97 or 1.1% was spent for temporary bridges and culverts; $11,648.10 of 7.1% was spent for repairs; $3,228.08 or 1.9% was spent for culvert material for townships; $3,473.51 or 2.1% was spent for equipment and unused material; $8,824.55 or 5.4% was spent for filling bridges and culverts, and $1,420.56 or 0.8% was spent for special cases.

Of the total amount $136,740.19 spent for new bridges and culverts, $134,929.22 or 98.6% was spent for permanent work, and $1,810.97 or 1.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 98 concrete box culverts costing $64,593.51; 15 circular concrete culverts costing $3,848.17; 1 concrete pipe with headwalls costing $186.85; 5 headwalls costing $466.07; 8 concrete slab bridges costing $19,970.23; 1 concrete arch bridge costing $16,010.00; 5 I-beam spans on concrete abutments costing $16,888.71; 1 pony truss with concrete abutments costing $3,444.28; 1 high steel truss with concrete abutments costing $9,521.40; 5 corrugated pipe culverts without headwalls costing $267.30; 6 cast iron pipe culverts without headwalls costing $474.56; 1 wood pile bridge costing $556.56, and 13 miscellaneous bridges and culverts costing $512.55.

MILLS COUNTY.

Roads.

The total county road expenditure was $29,242.84 of which $5,828.98 or 19.9% was spent for temporary work; $9,701.25 or 33.2% was spent for repairs; $7,257.61 or 24.8% was spent for maintenance; $5,830.00 or 20.0% was spent for equipment and unused material and $625.00 or 2.1% was spent for special cases.

There were no roads built to permanent or temporary grade, and none were surfaced. 51.4 miles were built to natural grade at a cost of $5,828.98.

The county road system was dragged an average of 12 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $154.17 per mile of county road. The total average expenditure per mile of county road was $265.00.

Of the 110 miles in the county road system, 108 were patrolled, there being 8 districts with an average length of 13.5 miles.

The total township road expenditure as shown by reports from 10 of the 13 townships was $17,474.80.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $90,194.32 of which $20,768.57 or 23.1% was spent for permanent bridges and culverts; $18,169.05 or 20.1% was spent for temporary bridges and culverts; $12,812.90 or 14.2% was spent for repairs; $3,358.48 or 3.7% was spent for culvert material for townships; $20,472.61 or 22.8% was spent for equipment and unused material; $6,571.85 or 7.3% was spent for filling bridges and culverts and $7,940.86 or 8.8% was spent for special cases.

Of the total amount $38,937.62 spent for new bridges and culverts, $20,768.57 or 53.3% was spent for permanent work and $18,169.05 or 46.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 11 concrete box culverts costing $16,187.31; 12 concrete pipes with headwalls, costing $3,306.50; 3 headwalls on culverts previously constructed, costing $1,274.76; 2 pony trusses on piling, wood floors, costing $8,720.28 and 14 wood pile bridges costing $9,448.77.

MITCHELL COUNTY.

Roads.

The total county road expenditure was $25,575.42 of which $5,351.78 or 20.9% was spent for permanent work; $6,202.28 or 24.2% was spent for temporary work; $5,278.04 or 20.6% was spent for repairs; $3,617.78 or 14.3% was spent for maintenance; $4,947.92 or 19.3% was spent for equipment and unused material, and $177.62 or 0.7% was spent for special cases.

2.0 miles were built to permanent grade at a cost of $831.20. 30.5 miles were built to natural grade at a cost of $6,202.28; 5.0 miles were surfaced with gravel at a cost of $4,714.54. There were no roads built to temporary grade.

The county road system was dragged an average of 26 times, the average cost of dragging being $0.88 per mile one round trip. The average cost of repairs and maintenance was $68.83 per mile of county road. The total average expenditure per mile of county road was $198.00.

Of the 129 miles in the county road system, 3 were patrolled, there being 1 district with an average length of 3 miles.

The total township road expenditure as shown by reports from all of the 16 townships was $24,106.82.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $65,314.85 of which $38,308.82 or 58.7% was spent for permanent bridges and culverts; $2,057.40 or 3.1% was spent for temporary bridges and culverts; $8,036.75 or 12.3% was spent for repairs; $1,378.82 or 2.1% was spent for culvert material for townships; $5,512.25 or 8.5% was spent for equipment and unused material; $7,501.83 or 11.5% was spent for filling bridges and culverts, and $2,518.98 or 3.8% was spent for special cases.

Of the total amount $40,366.22 spent for new bridges and culverts, $38,308.82 or 95.0% was spent for permanent work and $2,057.40 or 5.0% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 93 concrete box culverts costing $29,142.54; 1 concrete slab bridge costing $2,246.88; 4 I-beam spans on concrete abutments costing $6,919.40; and 115 corrugated pipe culverts without headwalls costing $2,057.40.

MONONA COUNTY.

Roads.

The total county road expenditure was $30,259.44, of which $4,927.61 or 16.3% was spent for permanent work; $4,175.76 or 13.8% was spent for temporary work; $2,499.72 or 8.3% was spent for repairs; $13,248.92 or 43.8% was spent for maintenance; $2,741.98 or 9% was spent for equipment and unused material; $2,665.45 or 8.8% was spent for special cases.

There were no roads built to temporary grade, and none were surfaced. 4.3 miles were built to permanent grade at a cost of $4,922.01. 31.0 miles were built to natural grade at a cost of $4,175.76.

The county road system was dragged an average of 28 times, the average cost of dragging being $.90 per mile one round trip. The average cost of repairs and maintenance was $97.52 per mile of county road. The total average expenditure per mile of county road was $188.00.

Of the 161 miles in the county road system, all were patrolled, there being 9 districts with an average length of 17.9 miles.

The total township road expenditures as shown by reports from all of the 19 townships was $37,507.42.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $74,287.37, of which $14,677.48 or 19.7% was spent for permanent bridges and culverts; $31,197.13 or 42% was spent for temporary bridges and culverts; $16,480.55 or 22.2% was spent for repairs; $2,505.72 or 3.4% was spent for culvert material for townships; $5,288.97 or 7.1% was spent for equipment and unused material; $1,974.07 or 2.7% was spent for filling bridges and culverts, and $2,163.45 or 2.9% was spent for special cases.

Of the total amount $45,874.61 spent for new bridges and culverts, $14,677.48 or 32.0% was spent for permanent work, and $31,197.13 or 68% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 21 concrete box culverts costing $9,760.10; 1 headwall costing $126.90; 3 concrete slab bridges costing $4,726.80; 1 pony truss with concrete abutments costing $63.68; 33 concrete pipe culverts without headwalls costing $2,454.41; 11 corrugated pipe culverts without headwalls costing $724.16; 1 pony truss on tubes costing $626.20; 6 I-beam spans on piling abutments costing $3,540.87; 7 pony trusses on piling with wood floors costing $20,622.16; wood pile bridges costing $3,200.93, and miscellaneous bridges and culverts costing $28.40.

MONROE COUNTY.

Roads.

The total county road expenditure was $19,244.82 of which $6,645.90 or 34.5% was spent for repairs; $9,646.80 or 50.1% was spent for maintenance;

$2,094.52 or 10.9% was spent for equipment and unused material, and $857.60 or 4.5% was spent for special cases.

The county road system was dragged an average of 27 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $97.27 per mile of county road. The total average expenditure per mile of county road was $115.10.

Of the 167 miles in the county road system, 153 were patrolled, there being 9 districts with an average length of 17 miles.

The total township road expenditure as shown by reports from all of the 12 townships was $22,290.84.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $49,365.71 of which $32,038.92 or 65.0% was spent for permanent bridges and culverts; $1,967.63 or 4.0% was spent for temporary bridges and culverts; $7,172.04 or 14.5% was spent for repairs; $3,695.83 or 7.4% was spent for culvert material for townships; $696.42 or 1.4% was spent for equipment and unused material; $2,689.87 or 5.5% was spent for filling bridges and culverts and $1,105.00 or 2.2% was spent for special cases.

Of the total amount $34,006.55 spent for new bridges and culverts, $32,038.92 or 94.2% was spent for permanent work and $1,967.63 or 5.8% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts costing $18,836.46; 1 concrete pipe with headwalls costing $765.00; 2 masonry box culverts costing $1,300.10; 6 headwalls costing $2,129.15; 1 concrete slab bridge costing $1,447.00; 2 I-beam spans on concrete abutments costing $7,561.21; 1 concrete pipe without headwalls costing $74.75; 20 corrugated pipes without headwalls costing $881.11 and 1 wood pile bridge costing $1,011.77.

MONTGOMERY COUNTY.

Roads.

The total county road expenditure was $28,185.98 of which $4,191.40 or 14.9% was spent for permanent work; $4,588.55 or 16.3% was spent for temporary work; $9,760.10 or 34.6% was spent for repairs; $7,537.49 or 26.8% was spent for maintenance; $665.32 or 2.4% was spent for equipment and unused material and $1,443.12 or 5.0% was spent for special cases.

7.0 miles were built to temporary grade at a cost of $4,170.60. There were no roads built to permanent or natural grade and none were surfaced.

The county road system was dragged an average of 46 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $136.47 per mile of county road. The total average expenditure per mile of county road was $223.80.

Of the 126 miles in the county road system, 126 were patrolled, there being 6 districts with an average length of 21 miles.

The total township road expenditure as shown by reports from 6 of the 12 townships was $16,167.19.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $76,080.51 of which $21,988.31 or 28.8% was spent for permanent bridges and culverts; $10,825.44 or 14.2% was spent for temporary bridges and culverts; $17,135.42 or 22.7% was spent for repairs; $3,548.72 or 4.7% was spent for culvert material for townships; $20,286.12 or 26.6% was spent for equipment and unused material, and $2,296.50 or 3.0% was spent for special cases.

Of the total amount $32,813.75 spent for new bridges and culverts, $21,988.31 or 66.9% was spent for permanent work and $10,825.44 or 33.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 2 concrete box culverts costing $6,468.46; 30 concrete pipe culverts with headwalls costing $8,138.47; 18 headwalls costing $3,466.54; 1 pony truss with concrete abutments costing $3,914.84; 30 concrete pipes without headwalls costing $1,829.57; 1 pony truss on piling with wood floor, costing $2,986.79; 21 wood pile bridges costing $5,970.08 and 1 miscellaneous bridge or culvert costing $39.00.

MUSCATINE COUNTY.

Roads.

The total county road expenditure was $37,108.90 of which $16,048.15 or 43.3% was spent for permanent work; $2,127.00 or 5.7% was spent for temporary work; $590.57 or 1.5% was spent for repairs; $11,680.89 or 31.5% was spent for maintenance; $1,214.86 or 3.3% was spent for equipment and unused material and $5,447.43 or 14.7% was spent for special cases.

7.55 miles were built to permanent grade at a cost of $9,281.46; 25 miles were built to natural grade at a cost of $2,110.34 and 3.18 miles were surfaced with gravel at a cost of $6,089.18. There were no roads built to temporary grade.

The county road system was dragged an average of 53 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $87.68 per mile of county road. The total average expenditure per mile of county road was $267.00.

Of the 139 miles in the county road system, 139 were patrolled, there being 9 districts with an average length of 15.45 miles.

The total township road expenditure as shown by reports from all of the 15 townships was $31,130.98.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $37,536.23 of which $23,385.26 or 62.3% was spent for permanent bridges and culverts; $832.31 or 2.2% was spent for temporary bridges and culverts; $5,779.08 or 15.4% was spent for repairs; $3,707.59 or 9.9% was spent for culvert material for townships; $1,885.67 or 5.0% was spent for equipment and unused material; $534.25 or 1.4% was spent for filling bridges and culverts and $1,412.07 or 3.8% was spent for special cases.

Of the total amount $24,217.57 spent for new bridges and culverts, $23,385.25 or 96.5% was spent for permanent work and $832.31 or 3.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 74 concrete box culverts costing $17,509.46; 17 circular concrete culverts costing $2,293.93; 3 concrete pipes with headwalls costing $351.36; 5 boiler pipe culverts with headwalls costing $319.82; 7 headwalls on culverts previously constructed, costing $490.12; 3 concrete slab bridges costing $2,420.57; 2 concrete pipe without headwalls costing $137.80; 48 corrugated pipe without headwalls costing $554.29; 15 boiler pipe culverts without headwalls costing $107.82 and 9 miscellaneous bridges and culverts costing $32.40.

O'BRIEN COUNTY.

Roads.

The total county road expenditure was $34,535.74 of which $18,312.13 or 53.0% was spent for permanent work; $3,054.15 or 8.8% was spent for temporary work; $1,510.62 or 4.4% was spent for repairs; $5,519.04 or 16% was spent for maintenance; $2,826.23 or 8.2% was spent for equipment and unused material, and $3,313.57 or 9.6% was spent for special cases.

23.27 miles were built to permanent grade at a cost of $16,539.05 and 19 miles were built to natural grade at a cost of $3,054.15. There were no roads built to temporary grade and none were surfaced.

The county road system was dragged an average of 22 times, the average cost of dragging being $0.85 per mile one round trip. The average cost of repairs and maintenance was $37.19 per mile of county road. The total average expenditure per mile of county road was $182.50.

Of the 189 miles in the county road system, 189 were patrolled, there being 5 districts with an average length of 37.8 miles.

The total township road expenditure as shown by reports from 16 of the 16 townships was $39,415.25.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $76,546.14 of which $64,057.06 or 83.4% was spent for permanent bridges and culverts; $6.27 or 0.1% was spent for temporary bridges and culverts; $3,125.08 or 4.1% was spent for repairs; $2,421.99 or 3.2% was spent for culvert material for townships; $6,051.39 or 7.9% was spent for equipment and unused material; $21.25 or 0.2% was spent for filling bridges and culverts, and $863.10 or 1.1% was spent for special cases.

Of the total amount $64,063.33 spent for new bridges and culverts, $64,057.06 or 99.9% was spent for permanent work and $6.27 or 0.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 83 concrete box culverts costing $15,555.76; 5 circular concrete culverts costing $694.00; 11 concrete slab bridges costing $12,854.90; 6 I-beam spans on concrete abutments costing $12,053.53; 11 pony trusses with concrete abutments costing $22,898.87, and 2 corrugated pipe culverts without headwalls costing $6.27.

OSCEOLA COUNTY.

Roads.

The total county road expenditure was $14,994.63 of which $1,303.63 or 8.7% was spent for permanent work; $4,268.00 or 28.5% was spent for temporary work; $1,622.98 or 10.8% was spent for repairs; $6,685.70 or 44.5% was spent for maintenance; $884.32 or 5.9% was spent for equipment and unused material, and $230.00 or 1.6% was spent for special cases.

There were no roads built to permanent grade and none were surfaced. 5 miles were built to temporary grade at a cost of $1,060.00. 24 miles were built to natural grade at a cost of $4,038.00.

The county road system was dragged an average of 29 times, the average cost of dragging being $.75 per mile one round trip. The average cost of repairs and maintenance was $62.95 per mile of county road. The total average expenditure per mile of county road was $113.50.

Of the 132 miles in the county road system, all were patrolled, there being 12 districts with an average length of 11 miles.

The total township road expenditure as shown by reports from 10 of the 12 townships was $16,094.92.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $47,033.42 of which $32,261.57 or 68.7% was spent for permanent bridges and culverts; $6,600.84 or 14% was spent for temporary bridges and culverts; $916.41 or 1.9% was spent for repairs; $1,816.85 or 3.8% was spent for culvert material for townships; $4,171.10 or 8.9% was spent for equipment and unused material; $1,233.95 or 2.6% was spent for filling bridges and culverts, and $32.70 or 0.1% was spent for special cases.

Of the total amount $38,862.41 spent for new bridges and culverts, $32,261.57 or 83% was spent for permanent work; $6,600.84 or 17% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 55 concrete box culverts costing $20,741.08; 29 circular concrete culverts costing $3,565.39; 1 corrugated pipe culvert with headwalls costing $82.93; 3 concrete slab bridges costing $4,413.22; 1 deck girder costing $259.31; 1 pony truss with concrete abutments costing $3,199.64; 1 corrugated pipe culvert without headwalls costing $58.10, and 16 wood pile bridges costing $6,542.74.

PAGE COUNTY.

Roads.

The total county road expenditure was $32,714.18 of which $7,838.94 or 24% was spent for permanent work; $5,126.50 or 15.6% was spent for temporary work; $2,593.73 or 7.9% was spent for repairs; $10,979.94 or 33.6% was spent for maintenance; $2,805.54 or 8.3% was spent for equipment and unused material, and $3,369.53 or 10.6% was spent for special cases.

1.0 mile was built to permanent grade at a cost of $2,067.80. 1.0 mile was built to temporary grade at a cost of $5,758.14. 51.0 miles were built to natural grade at a cost of $5,126.50. There were no roads surfaced.

The county road system was dragged an average of 22 times, the average cost of dragging being $1.75 per mile one round trip. The average cost of repairs and maintenance was $78.01 per mile of county road. The total average expenditure per mile of county road was $188.00.

Of the 174 miles in the county road system, all were patrolled, there being 12 districts with an average length of 14.5 miles.

The total township road expenditure as shown by reports from 16 of the 16 townships was $40,685.27.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $91,769.07 of which $39,994.84 or 43.6% was spent for permanent bridges and culverts; $8,633.29 or 9.4% was spent for temporary bridges and culverts; $16,439.23 or 18.0% was spent for repairs; $10,178.01 or 11.1% was spent for culvert material for townships; $857.57 or 0.9% was spent for equipment and unused material; $13,154.93 or 14.3% was spent for filling bridges and culverts, and $2,511.20 or 2.7% was spent for special cases.

Of the total amount $48,628.19 spent for new bridges and culverts, $39,994.84 or 82.3% was spent for permanent work and $8,633.29 or 17.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts costing $18,688.05; 3 headwalls costing $191.21; 2 pony trusses with concrete abutments costing $21,115.58; 11 concrete pipe culverts without headwalls costing $862.80; 31 corrugated pipe culverts without headwalls costing $1,014.26; 2 pony trusses on piling with wood floors costing $4,244.20, and 7 wood pile bridges costing $2,512.53.

PALO ALTO COUNTY.

Roads.

The total county road expenditure was $51,999.48 of which $41,249.15 or 79.3% was spent for permanent work; $1,889.33 or 3.6% was spent for repairs; $6,193.22 or 11.9% was spent for maintenance; $294.65 or 0.6% was spent for equipment and unused material, and $2,373.13 or 4.6% was spent for special cases.

32.48 miles were built to permanent grade at a cost of $38,131.16. There were no roads built to temporary or natural grade and none were surfaced.

The county road system was dragged an average of 27 times, the average cost of dragging being $.85 per mile one round trip. The average cost of repairs and maintenance was $48.43 per mile of county road. The total average expenditure per mile of county road was $313.00.

Of the 166 miles in the county road system, 140 were patrolled, there being 7 districts with an average length of 20 miles.

The total township road expenditure as shown by reports from 8 of the 16 townships was $16,421.26.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $48,349.83 of which $32,111.87 or 66.5% was spent for permanent bridges and culverts; $5,264.55 or 10.9% was spent for temporary bridges and culverts; $3,054.50 or 6.3% was spent for repairs; $1,360.95 or 2.8% was spent for culvert material for townships; $4,345.35 or 9.0% was spent for equipment and unused material; $1,133.26 or 2.3% was spent for filling bridges and culverts, and $1,079.35 or 2.2% was spent for special cases.

Of the total amount $37,376.42 spent for new bridges and culverts, $32,111.87 or 85.9% was spent for permanent work and $5,264.55 or 14.1% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 28 concrete box culverts costing $18,163.69; 9 circular concrete culverts costing $1,522.00; 3 concrete slab bridges costing $2,254.75; 1 I-beam span on concrete abutments costing $3,719.64; 4 pony trusses with concrete abutments costing $6,451.79; 127 corrugated pipe without headwalls costing $3,084.61; 1 I-beam span on piling abutments costing $752.20; 3 wood pile bridges costing $962.56, and 3 miscellaneous bridges and culverts costing $465.18.

PLYMOUTH COUNTY.

Roads.

The total county road expenditure was $37,088.47 of which $6,769.45 or 18.2% was spent for permanent work; $2,660.78 or 7.2% was spent for temporary work; $9,507.92 or 25.6% was spent for repairs; $13,706.01 or 37% was spent for maintenance; $2,714.37 or 7.3% was spent for equipment and unused material, and $1,729.94 or 4.7% was spent for special cases.

There were no roads built to permanent grade and none were surfaced. 3.0 miles were built to temporary grade at a cost of $6,769.45. 24 miles were built to natural grade at a cost of $2,660.78.

The county road system was dragged an average of 25 times, the average cost of dragging being $.90 per mile one round trip. The average cost of repairs and maintenance was $111.34 per mile of county road. The total average expenditure per mile of county road was $178.10.

Of the 208 miles in the county road system, all were patrolled, there being 12 districts with an average length of 17.3 mfles.

The total township road expenditure as shown by reports from 21 of the 24 townships was $33,827.70.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $114,521.50 of which $41,856.51 or 36.6% was spent for permanent bridges and culverts; $15,547.60 or 13.6% was spent for temporary bridges and culverts; $9,547.29 or 8.3% was spent for repairs; $4,022.80 or 3.5% was spent for culvert material for townships; $36,773.94 or 32% was spent for equipment and unused material; $2,943.70 or 2.6% was spent for filling bridges and culverts, and $3,829.66 or 3.4% was spent for special cases.

Of the total amount $57,404.11 spent for new bridges and culverts, $41,856.51 or 73% was spent for permanent work and $15,547.60 or 27% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 36 concrete box culverts costing $26,964.22; 1 concrete slab bridge costing $69.03; 3 I-beam spans on concrete abutments costing $3,495.40; 3 pony trusses with concrete abutments costing $11,327.86; 63 concrete pipe culverts without headwalls costing $3,089.46, and 41 wood pfle bridges costing $12,458.14.

POCAHONTAS COUNTY.

Roads.

The total county road expenditure was $95,400.58 of which $68,337.50 or 71.6% was spent for permanent work; $459.75 or 0.5% was spent for temporary work; $4,257.02 or 4.5% was spent for repairs; $8,981.55 or 9.4% was spent for maintenance; $3,766.36 or 3.9% was spent for equipment and unused material, and $9,598.40 or 10.1% was spent for special cases.

49.1 miles were built to permanent grade at a cost of $33,869.89. There were no roads built to temporary grade. 5.25 miles were built to natural grade at a cost of $459.75. 30.85 miles were surfaced with gravel at a cost of $33,440.78.

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 $78.57 per mile of county road. The total average expenditure per mile of county road was $567.50.

Of the 168 miles in the county road system, 156 were patrolled, there being 8 districts with an average length of 19.5 miles.

The total township road expenditure as shown by reports from 18 of the 18 townships was $47,823.19.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $54,454.39 of which $24,907.92 or 45.8% was spent for permanent bridges and culverts; $8,454.98 or 15.5% was spent for temporary bridges and culverts; $9,655.72 or 17.8% was spent for repairs; $3,706.99 or 6.8% was spent for culvert material for townships; $5,735.83 or 10.5% was spent for equipment and unused material; $933.54 or 1.7% was spent for filling bridges and culverts, and $1,059.41 or 1.9% was spent for special cases.

Of the total amount $33,362.90 spent for new bridges and culverts, $24,907.92 or 74.7% was spent for permanent work and $8,454.98 or 25.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 19 concrete box culverts costing $7,602.66; 2 circular concrete culverts costing $424.84; 2 headwalls costing $266.15; 3 concrete slab bridges costing $1,317.08; 4 I-beam spans on concrete abutments costing

$9,049.86; 5 pony trusses with concrete abutments costing $6,247.33; 13 wood pile bridges costing $5,635.58; miscellaneous bridges and culverts costing $612.07.

POLK COUNTY.

Roads.

The total county road expenditure was $267,161.11 of which $209,615.28 or 78.50% was spent for permanent work; $4,734.58 or 1.8% was spent for repairs; $32,532.04 or 12.2% was spent for maintenance; $11,132.98 or 4.1% was spent for equipment and unused material, and $9,146.23 or 3.4% was spent for special cases.

26.76 miles were built to permanent grade at a cost of $51,805.35. No roads were built to temporary or natural grade. 2.5 miles were surfaced with brick, monolithic construction with gravel shoulders 6 feet wide at a cost of $127,138.34. 14.9 miles were surfaced with gravel at a cost of $28,961.12.

The monolithic pavement reported above was constructed partly on 58th St. and partly on the Beaver Road extending from the city limits of Des Moines to Camp Dodge, a distance of 4.8 miles.

In the fall of 1917 all of the grading and approximately two miles of pavement was completed—the balance of the work being finished in July, 1918. This pavement is 20 feet wide with a 6 foot gravel shoulder on each side.

The total cost of this work including the cost of all gravel and sand which was furnished by the county is as follows:

Construction	$228,448.13
Engineering Expense by County	$ 2,458.67
Total cost to county	$230,906.80

In addition to this amount the Commission paid the sum of $4,203.52 which amount covered the entire cost of preparing plans and specifications also all engineering, supervision and inspection for the entire time the work was in progress.

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 repair and maintenance was $194.86 per mile of county road. The total average expenditure per mile of the county road was $1,395.00.

Of the 191 miles in the county road system, 165 were patrolled, there being 15 districts with an average length of 11 miles.

The total township road expenditure as shown by reports from 19 of the 19 townships was $43,842.97.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $199,628.33 of which $145,517.70 or 73.0% was spent for permanent bridges and culverts; $7,879.63 or 3.9% was spent for temporary bridges and culverts; $12,333.04 or 6.2% was spent for repairs; $7,741.80 or 3.9% was spent for culvert material for townships; $9,214.41 or 4.6% was spent for equipment and unused material; $14,244.97 or 7.1% was spent for filling bridges and culverts, and $2,696.78 or 1.3% was spent for special cases.

Of the total amount $153,973.33 spent for new bridges and culverts, $145,517.70 or 94.7% was spent for permanent work and $7,879.63 or 5.3% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 65 concrete box culverts costing $68,874.02; 2 circular concrete culverts costing $512.72; 4 concrete slab bridges costing $11,675.08; 1 concrete arch bridge costing $1,210.00; 1 concrete thru girder costing $3,727.80; 8 concrete deck girders costing $55,425.88; 1 retaining wall costing $342.20; 1 pony truss on concrete abutments costing $3,750.00; 18 concrete pipe culverts without headwalls, $1,713.89; 101 corrugated pipe culverts without headwalls, $2,525.46; 10 wood pile bridges costing $3,593.84, and 3 miscellaneous bridges and culverts costing $46.44.

POTTAWATTAMIE COUNTY.

Roads.

The total county road expenditure was $45,135.05 of which $14,301.07 or 31.7% was spent for temporary work; $5,819.66 or 12.9% was spent for repairs; $19,575.36 or 43.4% was spent for maintenance; $1,771.99 or 3.9% was spent for equipment and unused material, and $3,666.97 or 8.1% was spent for special cases.

The county road system was dragged an average of 39 times, the average cost of dragging being $0.90 per mile one round trip. The average cost of repairs and maintenance was $99.39 per mile of county road. The total average expenditure per mile of county road was $177.00.

Of the 255 miles in the county road system, 255 were patrolled, there being 10 districts with an average length of 25.5 miles.

The total township road expenditure as shown by reports from 13 of the 28 townships was $62,297.29.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $219,262.81 of which $32,849.13 or 15.0% was spent for permanent bridges and culverts; $75,535.19 or 34.5% was spent for temporary bridges and culverts; $17,582.36 or 8.0% was spent for repairs; $32,754.94 or 14.9% was spent for culvert material for townships; $44,151.22 or 20.2% was spent for equipment and unused material; $13,522.55 or 6.1% was spent for filling bridges and culverts, and $2,867.42 or 1.3% was spent for special cases.

Of the total amount $108,384.32 spent for new bridges and culverts, $32,849.13 or 30.3% was spent for permanent bridge work and $75,535.19 or 69.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 7 concrete box culverts costing $6,544.11; 60 concrete culverts with headwalls costing $17,566.59; 25 headwalls costing $2,958.85; 1 concrete slab bridge costing $2,167.47; 1 I-beam span on concrete abutments costing $625.06; 1 steel girder with concrete abutments costing $2,987.05; 12 concrete pipe culverts without headwalls costing $424.21; 13 corrugated pipe culverts without headwalls costing $455.27; 5 cast iron pipe culverts

without headwalls costing $106.00; 11 I-beam spans on piling abutments costing $12,525.32; 4 pony trusses on piling with wood floors costing $8,909.96; 106 wood pile bridges costing $52,784.69, and 5 miscellaneous bridges and culverts costing $329.74.

POWESHIEK COUNTY.

Roads.

The total county road expenditure was $33,857.85 of which $3,161.70 or 9.3% was spent for permanent work; $8,166.60 or 24.3% was spent for temporary work; $8,059.90 or 23.8% was spent for repairs; $10,388.96 or 30.6% was spent for maintenance; $1,916.00 or 5.6% was spent for equipment and unused material, and $2,164.69 or 6.4% was spent for special cases.

1.5 miles were built to temporary grade at a cost of $3,161.70 and 14.5 miles were built to natural grade at a cost of $5,198.30. There were no roads built to permanent grade and none 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 $133.39 per mile of county road. The total average expenditure per mile of county road was $245.00.

Of the 138 miles in the county road system, 112 were patrolled, there being 7 districts with an average length of 16 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was $46,120.00.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $103,484.48 of which $63,375.98 or 61.2% was spent for permanent bridges and culverts; $360.20 or 0.3% was spent for temporary bridges and culverts; $17,094.08 or 16.6% was spent for repairs; $8,598.00 or 8.3% was spent for culvert material for townships; $1,485.40 or 1.4% was spent for equipment and unused material; $8,665.10 or 8.4% was spent for filling bridges and culverts, and $3,905.72 or 3.8% was spent for special cases.

Of the total amount $63,736.18 spent for new bridges and culverts, $63,375.98 or 99.4% was spent for permanent work and $360.20 or 0.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 41 concrete box culverts costing $25,977.24; 3 circular concrete culverts costing $599.59; 1 concrete pipe with headwalls costing $718.28; 1 headwall costing $182.31; 9 I-beam spans on concrete abutments costing $23,460.67; 4 pony trusses with concrete abutments costing $12,437.89, and 6 concrete pipe culverts without headwalls costing $360.20.

RINGGOLD COUNTY.

Roads.

The total county road expenditure was $8,139.67 of which $1,856.70 or 22.8% was spent for repairs; $4,521.95 or 55.6% was spent for maintenance; $1,761.02 or 21.6% 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 25 times, the average cost of dragging being $0.51 per mile one round trip. The average cost of repairs and maintenance was $34.79 per mile of county road. The total average expenditure per mile of county road was $44.50.

Of the 183 miles in the county road system, 108 were patrolled, there being 3 districts with an average length of 36 miles.

The total township road expenditure as shown by reports from all of the 18 townships was $18,679.44.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $64,349.01 of which $27,242.93 or 42.5% was spent for permanent bridges and culverts; $4,630.92 or 7.2% was spent for temporary bridges and culverts; $8,141.19 or 12.6% was spent for repairs; $3,828.64 or 6.0% was spent for culvert material for townships; $9,657.41 or 14.8% was spent for equipment and unused material; $10,731.32 or 16.7% was spent for filling bridges and culverts; $116.60 or 0.2% was spent for special cases. Of the total amount $31,873.85 spent for new bridges and culverts, $27,242.93 or 85.6% was spent for permanent work and $4,630.92 or 14.4% was spent for temporary work. The amounts last above referred to were spent on the following construction:

37 concrete box culverts costing $20,071.90; 19 concrete pipe culverts costing $2,374.60; 3 I-beam spans on concrete abutments costing $4,796.43; 29 wood pile bridges costing $4,680.92.

SAC COUNTY.

Roads.

The total county road expenditure was $89,680.08 of which $73,021.89 or 81.5% was spent for permanent work; $1,811,86 or 2.0% was spent for repairs; $5,718.54 or 6.4% was spent for maintenance; $404.27 or 0.4% was spent for equipment and unused material, and $8,723.52 or 9.7% was spent for special cases.

34.75 miles were built to permanent grade at a cost of $60,341.47. 1,15 miles were built to temporary grade at a cost of $1,596.40. 8.58 miles were surfaced with gravel at a cost of $10,101.21. There were no roads built to natural grade.

The county road system was dragged an average of 18 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $50.14 per mile of county road. The total average expenditure per mile of county road was $597.50.

Of the 150 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 all of the 16 townships was $48,233.90.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $110,168.38 of which $93,271.57 or 84.6% was spent for permanent bridges and culverts; $1,175.40 or 1.1% was spent for temporary bridges and culverts; $3,808.00 or 3.6% was spent for repairs; $1,934.11 or 1.7% was spent for culvert material for townships; $4,161.20 or 3.8% was spent for equipment and unused material; $1,039.55 or 0.9% was spent for filling bridges and culverts, and $4,778.55 or 4.3% was spent for special cases.

Of the total amount $94,446.97 spent for new bridges and culverts, $93,271.57 or 98.8% was spent for permanent work and $1,175.40 or 1.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 63 concrete box culverts costing $29,631.83; 6 circular concrete culverts (encased tile) costing $525.62; 69 concrete arch culverts costing $7,201.96; 46 corrugated pipe culverts with head walls costing $2,303.05; 8 headwalls costing $173.28; 1 concrete arch bridge costing $14,004.88; 9 I-beam spans on concrete abutments costing $23,562.39; 2 pony trusses with concrete abutments costing $13,984.26; 1 high steel truss with concrete abutments costing $1,884.30; 3 concrete pipe culverts costing $12.70; 45 corrugated pipe culverts without headwalls costing $616.60; 1 I-beam span on piling abutments costing $190.03, and 1 wood pile bridge costing $356.07.

SCOTT COUNTY.

Roads.

The total county road expenditure was $35,093.91 of which $16,909.60 or 48.2% was spent for permanent work; $7,334.62 or 20.9% was spent for temporary work; $596.07 or 1.7% was spent for repairs; $6,191.29 or 17.6% was spent for maintenance; $3,796.33 or 10.8% was spent for equipment and unused material, and $266.00 or 0.8% was spent for special cases.

3.75 miles were built to permanent grade at a cost of $14,909.33. 0.25 miles were built to temporary grade at a cost of $125.00. 3.50 miles were built to natural grade at a cost of $606.10. 0.75 miles were surfaced with gravel at a cost of $1,875.27.

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 $49.61 per mile of county road. The total average expenditure per mile of county road was $258.00.

Of the 136 miles in the county road system, 113 were patrolled, there being 6 districts with an average length of 18.8 miles.

The total township road expenditure as shown by reports from all of the 14 townships was $36,505.85.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $31,949.82 of which $16,619.57 or 52.2% was spent for permanent bridges and culverts; $1,192.31 or 3.8% was spent for temporary bridges and culverts; $3,103.35 or 9.7% was spent for repairs; $666.85 or 2.7% was spent for culvert material for townships; $4,969.71 or 15.6% was spent for equipment and unused material; $1,616.45 or 5.2% was spent for filling bridges and culverts, and $3,781.58 or 11.8% was spent for special cases.

Of the total amount $17,811.88 spent for new bridges and culverts, $16,619.57 or 93.5% was spent for permanent work and $1,192.31 or 6.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 18 concrete box culverts costing $11,265.87; 14 circular concrete culverts costing $2,319.67; 2 slab bridges costing $3,034.03; corrugated pipe culverts costing $581.35; boiler pipe culverts costing $319.26, and 2 wood pile bridges costing $291.70.

SHELBY COUNTY.

Roads.

The total county road expenditure was $27,638.06 of which $69.85 or 0.2% was spent for permanent work; $2,749.91 or 10.0% was spent for temporary work; $13,154.65 or 47.6% was spent for repairs; $9,929.84 or 36.0% was spent for maintenance; $1,313.01 or 4.7% was spent for equipment and unused material, and $420.80 or 1.5% was spent for special cases.

There were no roads built to permanent or temporary grade. 23 miles were built to natural grade at a cost of $2,749.91. There were no roads surfaced.

The county road system was dragged an average of 39 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $146.33 per mile of county road. The total average expenditure per mile of county road was $175.80.

Of the 157 miles in the county road system, 157 were patrolled, there being 8 districts with an average length of 19.4 miles.

The total township road expenditure as shown by reports from all of the 16 townships was $34,751.99.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $78,551.22 of which $29,542.68 or 37.6% was spent for permanent bridges and culverts; $12,239.31 or 15.5% was spent for temporary bridges and culverts; $18,837.51 or 24.0% was spent for repairs; $5,,611.97 or 7.2% was spent for culvert material for townships; $3,729.45 or 4.8% was spent for equipment and unused material; $8,590.30 or 10.9% was spent for filling bridges and culverts, and nothing was spent for special cases.

Of the total amount $41,781.99 spent for new bridges and culverts, $29,542.68 or 70.6% was spent for permanent work; $12,239.31 or 29.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 17 concrete box culverts costing $21,594.44; 2 concrete deck girders costing $7,948.24; 5 concrete pipe (without headwalls) costing $507.46; 36 corrugated pipe (without headwalls) costing $2,458.98, and 17 wood pile bridges costing $9,272.87.

SIOUX COUNTY.

Roads.

The total county road expenditure was $47,282.37 of which $14,,880.00 or 31.4% was spent for permanent work; $11,623.30 or 24.6% was spent for temporary work; $2,083.58 or 4.4% was spent for repairs; $11,021.03 or 23.3% was spent for maintenance; $5,527.69 or 11.7% was spent for equipment and unused material, and $2,146.77 or 4.6% was spent for special cases.

7.1 miles were built to permanent grade at a cost of $14,880.00. There were no roads built to temporary grade and none were surfaced. 50 miles were built to natural grade at a cost of $8,380.10.

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 $60.67 per mile of county road. The total average expenditure per mile of county road was $219.00.

Of the 216 miles in the county road system, 171 were patrolled, there being 9 districts with an average length of 19 miles.

The total township road expenditure as shown by reports from all of the 23 townships was $44,343.06.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $51,186.52 of which $9,402.10 or 18.5% was spent for permanent bridges and culverts; $11,062.18 or 22.3% was spent for temporary bridges and culverts; $17,941.39 or 34.7% was spent for repairs; $1,028.28 or 1.9% was spent for culvert material for townships; $10,246.45 or 19.6% was spent for equipment and unused material; $945.51 or 1.8% was spent for filling bridges and culverts, and $560.61 or 1.2% was spent for special cases.

Of the total amount $20,464.28 spent for new bridges and culverts, $11,062.18 or 54.5% was spent for temporary work. The amounts last above referred to were spent on the following construction:

76 concrete box culverts costing $5,077.62; 3 slab bridges costing $2,326.55; 1 deck girder costing $847.18; 1 I-beam span costing $1,150.75; 7 concrete pipe costing $517.95; 12 corrugated pipe costing $1,058.20; 11 wood pile bridges costing $8,575.47, and 36 miscellaneous bridges and culverts costing $910.56.

STORY COUNTY.

Roads.

The total county road expenditure was $37,031.85 of which $20,172.02 or 54.4% was spent for permanent work; $3,164.58 or 8.6% was spent for repairs; $10,144.30 or 27.4% was spent for maintenance; $824.47 or 2.2% was spent for equipment and unused material, and $2,726.48 or 7.4% was spent for special cases.

0.75 miles were built to permanent grade at a cost of $920.25. No roads were built to temporary or natural grade. 21.0 miles were surfaced with gravel at a cost of $18,189.05.

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 $100.44 per mile of county road. The total average expenditure per mile of county road was $280.00.

Of the 132 miles in the county road system, 132 were patrolled, there being 7 districts with an average of 18.9 miles.

The total township road expenditure as shown by reports from 14 of the 16 townships was $40,989.33.

Bridges.

The total expenditures for bridge and culvert work during 1918 was $66.551.78 of which $30,503.67 or 45.9% was spent for permanent bridges and culverts; $8,214.84 or 12.3% was spent for temporary bridges and culverts; $23,708.15 or 35.6% was spent for repairs; $3,152.92 or 4.73% was spent for culvert material for townships; $105.00 or 0.16% was spent for equipment and unused material; $857.75 or 1.29% was spent for filling bridges and culverts, and $9.45 or .02% was spent for special cases.

Of the total amount $38,718.51 spent for new bridges and culverts, $30,503.67 or 78.8% was spent for permanent work and $8,214.84 or 21.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 42 concrete box culverts costing $13,749.75; 21 circular concrete culverts costing $1,754.68; 13 I-beam spans on concrete costing $13,084.59; 1 pony truss on concrete abutments costing $1,914.65, and 5 wood pile bridges costing $8,214.84.

TAMA COUNTY.

Roads.

The total county road expenditure was $52,728.74 of which $18,944.86 or 36.0% was spent for permanent work; $7,552.86 or 14.3% was spent for temporary work; $4,808.29 or 9.1% was spent for repairs; $14,250.48 or 27.0% was spent for maintenance; $6,321.15 or 12.0% was spent for equipment and unused material, and $851.10 or 1.6% was spent for special cases.

12.1 miles were built to permanent grade at a cost of $13,466.74. .2 mile was built to temporary grade at a cost of $995.98. 58 miles were

built to natural grade at a cost of $7,552.86. 2.2 miles were surfaced with gravel at a cost of $4,482.14.

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 $92.07 per mile of county road. The total average expenditure per mile of county road was $254.00.

Of the 207 miles in the county road system, 207 were patrolled, there being 10 districts with an average length of 20.7 miles.

The total township road expenditure as shown by reports from 18 of the 21 townships was $49,759.84.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $118,488.29 of which $64,451.04 or 54.4% was spent for permanent bridges and culverts; $20,798.67 or 17.6% was spent for temporary bridges and culverts; $19,648.91 or 16.6% was spent for repairs; $6,457.81 or 5.5% was spent for culvert material for townships; $3,533.92 or 2.9% was spent for equipment and unused material; $2,521.34 or 2.1% was spent for filling bridges and culverts, and $1,076.60 or 0.9% was spent for special cases.

Of the total amount $85,249.71 spent for new bridges and culverts, $64,451.04 or 75.6% was spent for permanent work; $20,798 or 24.4% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 35 concrete box culverts costing $18,164.45; 1 concrete slab bridge costing $2,678.19; 1 concrete abutment costing $84.60; 4 I-beam spans on concrete abutments costing $7,228.93; 3 pony trusses with concrete abutments costing $36,294.87; 10 concrete pipe without headwalls costing $825.92; 22 corrugated pipe without headwalls costing $573.68; 48 cast iron pipe without headwalls costing $4,331.40, and 40 wood pile bridges costing $15,067.67.

TAYLOR COUNTY.

Roads.

The total county road expenditure was $13,785.35 of which $2,917.25 or 21.2% was spent for temporary work; $4,358.27 or 31.6% was spent for repairs; $4,719.45 or 34.2% was spent for maintenance; $1,228.38 or 8.9% was spent for equipment and unused material, and $562.00 or 4.1% was spent for special cases.

There were no roads built to permanent grade, none to temporary grade and none surfaced. 24 miles were built to natural grade at a cost of $2,917.25.

The county road system was dragged an average of 31 times, the average cost of dragging being $0.65 per mile one round trip. The average cost of repairs and maintenance was $52.72 per mile of county road. The total average expenditure per mile of county road was $80.25.

Of the 172 miles in the county road system, 50 were patrolled, there being 1 district with an average length of 50 miles.

The total township road expenditure as shown by reports from all of the 17 townships was $28,451.13.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $69,639.41 of which $26,215.89 or 37.6% was spent for permanent bridges and culverts; $5,006.38 or 7.3% was spent for temporary bridges and culverts; $11,227.70 or 16.0% was spent for repairs; $956.20 or 1.5% was spent for culvert material for townships; $14,561.32 or 20.9% was spent for equipment and unused material; $11,671.92 or 16.7% was spent for filling new bridges and culverts.

Of the total amount $31,222.27 spent for new bridges and culverts, $26,215.89 or 84% was spent for permanent work; $5,006.38 or 16% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 28 concrete box culverts costing $16,552.17; 67 concrete pipe with headwalls costing $8,316.61; 2 headwalls on culverts previously constructed costing $99.85; 1 pony truss on piling costing $862.82; 11 wood pile bridges costing $1,765.56, and 1 miscellaneous bridge or culvert costing $2,378.00.

UNION COUNTY.

Roads.

The total county road expenditure was $16,094.59 of which $2,445.67 or 15.4% was spent for permanent work; $3,630.13 or 22.6% was spent for temporary work; $3,398.34 or 21.1% was spent for repairs; $5,522.05 or 34.2% was spent for maintenance; $685.33 or 4.2% was spent for equipment and unused material, and $403.07 or 2.5% was spent for special cases.

1.1 miles were built to temporary grade at a cost of $2,455.67. 38.20 miles were built to natural grade at a cost of $3,630.13. There were no roads built to permanent grade and none were surfaced.

The county road system was dragged an average of 24 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $65.91 per mile of county road. The total average expenditure per mile of county road was $119.20.

Of the 135 miles in the county road system, 132 were patrolled, there being 7 districts with an average length of 18.9 miles.

The total township road expenditure as shown by reports from 9 of the 12 townships was $16,890.80.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $39,224.46 of which $26,777.89 or 68.2% was spent for permanent bridges and culverts; $263.58 or 0.7% was spent for temporary bridges and culverts; $1,348.54 or 3.4% was spent for repairs; $2,463.06 or 6.3% was

spent for culvert material for townships; $3,320.07 was spent for equipment and unused material; $4,871.82 or 12.4% was spent for filling bridges and culverts, and $179.50 or 0.5% was spent for special cases.

Of the total amount $27,041.47 spent for new bridges and culverts, $26,777.89 or 99.1% was spent for permanent work and $263.58 or 0.9% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 8 concrete box culverts costing $3,285.47; 85 concrete pipe with headwalls costing $11,703.38; 23 headwalls on culverts previously constructed costing $323.73; 2 I-beam spans on concrete abutments costing $4,014.58; 1 pony truss on concrete abutments costing $4,298.85, and 12 corrugated pipe without headwalls costing $263.58.

VAN BUREN COUNTY.

Roads.

The total county road expenditure was $18,425.74 of which $6,333.24 or 34.4% was spent for temporary work; $2,584.41 or 14.0% was spent for repairs; $4,547.11 or 24.7% was spent for maintenance; $2,555.39 or 13.8% was spent for equipment and unused material, and $2,405.59 or 13.1% was spent for special cases.

There were no roads built to permanent grade, none to temporary grade and none were surfaced. 37.75 miles were built to natural grade at a cost of $6,333.24.

The county road system was dragged an average of 39 times, the average cost of dragging being $0.70 per mile one round trip. The average cost of repairs and maintenance was $53.50 per mile of county road. The total average expenditure per mile of county road was $138.40.

Of the 133 miles in the county road system, no mileage was reported as patrolled.

The total township road expenditure as shown by reports from 13 of the 14 townships was $28,424.06.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $65,003.20 of which $18,777.46 or 28.9% was spent for permanent bridges and culverts; $13,907.13 or 21.5% was spent for temporary bridges and culverts; $15,336.67 or 23.3% was spent for repairs; $2,699.60 or 4.2% was spent for culvert material for townships; $13,315.70 or 20.6% was spent for equipment and unused material; $166.27 or .25% was spent for filling bridges and culverts, and $800.37 or 1.25% was spent for special cases.

Of the total amount $32,684.59 spent for new bridges and culverts, $18,777.46 or 57.4% was spent for permanent work; $13,907.13 or 42.6% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 23 concrete box culverts costing $15,223.12; 1 boiler pipe with headwalls costing $185.77; 1 concrete abutment costing $2,208.25; 2 masonry abutments costing $1,160.32; 130 boiler pipe costing $11,597.62; 2 I-beams on piling costing $881.32; 1 pony truss on piling costing $395.74, and 7 wood pile bridges costing $1,032.45.

WAPELLO COUNTY.

Roads.

The total county road expenditure was $25,662.62 of which $4,846.44 or 18.9% was spent for permanent work; $3,924.48 or 15.3% was spent for repairs; $10,038.54 or 39% was spent for maintenance; $3,326.57 or 13% was spent for equipment and unused material, and $3,526.59 or 13% was spent for special cases.

.2 mile was built to permanent grade at a cost of $2,960.69. .33 mile was built to temporary grade at a cost of $1,175.71. There were no roads built to natural grade and none surfaced.

The county road system was dragged an average of 70 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $101.83 per mile of county road. The total average expenditure per mile of county road was $187.50.

Of the 137 miles in the county road system, 136 were patrolled, there being 13 districts with an average length of 10.5 miles.

The total township road expenditure as shown by reports from all of the 14 townships was $32,205.46.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $81,633.63 of which $29,277.88 or 35.9% was spent for permanent bridges and culverts; $7,524.63 or 9.3% was spent for temporary bridges and culverts; $23,222.76 or 28.5% was spent for repairs; $9,437.70 or 11.5% was spent for culvert material for townships; $6,466.88 or 7.9% was spent for equipment and unused material; $5,564.99 or 6.8% was spent for filling bridges and culverts, and $138.79 or .1% was spent for special cases.

Of the total amount $36,802.51 spent for new bridges and culverts, $29,277.88 or 79.5% was spent for permanent work; $7,524.63 or 20.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 14 concrete box culverts costing $14,204.92; 11 concrete pipe with headwalls costing $5,343.69; 6 headwalls on culverts previously constructed costing $2,544.05; 1 concrete slab bridge costing $222.30; 3 I-beam spans on concrete abutments costing $3,113.57; 1 pony truss on concrete abutments costing $3,849.33; 3 concrete pipe costing $447.77; 1 corrugated pipe costing $11.10, and 13 wood pile bridges costing $7,065.76.

WARREN COUNTY.

Roads.

The total county road expenditure was $19,624.80 of which $49.25 or 0.2% was spent for permanent work; $7,366.69 or 37.6% was spent for

temporary work; $2,592.95 or 13.2% was spent for repairs; $7,839.53 or 40% was spent for maintenance; $404.80 or 2% was spent for equipment and unused material; $1,371.58 or 7.0% was spent for special cases. No roads were built to permanent grade. No roads were built to temporary grade. 65 miles were built to natural grade at a cost of $7,366.69. No surfacing was done.

The county road system was dragged an average of 20 times, the average cost of dragging being $0.80 per mile one round trip. The average cost of repairs and maintenance was $61.37 per mile of county road. The total average expenditure per mile of county road was $115.30.

Of the 170 miles in the county road system, 170 were patrolled, there being 3 districts with an average length of 56.66 miles.

The total township road expenditure as shown by reports from 15 of the 16 townships was $35,313.81.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $61,383.62 of which $29,085.48 or 47.4% was spent on permanent bridges and culverts; $4,369.39 or 7.1% was spent on temporary bridges and culverts; $6,446.71 or 10.5% was spent on repair work; $3,097.95 or 5.1% was spent for culvert material for townships; $11,756.33 or 19.2% was spent for equipment and unused material; $6,422.97 or 10.4% was spent for filling bridges and culverts; $204.97 or 0.3% was spent for special cases.

Of the total amount $33,454.87 spent for new bridges and culverts, $29,085.48 or 86.9% was spent for permanent work; $4,369.39 or 13.1% was spent for temporary work. The amounts last above referred to were spent on the following construction:

15 concrete box culverts, costing $12,044.78; 20 circular concrete culverts costing $2,550.80; 1 concrete pipe culvert with headwalls costing $318.40; 1 I-beam span on concrete abutments costing $6,475.50; 1 pony truss with concrete abutments costing $7,696.00; 3 corrugated pipe culverts without headwalls costing $167.80; 20 wood pile bridges costing $3,992.81; miscellaneous bridges and culverts costing $208.78.

WASHINGTON COUNTY.

Roads.

The total county road expenditure was $51,735.10 of which $9,514.47 or 18.4% was spent for temprorary work; $2,234.75 or 4.3% was spent for repairs; $29,258.76 or 56.6% was spent for maintenance; $8,972.32 or 17.3% was spent for equipment and unused material, and $1,754.80 or 3.4% was spent for special cases.

No roads were built to permanent or temporary grade and none were surfaced. 73.98 miles were built to natural grade at a cost of $9,514.47.

The county road system was dragged an average of 27 times, the average cost of dragging being $.80 per mile one round trip. The average cost of repairs and maintenance was $163.60 per mile of county road. The total average expenditure per mile of county road was $269.50.

Of the 192 miles in the county road system, 120 were patrolled, there being 12 districts with an average length of 10 miles.

The total township road expenditure as shown by reports from 14 of the 15 townships was $48,605.82.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,138.43 of which $20,644.25 or 41.2% was spent for permanent bridges and culverts; $8,992.67 or 17.8% was spent for temporary bridges and culverts; $4,762.89 or 9.5% was spent for repairs; $6,005.04 or 12% was spent for culvert material for townships; $9,513.02 or 19% was spent for equipment and unused material; $102.60 or .23% was spent for filling bridges and culverts; $117.96 or .27% was spent for special cases.

Of the total amount $29,636.92 spent for new bridges and culverts, $20,644.25 or 69.6% was spent for permanent work and $8,992.67 or 30.4% for temporary work.

The amounts last above referred to were spent on the following construction: 20 concrete box culverts costing $12,855.25; 3 headwalls on culverts previously constructed costing $1,469.27; 1 concrete abutment costing $3,952.88; 1 I-beam span on cncrete abutments costing $2,366.85; 81 corrugated pipe costing $3,172.00; 3 boiler pipe costing $216.00; 8 wood pile bridges costing $3,369.23; 1 miscellaneous bridge or culvert costing $2,235.44.

WAYNE COUNTY.

Roads.

The total county road expenditure was $18,750.39 of which $1,415.93 or 7.6% was spent for temporary work; $1,578.97 or 8.4% was spent for repairs; $9,694.74 or 51.7% was spent for maintenance; $4,405.66 or 23.5% was spent for equipment and unused material; $1,655.09 or 8.8% was spent for special cases. No roads were built to permanent grade. 20 miles were built to natural grade at a cost of $1,415.93. No surfacing was done.

The county road system was dragged an average of 34 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $65.18 per mile of county road. The total average expenditure per mile of county road was $108.70.

Of the 172 miles in the county road system, 172 were patrolled, there being 12 districts with an average length of 14.4 miles.

The total township road expenditure as shown by reports from all of the 16 townships was $26,398.81.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $50,252.91 of which $14,875.67 or 29.7% was spent on permanent bridges and culverts; $3,726.20 or 7.4% was spent on temporary bridges and culverts; $4,022.93 or 8.0% was spent on repair work; $3,279.00 or 6.4%

was spent on culvert material for townships; $15,274.81 or 30.4% was spent for equipment and unused material; $8,054.30 or 16.1% was spent for filling bridges and culverts; $1,020.00 or 2.0% was spent for special cases.

Of the total amount $18,601.87 spent for new bridges and culverts, $14,875.67 or 80% was spent for permanent work; $3,726.20 or 20.0% was spent for temporary work. The amounts last referred to were spent on the following construction:

12 concrete box culverts costing $10,142.30; 1 pony truss on concrete abutments costing $4,733.37; 7 concrete pipe culverts costing $542.20; 5 boiler pipe costing $230.00; 10 wood pile bridges costing $2,950.00.

WEBSTER COUNTY.

Roads.

The total county road expenditure was $54,678.18 of which $38,356.05 or 70.1% was spent for permanent work; $1,239.69 or 2.3% was spent for temporary work; $2,936.54 or 5.4% was spent for repairs; $8,750.48 or 16.0% was spent for maintenance; $1,807.51 or 3.3% was spent for equipment and unused material, and $1,587.91 or 2.9% was spent for special cases.

4.8 miles were built to permanent grade at a cost of $4,013.94. There were no roads built to temporary grade. 10.0 miles were built to natural grade at a cost of $1,239.69. 16.55 miles were surfaced with gravel at a cost of $29,256.03.

The county road system was dragged an average of 31 times, the average cost of dragging being $1.00 per mile one round trip. The average cost of repairs and maintenance was $63.05 per mile of county road. The total average expenditure per mile of county road was $295.50.

Of the 185 miles in the county road system, 185 were patrolled, there being 4 districts with an average length of 46.3 miles.

The total township road expenditure as shown by reports from all of the 23 townships was $67,570.57.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $54,266.86 of which $32,797.19 or 60.8% was spent for permanent bridges and culverts; $1,435.43 or 2.6% was spent for temporary bridges and culverts; $14,882.97 or 27.2% was spent for repairs; $4,361.62 or 8.0% was spent for culvert material for townships; $415.45 or .73% was spent for filling bridges and culverts, and $374.20 or .67% was spent for special cases.

Of the total amount $34,232.62 spent for new bridges and culverts, $32,797.19 or 95.8% was spent for permanent work and $1,435.43 or 4.2% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 6 concrete box culverts costing $6,585.14; 4 concrete slab bridges costing $8,064.37; 1 concrete thru girder costing $2,263.00; 3 concrete deck girders costing $13,058.31; 1 I-beam span on concrete abutments costing $2,826.37; 56 concrete pipe costing $564.24; 5 corrugated pipe costing $171.11, and 5 cast iron pipe costing $61.61.

WINNEBAGO COUNTY.

Roads.

The total county road expenditure was $27,987.71 of which $11,878.28 or 42.5% was spent for permanent work; $693.05 or 2.5% was spent for temporary work; $4,553.45 or 16.3% was spent for repairs; $8,483.00 or 30.2% was spent for maintenance; $135.80 or .5% was spent for equipment and unused material, and $2,244.13 or 8% was spent for special cases.

5.5 miles were built to permanent grade at a cost of $11,319.79. No roads were built to temporary grade and none were surfaced. 6 miles were built to natural grade at a cost of $693.05.

The county road system was dragged an average of 49 times, the average cost of dragging being $.90 per mile one round trip. The average cost of repairs and maintenance was $99.16 per mile of county road. The total average expenditure per mile of county road was $213.50.

Of the 131 miles in the county road system, 120 were patrolled, there being 3 districts with an average length of 40 miles.

The total township road expenditure as shown by reports from 12 of the 12 townships was $31,668.93.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $29,600.41 of which $12,526.17 or 42.1% was spent for permanent bridges and culverts; $452.40 or 1.8% was spent for temporary bridges and culverts; $9,191.00 or 31% was spent for repairs; $4,471.58 or 15.2% was spent for culvert material for townships; $2,959.26 or 9.9% was spent for equipment and unused material.

Of the total amount $12,978.57 spent for new bridges and culverts, $12,526.17 or 96.5% was spent for permanent work and $452.40 or 3.5% for temporary work.

The amounts last above referred to were spent on the following construction: 10 concrete box culverts costing $4,230.49; 11 circular concrete culverts costing $1,471.75; 3 concrete slab bridges costing $5,039.38; 5 I-beam spans on concrete abutments costing $1,784.55, and 19 corrugated pipe costing $452.40.

WINNESHIEK COUNTY.

Roads.

The total county road expenditure was $27,960.91, of which $2,920.46 or 10.4% was spent for permanent work; $9,295.90 or 33.2% was spent for temporary work; $5,468.21 or 19.6% was spent for repairs; $8,003.79 or 28.6% was spent for maintenance; $1,970.31 or 7.1% was spent for equipment and unused material, and $302.24 or 1.1% was spent for special cases.

.25 miles were built to permanent grade at a cost of $2,043.51. 49.75 miles were built to natural grade at a cost of $9,258.40. There were no roads built to temporary grade, and none were surfaced.

The county road system was dragged an average of 28 times, the average cost of dragging being $.98 per mile one round trip. The average cost of repairs and maintenance was $66.54 per mile of county road. The total average expenditure per mile of county road was $138.50.

Of the 202 miles in the county road system, 108 were patrolled, there being 17 districts with an average length of 6.3 miles.

The total township road expenditure as shown by reports from 19 of the 20 townships was $38,428.73.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $55,267.95, of which $28,648.31 or 51.8% was spent for permanent bridges and culverts; $6,702.12 or 12.6% was spent for temporary bridges and culverts; $11,272.24 or 20.3% was spent for repairs; $2,515.79 or 14.5% was spent for culvert material for townships; $2,471.28 or 4.4% was spent for equipment and unused material; $1,896.71 or 3.4% was spent for filling bridges and culverts, and $1,761.50 or 3.1% was spent for special cases.

Of the total amount $35,350.43 spent for new bridges and culverts, $28,648.31 or 80.3% was spent for permanent work, and $6,702.12 or 19.7% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 70 concrete box culverts costing $13,999.12; 2 circular concrete culverts costing $37.38; 5 masonry box culverts costing $2,107.96; 2 headwalls on culverts previously constructed costing $21.70; 1 concrete slab bridge costing $1,419.75; 6 concrete abutments costing $2,463.00; 1 concrete deck girder costing $4,901.91; 1 retaining wall costing $749.87; 10 masonry abutments costing $2,079.71; 1 I-beam span on concrete abutments costing $867.91; 62 corrugated pipe culverts costing $1,913.95; 3 I-beam spans on wood piling costing $632.94; 2 pony trusses on wood piling costing $2,430.23; 6 wood pile bridges costing $1,326.53; 3 miscellaneous bridges and culverts costing $398.47.

WOODBURY COUNTY.

Roads.

The total road expenditure was $60,330.22 of which $34,467.38 or 57.0% was spent for permanent work; $981.75 or 1.7% was spent for temporary work; $8,801.15 or 14.6% was spent for repairs; $10,873.31 or 18.0% was spent for maintenance; $1,199.22 or 2.0% was spent for equipment and unused material and $4,007.41 or 6.7% was spent for special cases.

27.02 miles were built to permanent grade at a cost of $33,383.43. 0.36 miles were built to temporary grade at a cost of $980.50. 9.1 miles were built to natural grade at a cost of $981.75. No roads were surfaced.

The county road system was dragged an average of 27 times, the average cost of dragging being $1.37 per mile one round trip. The average cost of repairs and maintenance was $92.36 per mile of county road. The total average expenditure per mile of county road was $283.00.

Of the 213 miles in the county road system, 96 were patrolled, there being 6 districts with an average length of 16 miles.

The total township road expenditure as shown by reports from 13 of the 23 townships was $26,626.29.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $97,103.72 of which $35,426.72 or 36.4% was spent for permanent bridges and culverts; $14,058.08 or 14.4% was spent for temporary bridges and culverts; $19,636.88 or 20.2% was spent for repairs; $1,805.15 or 1.8% was spent for culvert material for townships; $17,620.87 or 18.1% was spent for equipment and unused material; $3,298.00 or 3.4% was spent for filling bridges and culverts and $5,258.02 or 5.4% was spent for special cases.

Of the total amount $49,484.80 spent for new bridges and culverts $35,426.72 or 71.5% was spent for permanent work and $14,058.08 or 18.5% was spent for temporary work.

The amounts last above referred to were spent on the following construction: 19 concrete box culverts, costing $13,828.79; 14 concrete pipe with headwalls costing $2,547.59; 2 headwalls on concrete previously constructed costing $177.73; 4 concrete slab bridges costing $6,729.50; 3 I-beam spans on concrete abutments costing $2,855.18; 2 pony trusses on concrete abutments costing $9,287.93; 32 concrete pipe costing $1,504.28; 7 I-beam spans on piling abutments costing $6,878.39 and 22 wood pile bridges costing $5,675.41.

WORTH COUNTY.

Roads.

The total county road expenditure was $22,257.55 of which $12,102.88 or 54.4% was spent for permanent work; $943.75 or 4.2% was spent for repairs; $2,936.53 or 13.2% was spent for maintenance; $3,632.60 or 16.3% was spent for equipment and unused material; $2,641.79, or 11.9% was spent for special cases. 6.8 miles were built to permanent grade at a cost of $7,117.41; 6.95 miles were surfaced with gravel, at a cost of $3,970.70.

The county road system was dragged an average of 28 times, the average cost of dragging being $0.75 per mile one round trip. The average cost of repairs and maintenance was $33.89 per mile of county road. The total average expenditure per mile of county road was $195.00.

Of the 114 miles in the county road system, 36 were patrolled, there being 2 districts with an average length of 18 miles.

The total township road expenditures as shown by reports from all of the 12 townships was $25,324.83.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $30,338.49, of which $25,349.22 or 83.5% was spent on permanent bridges and culverts; $95.96 or .3% was spent on temporary bridges and culverts; $476.40 or 1.5% was spent for repairs; $2,472.34, or 8.2% was spent for cul-

vert material for townships; $1,448.12 or 4.8% was spent for equipment and unused material; $154.90 or .5% was spent for filling bridges and culverts; $341.55 or 1.2% was spent for special cases.

Of the total amount $25,445.18 spent for new bridges and culverts, $25,349.22 or 99.7% was spent for permanent work; $95.96 or .3% was spent for temporary work.

The amounts last referred to were spent on the following construction: 77 concrete box culverts, costing $12,663.26; 2 corrugated pipe culverts with headwalls, costing $79.55; 1 concrete slab bridge, costing $978.22; 6 I-beam spans on concrete abutments, costing $8,078.19; 1 pony truss on concrete abutments, costing $3,550.00; 1 corrugated pipe culvert costing $20.60; 1 wood pile bridge, costing $75.36.

WRIGHT COUNTY.

Roads.

The total county road expenditure was $42,957.25 of which $13,189.86 or 30.7% was spent for permanent work; $9,695.73 or 22.6% was spent for temporary work; $4,113.79 or 9.6% was spent for repairs; $5,312.84 or 12.4% was spent for maintenance; $7,020.98 or 16.3% was spent for equipment and unused material and $3,624.05 or 8.4% was spent for special cases.

No roads were built to permanent or temporary grades. 39 miles were built to natural grade at a cost of $9,590.86. 4 miles were surfaced with gravel at a cost of $11,847.22.

The county road system was dragged an average of 22 times, the average cost of dragging being $.87 per mile one round trip. The average cost of repairs and maintenance was $52.48 per mile of county road. The total average expenditure per mile of county road was $240.00.

Of the 179 miles in the county road system, 90 were patrolled, there being 6 districts with an average length of 15 miles.

No report of township expenditures was received.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $46,658.56 of which $27,998.19 or 60% was spent for permanent bridges and culverts; $875.30 or 1.9% was spent for temporary bridges and culverts; $14,492.57 or 31.1% was spent for repairs; $2,707.46 or 5.8% was spent for culvert material for townships; $63.77 or .14% was spent for equipment and unused material; $76.40 or .16% was spent for filling bridges and culverts, and $444.87 or .9% was spent for special cases.

Of the total amount $28,873.49 spent for new bridges and culverts, $27,998.19 or 97% was spent for permanent work and $875.30 or 3% was spent for temporary work.

The last named amounts referred to were spent on the following construction: 42 concrete box culverts, costing $13,762.96; 1 circular concrete culvert costing $137.36; 1 concrete abutment costing $4,071.22; 1 I-beam span on concrete abutments, costing $5,306.85; 1 pony truss on concrete abutments, costing $4,719.80; 37 corrugated pipe, costing $752.30, and 1 wood pile bridge costing $123.00.

SUMMARY TABLE NO. 1.

Amount Spent for Bridge and Road Work.—All County Funds.—Annual Reports of County Engineers.

County	Bridges and Culverts						Roads						Total bridge and road expenditures
	Bridge fund	Motor vehicle fund	Road fund	All other sources	Total		County road cash fund	Motor vehicle fund	Bridge fund	All other sources	Total		
	$	$	$	$	$		$	$	$	$	$		
Adair	43,692.59	6,855.06	3,831.63	5,066.65	59,356.53		12,029.07	10,561.79			22,590.86		81,947.39
Adams	26,739.40	3,279.40	7,654.38		37,673.18		11,997.95				11,997.95		49,671.13
Allamakee	37,901.15	5,317.58			43,218.53		26,042.40	16,678.97			42,721.37		85,939.90
Appanoose	28,152.96	12,458.20	9,787.63		50,398.79		28,561.20			953.09	29,514.29		79,913.08
Audubon	57,188.56		963.07	1,050.00	59,231.63		13,963.74				13,963.74		73,195.37
Benton	81,784.90	17,288.60	7,258.14		106,331.64		36,567.57	5,150.06			41,717.63		148,049.27
Black Hawk	53,840.56		234.00		54,074.56		28,127.99				28,127.99		82,202.55
Boone	78,865.63		3,743.80		82,729.43		20,626.07	4,569.02	$ 85.00		25,280.09		107,909.52
Bremer	31,366.71	6,480.94	3,170.80		41,018.45		20,734.55				20,734.55		61,753.00
Buchanan	27,281.79	10,187.08			37,468.87		37,576.25	515.53			38,091.78		75,560.65
Buena Vista	28,519.95				28,519.95		44,899.72	15,895.16			60,794.88		89,314.83
Butler	54,453.18	133.50	3,319.43		57,906.11		10,152.42	9,148.62			19,301.04		77,207.15
Calhoun	47,902.49				47,902.49		28,431.31	11,688.21			40,119.52		88,021.67
Carroll	68,604.71		1,199.08		69,203.79		61,341.13			3,018.85	64,359.98		133,563.77
Cass	70,734.42	2,200.31	10,766.67		83,701.40		19,196.46				19,196.46		102,897.86
Cedar	29,503.88		50.00		29,553.88		9,815.54	5,422.99			15,238.53		44,792.41
Cerro Gordo	68,346.76		831.91		69,178.67		49,196.18	33,770.77		26,806.88	109,773.83		178,952.50
Cherokee	72,396.36	17,253.48	6,621.52		96,271.36		18,430.22				18,430.22		114,701.58
Chickasaw	54,283.89	1,632.47	1,351.00		57,267.36		18,082.30	11,537.18			25,269.48		82,476.84
Clarke	33,646.93	3,003.33	7,223.30		43,903.56		9,121.13	5,345.54	165.00		14,466.67		58,430.23
Clay	59,306.67	8.00	1,528.03		60,842.70		42,819.29	2,803.03			45,787.32		106,630.03
Clayton	50,719.63	6,666.98	6,584.52		63,971.13		24,106.36	5,676.46			29,782.82		93,753.95
Clinton	46,008.73	4,597.02	592.90		51,858.65		27,808.96				27,808.96		79,737.61
Crawford	173,054.47		4,811.27		178,295.74		66,544.20	11,097.09			77,641.29		255,967.03
Dallas	72,864.07		3,781.99		76,646.06		22,446.27	16,590.60			39,036.87		115,682.93
Davis	21,220.95	9,214.78	1,331.65		31,767.58		7,853.27				7,853.27		39,620.85
Decatur	39,988.16	4,174.86	5,978.03		50,141.05		19,939.05	7,798.98			27,738.03		77,879.08
Delaware	35,776.24		1,631.77		38,808.01		29,387.82	10,005.75			39,393.57		78,201.58
Des Moines	30,645.93	4.00	16.05		30,665.98		21,074.57	1,273.99		107.23	23,355.79		54,021.77
Dickinson	40,626.34		1,325.30		41,951.64		33,900.84	10,209.21			44,110.05		86,061.69

vert material for townships; $1,448.12 or 4.8% was spent for equipment and unused material; $154.90 or .5% was spent for filling bridges and culverts; $341.55 or 1.2% was spent for special cases.

Of the total amount $25,445.18 spent for new bridges and culverts, $25,349.22 or 99.7% was spent for permanent work; $95.96 or .3% was spent for temporary work.

The amounts last referred to were spent on the following construction: 77 concrete box culverts, costing $12,663.26; 2 corrugated pipe culverts with headwalls, costing $79.55; 1 concrete slab bridge, costing $978.22; 6 I-beam spans on concrete abutments, costing $8,078.19; 1 pony truss on concrete abutments, costing $3,550.00; 1 corrugated pipe culvert costing $20.60; 1 wood pile bridge, costing $75.36.

WRIGHT COUNTY.

Roads.

The total county road expenditure was $42,957.25 of which $13,189.86 or 30.7% was spent for permanent work; $9,695.73 or 22.6% was spent for temporary work; $4,113.79 or 9.6% was spent for repairs; $5,312.84 or 12.4% was spent for maintenance; $7,020.98 or 16.3% was spent for equipment and unused material and $3,624.05 or 8.4% was spent for special cases.

No roads were built to permanent or temporary grades. 39 miles were built to natural grade at a cost of $9,590.86. 4 miles were surfaced with gravel at a cost of $11,847.22.

The county road system was dragged an average of 22 times, the average cost of dragging being $.87 per mile one round trip. The average cost of repairs and maintenance was $52.48 per mile of county road. The total average expenditure per mile of county road was $240.00.

Of the 179 miles in the county road system, 90 were patrolled, there being 6 districts with an average length of 15 miles.

No report of township expenditures was received.

Bridges.

The total expenditure for bridge and culvert work during 1918 was $46,658.56 of which $27,998.19 or 60% was spent for permanent bridges and culverts; $875.30 or 1.9% was spent for temporary bridges and culverts; $14,492.57 or 31.1% was spent for repairs; $2,707.46 or 5.8% was spent for culvert material for townships; $63.77 or .14% was spent for equipment and unused material; $76.40 or .16% was spent for filling bridges and culverts, and $444.87 or .9% was spent for special cases.

Of the total amount $28,873.49 spent for new bridges and culverts, $27,998.19 or 97% was spent for permanent work and $875.30 or 3% was spent for temporary work.

The last named amounts referred to were spent on the following construction: 42 concrete box culverts, costing $13,762.96; 1 circular concrete culvert costing $137.36; 1 concrete abutment costing $4,071.22; 1 I-beam span on concrete abutments, costing $5,306.85; 1 pony truss on concrete abutments, costing $4,719.80; 37 corrugated pipe, costing $752.30, and 1 wood pile bridge costing $123.00.

SUMMARY TABLE NO. 1.

Amount Spent for Bridge and Road Work.—All County Funds.—Annual Reports of County Engineers.

County	Bridges and Culverts						Roads					Total bridge and road expenditures
	Bridge fund	Motor vehicle fund	Road fund	All other sources	Total	County road cash fund	Motor vehicle fund	Bridge fund	All other sources	Total	
	$	$	$	$	$	$	$	$	$	$	$
Adair	43,692.59	6,855.06	3,881.63	5,066.65	59,496.53	12,029.07	10,561.79			22,590.86	81,947.39
Adams	26,739.40	3,270.40	7,654.38		37,673.18	11,997.95				11,997.95	49,671.13
Allamakee	37,901.15	5,317.38			43,218.53	26,042.40	16,678.97		663.09	43,674.46	86,892.99
Appanoose	28,152.96	12,458.20	9,787.63		50,398.79	28,561.20				28,561.20	78,959.99
Audubon	57,188.56		963.07	1,660.00	59,231.63	13,393.74				13,393.74	72,625.37
Benton	81,784.90	17,288.60	7,258.14		106,331.64	36,567.57	5,150.06			41,729.63	148,058.27
Black Hawk	53,840.56		7,234.00		54,074.56	28,127.99				28,127.99	82,202.55
Boone	78,965.63		3,743.80		82,729.43	20,026.07	4,559.02	$ 35.69		25,220.18	107,949.61
Bremer	31,366.71	6,480.91	3,170.89		41,018.51	20,734.55				20,734.55	61,753.06
Buchanan	27,281.79	10,187.08			37,468.87	37,876.25	515.23			38,391.48	75,860.35
Buena Vista	28,519.95	133.50	3,319.43		28,519.95	44,599.72	15,896.16			60,794.88	89,314.83
Butler	54,453.18				57,606.11	10,152.42	9,148.62			19,301.04	77,207.15
Calhoun	47,902.49				47,902.49	28,431.31	11,688.21		3,018.83	43,138.35	91,040.86
Carroll	68,604.71	2,300.31	1,199.08		69,243.79	51,241.13				51,241.13	120,444.92
Cass	70,734.42		10,766.67		83,701.40	19,196.46				19,196.46	102,897.86
Cedar	29,503.88		50.00		29,553.88	9,815.54	5,422.59			15,237.83	44,791.71
Cerro Gordo	68,346.76		831.91		69,178.67	49,196.18	33,770.77		26,806.88	109,773.83	178,952.50
Cherokee	72,396.36	17,253.48	6,621.52		96,271.36	18,430.22				18,430.22	114,701.58
Chickasaw	54,283.89	1,682.47	1,351.00		57,297.36	18,082.39	11,527.18			25,209.45	82,476.84
Clarke	33,646.93	3,693.33	7,223.30		43,963.56	9,121.13	5,345.54			14,466.67	58,430.23
Clay	59,306.67	8.00	1,528.03		60,842.70	42,819.29	2,803.03	165.00		45,787.32	106,630.03
Clayton	50,719.63	6,666.98	6,584.52		63,971.13	24,166.36	5,616.46			29,782.82	93,753.95
Clinton	46,668.73	4,597.02	592.90		51,858.65	27,808.96				27,808.96	79,727.61
Crawford	173,954.47		4,311.27		178,265.74	66,544.20	11,097.09			77,641.29	255,907.03
Dallas	72,964.07		3,781.99		76,646.06	22,446.27	16,590.60			39,036.87	115,682.93
Davis	21,229.95	9,214.78	1,361.85		31,767.33	7,853.27				7,853.27	39,620.85
Decatur	39,988.16	4,174.86	5,978.03		50,141.05	19,939.65	7,728.98			27,668.63	77,809.68
Delaware	35,776.24		1,631.77		36,808.01	29,387.82	10,005.75			39,393.57	76,201.58
Des Moines	39,645.93	4.00	16.05		39,665.98	21,974.57	1,273.99		107.23	23,355.79	54,021.77
Dickinson	49,625.34		1,325.30		41,951.54	33,900.84	10,269.21			44,170.05	86,061.59

SUMMARY TABLE NO. 1.—Continued.

County	Bridges and Culverts					Roads					Total bridge and road expenditures
	Bridge fund	Motor vehicle fund	Road fund	All other sources	Total	County road cash fund	Motor vehicle fund	Bridge fund	All other sources	Total	
Dubuque	76,883.15			7,236.84	84,119.99	92,936.47	13,745.93			106,682.40	190,802.39
Emmet	16,157.89	2,416.91	1,325.95		19,900.75	37,497.13	10,866.24	93.50		48,456.87	68,357.62
Fayette	48,881.07	7,570.82		4,069.86	60,521.75	51,379.45				51,379.45	111,901.20
Floyd	41,052.12	278.24	1,341.25		42,671.61	26,692.86	7,354.41			34,047.27	76,718.88
Franklin	50,109.14	4,050.81			54,159.95	41,590.60	7,489.88			49,080.48	103,240.43
Fremont	76,373.60	11,571.66	2,575.66		90,520.32	23,170.99	1,839.51			25,010.50	115,530.82
Greene	52,699.45		14,094.41		66,793.86	23,697.20			360.75	24,057.95	90,851.81
Grundy	83,056.88	13,309.13	3,728.42		100,094.43	19,063.75				19,063.75	119,158.18
Guthrie	76,441.55	1,174.60	4,883.35		83,499.50	23,146.89	9,339.26		809.11	33,295.26	116,794.76
Hamilton	70,873.73				70,873.73	105,239.69				105,239.69	176,113.42
Hancock	53,814.97	5,380.60	17.03		59,212.60	17,861.19	12,495.74			30,356.93	89,569.53
Hardin	99,303.83	5,588.18			104,982.01	50,247.87	4,227.41		3,401.85	57,877.13	162,859.14
Harrison	64,428.71	8,269.64			72,698.35	26,675.86	4,379.98			31,055.84	103,754.19
Henry	44,277.80	7,201.73	1,835.10		53,314.63	21,117.83	2,430.35			23,548.18	76,862.81
Howard	37,672.68	2,459.34	333.85		40,465.87	12,241.91	9,629.08			21,870.99	62,336.86
Humboldt	49,996.37		522.17		50,518.54	32,549.83	13,318.42			45,868.25	96,386.79
Ida	42,882.72	4,141.78	3,267.99		50,292.49	5,149.98	7,407.54			12,557.52	62,850.01
Iowa	152,693.78	8,273.20	498.15		161,465.13	29,239.59	7,184.65			36,424.24	197,889.37
Jackson	51,115.61	15,418.84	164.10		66,698.55	19,722.15	2,524.38			22,246.53	88,945.08
Jasper	139,501.21		16,543.43		156,044.64	62,132.60				62,132.60	218,177.24
Jefferson	37,883.73	1,687.68	2,057.05		41,628.46	16,519.18	6,026.42			22,545.60	64,174.06
Johnson	54,563.64		5,858.14		60,421.78	30,251.89	1,659.25			31,911.14	92,332.92
Jones	49,419.76	800.00			50,219.76	24,493.79	14,250.67			38,744.46	88,964.22
Keokuk	58,801.37	23,803.91	1.81		82,607.09	16,402.15	414.50			16,816.65	99,423.74
Kossuth	67,620.42				67,620.42	27,744.44	17,508.80			45,253.24	112,873.66
Lee	43,153.45	3,189.30			46,342.75	18,355.54	5,464.84			23,820.38	70,163.13
Linn	76,123.48		3,741.00		79,864.48	50,440.09	19 913.19		1,046.75	71,400.03	151,264.5.
Louisa	26,584.14	3,612.59	151.16		30,347.89	6,260.89	17,042.13			23,303.02	53,650.91
Lucas	41,025.63		13,018.41		54,044.04	3,515.93	12,000.00			15,515.93	69,559.97
Lyon	46,632.73	7,571.92	6,181.54		60,386.19	8,012.63	9,405.48			17,418.11	77,804.30
Madison	41,932.74	14,259.01	11,828.74		68,020.49	48,963.24			35,463.02	84,426.26	154,612.60
Mahaska	53,641.81	9,391.68	2,436.95		65,470.44	22,462.86	1,092.60			23,555.46	91,575.95

Marion	58,225.28		11,961.06		70,186.34	24,149.13	13,995.48			38,144.61	193,615.05
Marshall	152,210.80	1,851.45	11,272.74		165,334.99	57,584.68	11,317.23		116.75	69,018.66	234,353 65
Mills	83,622.47		6,571.85		90,194.32	29,242.84				29,242.84	119,437.16
Mitchell	43,836.77	14,165.23	7,312.85		65,314.85	25,416.38	159.04			25,575.42	90,890.27
Monona	61,757.74	9,887.00	2,642.63		74,287.37	30,259.44				30,259.44	104,546.81
Monroe	21,976.70	12,000.00	14,964.01	425.00	49,365.71	19,244.82				19,244.82	68,610.53
Montgomery	39,077.72	16,075.96	20,926.83		76,080 51	24,966.29	3,279.69			28,185.98	104,266.49
Muscatine	37,536.23				37,536.23	29,439.30	15,834.84	64.78	769.98	37,108.90	74,645.13
O'Brien	64,810.71	11,735.43			76,546.14	29,554.42	4,981.32			34,535.74	111,081.88
Osceola	28,719.52	6,500.00	11,813.90		47,033.42	3,805.29	11,189.34			14,994.63	62,028.05
Page	68,606.70	9,499.74	13,682.63		91,709 07	25,462.14	7,252.04			32,714.18	124,483.25
Palo Alto	42,122.94	6,226.89			48,349.83	51,999.48				51,999.48	100,349.31
Plymouth	91,805.50	19,271.75	1,205.90	2,238.35	114,521.50	37,088.47				37,088.47	151,609.97
Pocahontas	52,444.04		2,010.35		54,454.39	95,400.58				95,400.58	149,854.97
Polk	161,643.24	23,432.53	14,552.56		199,628.33	261,945.58	5,215.53			267,161.11	466,789.44
Pottawattamie	185,975.95	20,141.78	13,145.08		219,262.81	31,083.97	14,051.08			45,135.05	264,397.86
Poweshiek	85,025.80	9,793.58	8,665.10		103,484.48	30,855.93	3,001.92			33,857.85	137,342.33
Ringgold	36,714.70	19,268.21	8,366.10		64,349.01	8,139.67				8,139.67	72,488.68
Sac	110,168.38				110,168 38	74,250.62	15,429.46			89,680.08	199,848.46
Scott	31,599.32		350.50		31,949.82	17,107.50	14,482.64	3,503.68		35,093.91	67,043.73
Shelby	54,780.06	17,587.00	6,184.16		78,551.22	27,638.06				27,638.06	106,189.28
Sioux	34,719.61	530.22	1,865.36	14,071.33	51,186.52	47,282.37				47,282.37	98,468.89
Story	53,964.38	12,070.20	517.20		66,551.78	29,111.56	7,920.29			37,031.85	103,583.63
Tama	113,397.65	4,045.74	1,044.90		118,488.29	31,467.26	19,656.75	1,604.73		52,728.74	171,217.03
Taylor	46,705.57	11,261.92	11,671.92		69,639.41	10,688.96	3,098.39			13,785.35	83,424.76
Union	21,632.05	12,720.59	4,871.82		39,224.46	14,825.92	1,268.67			16,094.59	55,319.05
Van Buren	45,995.84	19,007.36			65,003.20	18,425.74				18,425.74	83,428.94
Wapello	63,930.63	12,591.21	5,111.79		81,633.63	24,639.52	1,023.10			25,662.62	107,296.25
Warren	54,960.65		6,422.97		61,383.62	19,624.80				19,624.80	81,008.42
Washington	50,138.43				50,138.43	31,600 39	20,134.71			51,735.10	101,873.53
Wayne	37,360.00	4,838.61	8,054.30		50,252.91	11,634.06	7,116.33			18,750.39	69,003.30
Webster	54,266.86				54,266.86	21,628.37	33,049.81			54,678.18	108,945.04
Winnebago	21,869.95	3,782.48	3,947.98		29,600.41	21,017.99	6,969.72			27,987.71	57,588.12
Winneshiek	41,159.51	12,596.13	1,512.31		55,267.95	21,871.33	6,089.58			27,960.91	83,228.86
Woodbury	86,444.54	10,659.18			97,103.72	46,747.00			13,583.22	60,330.22	157,433.94
Worth	30,338.49				30,338.49	22,257.55				22,257.55	52,596.04
Wright	46,658.56				46,658.56	42,957.25				42,957.25	89,615.81
Totals	$5,808,300.46	$574,807.15	$391,552.52	$ 34,158.03	$6,808,818.16	$3,123,023.05	$641,124.57	$5,466.78	$ 86,437.48	$3,856,051.88	$10,664,870.04

SUMMARY TABLE NO. 2.

Bridge and Culvert Construction.—County Expenditures.—Annual Reports of County Engineers.

County	Permanent bridges and culverts	Temporary bridges and culverts	Repairs	Culvert material purchased for townships	Equipment and material	Filling bridges and culverts	Miscellaneous right of way, channel changes, etc.	Total
Adair	$ 33,735.37	$ 9,166.38	$ 8,068.94	$ 930.84	$ 349.37	$ 7,075.63	$ 93.00	$ 59,356.53
Adams	9,227.45	4,526.64	7,786.10	2,953.67	5,416.58	7,525.32	237.42	37,673.18
Allamakee	12,530.41	9,465.70	11,776.29	2,500.11	4,180.47	495.75	2,269.80	43,218.53
Appanoose	13,771.80	3,770.81	10,592.59	8,454.06	3,884.40	9,550.25	365.88	50,398.79
Audubon	27,792.16	14,664.81	6,098.09	4,086.76	2,924.21	2,976.02	689.58	59,231.63
Benton	75,431.68	2,263.04	12,522.47	4,361.73	2,980.14	7,258.14	1,514.44	106,331.64
Black Hawk	13,400.75	2,454.19	13,980.48	3,368.03	9,149.06	8,219 90	3,502.15	54,074.56
Boone	63,952.64	3,156.51	3,407.72	3,478.49	4,545.48	3,655.69	532.90	82,729.43
Bremer	23,646.59	497.90	5,025.98	1,000.00	7,677.18	3,170.89	----------	41,018.54
Buchanan	23,505.00	1,406.81	6,004.89	6,215.77	32.33	----------	394.07	37,468.87
Buena Vista	25,630.17	83.02	776.64	----------	105.60	1,142.30	782.22	28,519 95
Butler	15,667.27	6,384.00	23,745.31	----------	8,020.10	4,069.43	20.00	57,996.11
Calhoun	22,294.85	1,727.36	4,768.53	3,783.68	12,788.26	843.35	1,695.46	47,902.49
Carroll	28,903.35	4,095.53	9,846.63	5,731.38	5,269.00	807.93	14,489.97	69,203.79
Cass	36,702.85	10,037.54	11,686.58	5,655.50	8,853.26	10,766.67	----------	83,701.40
Cedar	13,323.22	94.80	9,230.67	21.60	6,106.63	145.88	631.08	29,553.88
Cerro Gordo	51,883.92	682.89	7,335.71	1,769.15	6,480.00	927.00	100.00	69,178.67
Cherokee	67,229.64	65.20	6,155.42	7,344.03	6,323.01	3,569.19	5,593.87	96,271.36
Chickasaw	28,659.39	12,310.39	7,999.79	369.60	5,791.13	1,808.41	298.65	57,267.36
Clarke	15,074.11	5,329.16	5,587.95	4,796.68	5,110.50	7,223.30	841.86	43,963.56
Clay	46,141.55	1,944.96	1,428.37	2,324.78	7,110.31	1,360.45	532.28	69,842.70
Clayton	46,949.47	2,631.88	6,342.95	3,314.34	949.36	3,187.23	595.90	63,971.13
Clinton	37,440.58	526.65	4,492.87	5,006.95	896.07	2,386.33	1,109.20	51,858.65
Crawford	119,283 86	2,653.42	28,198.15	10,160.96	8,000.00	8,343.60	1,625.75	178,265.74
Dallas	47,653.16	1,929.03	7,085.04	9,703.14	5,422.48	4,343.08	510.13	76,646.06
Davis	9,914.27	5,142.72	13,456.11	142.08	1,143.32	1,331.85	637.23	31,767.58
Decatur	14,372.09	4,796.14	7,769.41	3,029.25	10,743.92	5,978.03	3,461.21	50,141.05
Delaware	19,625.36	1,943.58	6,884.72	3,230.26	3,847.09	1,067.60	209.40	36,808.01
Des Moines	19,114.60	----------	1,858.13	4,126.43	2,520.14	19.05	3,027.63	30,665.98
Dickinson	33,750.99	1,157.25	2,711.15	2,192.93	500.00	1,391.72	247.50	41,951.54
Dubuque	48,860.35	927.23	15,535 95	385.98	8,759.27	7,160.92	2,490.29	84,119.99
Emmet	8,296.83	2,242.85	1,245.83	527.86	5,967.62	840.85	778.91	19,900.75
Fayette	35,031.91	656.44	14,796.54	4,046.11	1,219.98	446.35	4,324.42	60,521.75

Floyd	22,670.90	7,945.54	3,956.55	1,000.00	5,350.21	1,341.25	407.16	42,671.61
Franklin	32,384.32	364.06	7,456.09	4,051.46	7,189.40	1,827.27	896.35	54,159.95
Fremont	19,245.41	24,854.46	14,543.42	5,619.00	20,472.45	5,553.88	231.70	90,520.32
Greene	39,491.24	949.15	12,126.04	1,455.08	10,564.53	1,777.69	439.13	66,793.86
Grundy	52,897.08	9,950.94	8,299.38	3,325.60	14,345.61	4,035.25	7,240.57	100,094.43
Guthrie	51,228.96	6,788.56	7,591.44	4,390.98	2,468.88	9,051.79	1,978.89	83,499.50
Hamilton	49,865.51	2,814.26	13,624.52	1,092.86	----------	----------	3,476.58	70,873.73
Hancock	41,353.81	2,223.50	8,422.55	5,240.63	466.22	178.90	1,326.99	59,212.60
Hardin	83,571.63	7,379.26	4,874.85	5,305.40	3,465.14	79.68	306.05	104,982.91
Harrison	30,297.70	3,304.62	24,086.37	1,331.94	2,400.37	562.80	10,714.55	72,698.35
Henry	45,232.85	1,126.48	2,318.82	407.12	2,277.76	1,835.10	116.50	53,314.63
Howard	18,290.06	9,247.70	3,550.33	2,987.28	5,228.31	1,142.19	20.00	40,465.87
Humboldt	40,074.89	----------	1,261.97	5,287.26	2,704.48	809.54	380.40	50,518.54
Ida	23,022.65	8,096.40	9,753.90	2,313.84	3,129.88	3,729.63	246.19	50,292.49
Iowa	109,813.73	4,596.59	23,780.66	7,943.73	13,445.89	972.86	911.67	161,465.13
Jackson	35,066.37	1,255.21	27,324.47	70.76	22.40	2,128.29	831.05	66,698.55
Jasper	80,583.36	4,816.43	36,401.11	17,116.87	484.14	16,543.43	599.30	156,044.64
Jefferson	17,393.29	2,042.26	7,247.95	5,125.66	4,714.13	2,057.05	3,048.12	41,628.46
Johnson	27,357.66	5,510.62	10,157.45	7,692.68	2,934.18	6,030.19	739.00	60,421.78
Jones	25,947.97	4,951.50	13,868.03	1,800.31	3,172.95	327.50	151.50	50,219.76
Keokuk	52,950.89	1,483.65	14,098.01	2,088.01	9,214.98	2,769.55	----------	82,607.09
Kossuth	2,400.82	25,714.10	11,321.98	7,088.26	16,000.00	2,483.81	2,611.45	67,620.42
Lee	26,870.80	463.39	5,383.80	2,464.56	11,035.45	124.75	----------	46,342.75
Linn	41,640.75	3,423.10	17,469.25	3,690.87	9,764.51	3,425.00	451.00	79,864.48
Louisa	7,632.49	6,887.32	11,778.80	2,052.39	1,299.75	526.80	179.34	30,347.89
Lucas	24,435.70	2,129.59	4,962.84	5,410.09	2,383.79	13,018.41	1,703.62	54,044.04
Lyon	35,642.01	134.90	13,129.44	2,904.73	1,634.20	4,804.48	2,136.43	60,386.19
Mahaska	31,604.87	3,250.02	6,665.40	9,513.81	5,416.08	10,869.80	1,530.51	68,020.49
Madison	22,009.41	5,869.06	13,325.75	8,999.88	9,252.69	2,993.74	2,189.91	65,470.44
Marion	35,213.24	812.00	4,260.52	4,409.88	11,413.98	11,961.06	1,115.66	70,186.34
Marshall	134,929.22	1,816.97	11,648.10	3,228.08	3,473.51	8,824.55	1,420.56	165,334.99
Mills	20,768.57	18,169.05	12,812.90	3,358.48	20,572.61	6,571.85	7,940.86	90,194.32
Mitchell	38,308.82	2,057.40	8,036.75	1,378.82	5,512.25	7,501.83	2,518.98	65,314.85
Monona	14,677.48	31,197.13	16,480.55	2,505.72	5,288.97	1,974.07	2,163.45	74,287.37
Monroe	32,038 92	1,967.63	7,172.04	3,695.83	969.42	2,689.87	1,105.09	49,365.71
Montgomery	21,988.31	10,825.44	17,135.42	3,548.72	20,286.12	----------	2,296.50	76,080.51
Muscatine	23,385.26	832.31	5,779.08	3,707.59	1,885.67	534.25	1,412.07	37,536.23
O'Brien	64,057.06	6.27	3,125.08	2,421.99	6,051.39	21.25	863.10	76,546.14
Osceola	32,261.57	6,600.84	916.41	1,816.85	4,171.10	1,233.95	32.70	47,033.42
Page	39,994.84	8,633.29	16,439.23	10,178.01	857.57	13,154.93	2,511.20	91,769.07
Palo Alto	32,111.87	5,264.55	3,054.50	1,350.95	4,345.35	1,133.26	1,079.35	48,349.83
Plymouth	41,856.51	15,547.60	9,547.29	4,022.80	36,773.94	2,943.70	3,829.66	114,521.50
Pocahontas	24,907.92	8,454.98	9,655.72	3,706.99	5,735.83	933.54	1,059.41	54,454.39
Polk	145,517.70	7,879.63	12,333.04	7,741.80	9,214.41	14,244.97	2,696.78	199,628.33
Pottawattamie	32,849.13	75,535.19	17,582.36	32,754.94	44,151.22	13,522.55	2,867.42	219,262.81
Poweshiek	63,375.98	360.20	17,094.08	8,598.00	1,485.40	8,665.10	3,905.72	103,484.48
Ringgold	27,242.93	4,630.92	8,141.19	3,828.64	9,657.41	10,731.32	116.69	64,349.01
Sac	93,271.57	1,175.40	3,808.00	1,934.11	4,161.20	1,039.55	4,778.55	110,168.38
Scott	16,619.57	1,192.31	3,103 35	666.85	4,909.71	1,616.45	3,781.58	31,949.82
Shelby	29,542.68	12,239.31	18,837.51	5,611.97	3,729.45	8,590.39	----------	78,551.22

SUMMARY TABLE NO. 2.—Continued.

County	Permanent bridges and culverts	Temporary bridges and culverts	Repairs	Culvert material purchased for townships	Equipment and material	Filling bridges and culverts	Miscellaneous right of way, channel changes, etc.	Total
Sioux	9,402.10	11,062.18	17,941.39	1,028.28	10,246.45	945.51	560.61	51,186.52
Story	30,503.67	8,214.84	23,708.15	3,152.92	105.00	857.75	9.45	66,551.78
Tama	64,451.04	20,798.67	19,648.91	6,457.81	3,533.92	2,521.34	1,076.60	118,488.29
Taylor	26,215.89	5,006.38	11,227.70	956.20	14,561.32	11,671.92		69,639.41
Union	26,777.89	263.58	1,348.54	2,463.06	3,320.07	4,871.82	179.50	39,234.46
Van Buren	18,777.46	13,907.13	15,336.67	2,699.60	13,315.70	166.27	800.37	65,003.20
Wapello	29,277.88	7,524.63	23,222.76	9,437.70	6,466.88	5,564.99	138.79	81,633.63
Warren	29,085.48	4,369.39	6,446.71	3,097.95	11,756.33	6,422.97	204.79	61,383.62
Washington	20,644.25	8,992.67	4,762.89	6,005.04	9,513.02	102.60	117.96	50,138.43
Wayne	14,875.67	3,726.20	4,022.93	3,279.00	15,274.81	8,054.30	1,020.00	50,252.91
Webster	32,797.19	1,435.43	14,882.97	4,361.62		415.45	374.20	54,266.86
Winnebago	12,526.17	452.40	9,191.00	4,471.58	2,959.26			29,600.41
Winneshiek	28,648.31	6,702.12	11,272.24	2,515.79	2,471.28	1,896.71	1,761.50	55,267.95
Woodbury	35,426.72	14,058.08	19,636.88	1,805.15	17,620.87	3,298.00	5,258.02	97,103.72
Worth	25,349.22	95.93	476.40	2,472.34	1,448.12	154.90	341.55	30,338.49
Wright	27,998.19	875.30	14,492.57	2,707.46	63.77	76.40	444.87	46,658.56
Totals	$3,578,451.05	$ 598,426.88	$1,017,526.00	$ 410,171.73	$650,984.96	$385,118.02	$158,139.52	$ 6,808,818.16

SUMMARY TABLE NO. 3—PART I.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—

County Expenditures.—Annual Reports of County Engineers.

County	Culverts Concrete Box		Culverts Circular Concrete		Culverts Concrete Arch		Concrete Pipe Culverts With Headwalls		Corrugated Pipe Culverts With Headwalls		Masonry Arch Culverts	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Adair	14	$ 15,748.58					65	$ 16,489.93			1	$ 50.29
Adams							40	9,190.93				
Allamakee	10	4,828.93									2	1,402.35
Appanoose	2	1,770.00										
Audubon	19	23,058.64					4	1,027.07				
Benton	95	48,237.51										
Black Hawk	57	12,532.43							1	$ 139.88		
Boone	32	39,438.93	1	$ 133.72								
Bremer	23	9,072.79										
Buchanan	48	17,695.75										
Buena Vista	55	16,129.77										
Butler	4	872.54										
Calhoun	10	7,769.29	17	2,447.85								
Carroll	40	17,529.30	4	736.72			1	95.45	1	115.95		
Cass	28	39,498.71										
Cedar	25	10,919.94										
Cerro Gordo	30	10,066.81	46	5,195.14								
Cherokee	59	25,837.06										
Chickasaw	5	1,512.19										
Clarke	22	12,888.14										
Clay	57	28,711.79	1	72.84								
Clayton	20	6,423.00										
Clinton	41	16,640.11										
Crawford	99	96,118.09										
Dallas	32	19,266.96	3	732.12								
Davis	7	2,965.21	4	257.18			55	5,973.74				
Decatur	7	5,537.13					36	8,180.57				
Delaware	47	13,007.47	8	1,288.25								
Des Moines	7	3,837.07	2	487.56			20	3,418.56				
Dickinson	25	9,661.92	86	10,078.15								
Dubuque	28	12,914.64							1	95.00		
Emmet	10	3,312.15	25	2,919.58								

SUMMARY TABLE NO. 3—PART I.—Continued.

County	Culverts Concrete Box		Culverts Circular Concrete		Culverts Concrete Arch		Concrete Pipe Culverts With Headwalls		Corrugated Pipe Culverts With Headwalls		Masonry Arch Culverts	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Fayette	22	9,780.36										
Floyd	53	16,809.63							1	184.32		
Franklin	28	16,528.72										
Fremont	15	15,486.12					19	3,373.45				
Greene	18	9,172.39	59	7,647.34			14	720.31				
Grundy	89	32,654.82	2	410.93								
Guthrie	51	36,184.99					12	1,647.05				
Hamilton	38	19,370.15	5	734.27					1	158.30		
Hancock	52	23,551.85	6	817.20				4.65				
Hardin	68	33,404.92	64	7,637.25			32	8,692.27				
Harrison	1	1,965.90										
Henry	108	30,424.08	11	1,327.12								
Howard	19	8,256.02	8	1,117.07								
Humboldt	35	17,462.40	6	849.60								
Ida	18	20,138.03										
Iowa	45	48,374.50										
Jackson	45	20,600.96	25	5,231.69			1	107.40				
Jasper	65	39,939.77							2	514.50	1	367.85
Jefferson	22	11,054.60										
Johnson	27	11,410.20	18	2,376.02								
Jones	14	8,325.08										
Keokuk	39	37,068.90										
Kossuth	3	482.30	16	1,918.52			13	2,880.33				
Lee	8	3,477.09	17	2,638.47								
Linn	29	16,458.65	7	1,109.39								
Louisa	5	4,714.51	2	957.94					2	276.33		
Lucas	27	15,622.34										
Lyon	18	4,417.83					52	8,171.28				
Madison	31	20,572.28										
Mahaska	22	16,757.49					1	524.84				
Marion	36	25,939.59	17	3,533.96			3	496.35				
Marshall	98	64,593.51	15	3,848.17								
Mills	11	16,187.31							1	186.85		
Mitchell	93	29,142.54					12	3,306.50				
Monona	21	9,760.10										
Monroe	18	18,836.46					1	765 00				
Montgomery	2	6,468.46					30	8,138.47				

Muscatine	74	17,509.46	17	2,293.93			3	351.36				
O'Brien	83	15,555.76	5	694.00								
Osceola	55	20,741.08	29	3,565.39					1	82.93		
Page	20	18,688.05										
Palo Alto	28	18,163.69	9	1,522.00								
Plymouth	36	26,964.22										
Pocahontas	19	7,602.66	2	424.84								
Polk	65	68,874.02	2	512.72								
Pottawattamie	7	6,544.11					60	17,566.59				
Poweshiek	41	25,977.24	3	599.59			1	718.28				
Ringgold	37	20,071.90					19	2,374.60				
Sac	63	29,631.83	6	525.62	69	$ 7,201.96			46	2,303.05		
Scott	18	11,265.87	14	2,319.67								
Shelby	17	21,594.44										
Sioux	76	5,077.62										
Story	42	13,749.75	21	1,754.68								
Tama	35	18,164.45										
Taylor	28	16,552.17					67	9,563.87				
Union	8	3,285.47					85	11,703.38				
Van Buren	23	15,223.12										
Wapello	14	14,204.92					11	5,343.69				
Warren	15	12,044.78	20	2,550.80			1	318.40				
Washington	20	12,855.25										
Wayne	12	10,142.30										
Webster	6	6,585.14										
Winnebago	10	4,230.49	11	1,471.75								
Winneshiek	70	13,999.12	2	37.38								
Woodbury	19	13,828.79					14	2,547.59				
Worth	77	12,663.26							2	79.55		
Wright	42	13,762.96	1	137.36								
Totals	3,312	$1,741,751.62	617	$ 84,903.78	69	$ 7,201.96	672	$ 133,691.91	59	$ 4,136.66	4	$ 1,820.45

SUMMARY TABLE NO. 3—PART II.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—

County Expenditures.—Annual Reports of County Engineers.

County	Boiler Pipe Culverts With Headwalls		Cast Iron Pipe Culverts With Headwalls		Masonry Box Culverts		Headwalls on Culverts Previously Constructed		Concrete Slab Bridges		Concrete Arch Bridges	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Adair							22	$ 1,328.53				
Adams							1	36.52				
Allamakee					4	$ 1,117.65			3	$ 3,521.03	2	$ 810.45
Appanoose												
Audubon									1	3,683.55		
Benton									5	10,246.59		
Black Hawk												
Boone									1	1,853.62	3	8,308.20
Bremer												
Buchanan												
Buena Vista							9	1,755.47				
Butler									1	496.81		
Calhoun												
Carroll			1	$ 13.04								
Cass	1	$ 336.90										
Cedar												
Cerro Gordo									7	8,701.22		
Cherokee									5	2,723.55		
Chickasaw									1	2,912.07		
Clarke												
Clay												
Clayton									8	8,210.85	1	18,473.92
Clinton							1	126.00				
Crawford												
Dallas									2	6,679.20		
Davis							16	718.14				
Decatur	4	654.39										
Delaware									4	5,329.64		
Des Moines			1	194.48								
Dickinson												
Dubuque											1	32,086.84

Emmet									1	1,788.89		
Fayette									1	1,542.15		
Floyd									5	3,267.56		
Franklin							4	385.84	2	6,214.51		
Fremont							2	123.34	1	2,509.68		
Greene									4	10,431.61		
Grundy							3	308.80				
Guthrie									3	6,291.61		
Hamilton									6	12,777.79		
Hancock									5	7,414.25		
Hardin												
Harrison									8	8,779.84		
Henry									1	1,558.86		
Howard									4	7,805.25		
Humboldt							3	180.00				
Ida												
Iowa							1	315.60	4	9,821.79		
Jackson							2	852.00				
Jasper	3	991.66							16	20,466.19		
Jefferson							2	315.69				
Johnson							1	26.94				
Jones					1	165.10	4	473.50				
Keokuk												
Kossuth												
Lee	13	1,217.27							2	6,483.28		
Linn	2	523.50										
Louisa			1	590.62								
Lucas			2	195.52								
Lyon												
Madison					1	818.17						
Mahaska	1	90.00					6	1,776.18	2	2,982.15		
Marion			1	120.90			1	20.80				
Marshall							5	466.07	8	19,970.23	1	16,010.00
Mills							3	1,274.76				
Mitchell									1	2,246.88		
Monona							1	126.90	3	4,726.80		
Monroe					2	1,300.10	9	2,129.15	1	1,447.00		
Montgomery							18	3,466.54				
Muscatine	5	319.82					7	490.12	3	2,420.57		
O'Brien									11	12,854.90		
Osceola									3	4,413.22		
Page							3	191.21				
Palo Alto									3	2,254.75		
Plymouth										69.03		
Pocahontas							2	266.15	3	1,317.08		
Polk									4	11,675.08	1	1,210.00
Pottawattamie							25	2,958.85	1	2,167.47		
Poweshiek							1	182.31				
Ringgold												
Sac												

SUMMARY TABLE NO. 3—PART II.—Continued.

County	Boiler Pipe Culverts With Headwalls		Cast Iron Pipe Culverts With Headwalls		Masonry Box Culverts		Headwalls on Culverts Previously Constructed		Concrete Slab Bridges		Concrete Arch Bridges	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Scott							8	173.28				
Shelby									2	3,034.03	1	14,004.88
Sioux												
Story									3	2,326.55		
Tama												
Taylor									1	2,678.19		
Union							2	99.85				
Van Buren	1	185.77					23	3,151.88				
Wapello												
Warren							6	2,544.05	1	222.30		
Washington												
Wayne							3	1,469.27				
Webster												
Winnebago									4	8,064.37		
Winneshiek									3	5,039.38		
Woodbury					5	2,107.96	2	21.70	1	1,419.75		
Worth							2	177.73	4	6,729.50		
Wright									1	978.22		
Totals	30	$ 4,319.31	6	$ 1,114.56	13	$ 5,448.98	198	$ 27,933.17	164	$ 260,548.84	10	$ 90,904.29

SUMMARY TABLE NO. 3—PART III.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—

County Expenditures—Annual Report of County Engineers.

County	Concrete Abutments		Concrete Through Girders		Concrete Deck Girders		Retaining Walls		Abutments Masonry		I-Beam Spans Abutments on Concrete	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Adair							1	$ 118.04				
Adams												
Allamakee											1	$ 850.00
Appanoose					1	$ 9,955.00					2	2,046.80
Audubon											1	22.90
Benton			6	$ 12,925.34								
Black Hawk							1	728.44				
Boone					3	8,276.75					3	5,941.42
Bremer					2	8,862.80						
Buchanan	1	$ 1,511.65			2	4,297.60						
Buena Vista							1	191.43			19	7,553.50
Butler			2	5,664.80								
Calhoun	1	2,399.00			1	2,878.80					2	3,915.61
Carroll					4	9,766.89	2	446.00			1	200.00
Cass											1	569.06
Cedar											1	2,403.28
Cerro Gordo					4	14,621.60					3	4,845.05
Cherokee							1	983.50			32	14,960.17
Chickasaw									1	$ 129.28	2	4,558.31
Clarke												
Clay											14	15,992.52
Clayton	2	1,969.60							1	30.00	5	2,692.10
Clinton											1	3,307.21
Crawford											3	7,590.77
Dallas	3	17,278.88			1	3,696.00						
Davis												
Decatur												
Delaware												
Des Moines					2	4,251.42						
Dickinson	1	476.66									4	6,567.00
Dubuque	3	3,763.87										
Emmet					1	276.21						
Fayette					1	12,913.16					1	5,709.60

SUMMARY TABLE NO. 3—PART III.—Continued.

County	Concrete Abutments		Concrete Through Girders		Concrete Deck Girders		Retaining Walls		Masonry Abutments		I-Beam Spans on Concrete Abutments	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Floyd					1	72.90					3	2,258.29
Franklin	1	211.41									2	1,749.19
Fremont												
Greene					4	19,318.18						
Grundy											3	9,399.72
Guthrie											2	357.06
Hamilton			1	4,441.80	4	8,266.64					5	10,545.20
Hancock											1	4,194 82
Hardin			3	3,777.99	5	24,245.95					5	1,199.93
Harrison	2	479.27									1	245.12
Henry	1	1,636.50									3	3,965.31
Howard											2	6,938.57
Humboldt	3	3,273.40	1	440.10			1	100.60			4	2,846.79
Ida												
Iowa	2	4,940.32									9	24,659.78
Jackson	1	13.00					1	521.93	2	1,814.60	2	3,184.25
Jasper							4	792.60			2	3,225.86
Jefferson												
Johnson											4	6,981.74
Jones											8	17,044.29
Keokuk												
Kossuth												
Lee											1	3,025 51
Linn					1	2,919.20					4	11,498.90
Louisa											1	1,265.87
Lucas							1	446.56				
Lyon					2	9,667.42					6	4,160.60
Madison	1	94.12										
Mahaska												
Marion											1	1,020.00
Marshall											5	16,888.71
Mills												
Mitchell											4	6,919.40
Monona												
Monroe											2	7,561.21
Montgomery												
Muscatine												
O'Brien											6	12,053.53

						259.31						
Osceola											1	3,719.64
Page											3	3,495.40
Palo Alto											4	9,049.86
Plymouth												
Pocahontas			1	3,727.80	8	55,425.88	1	342.20			1	625.66
Polk											9	23,460.67
Pottawattamie											3	4,796.43
Poweshiek											9	23,562.39
Ringgold												
Sac												
Scott					2	7,948.24					1	1,150.75
Shelby					1	847.18					13	13,084.59
Sioux											4	7,228.93
Story												
Tama	1	84.60									2	4,014.58
Taylor												
Union	1	323.73							2	1,160.32	3	3,113.57
Van Buren	1	2,208.25									1	6,475.50
Wapello											1	2,366.85
Warren												
Washington	1	3,952.88									1	2,826.37
Wayne			1	2,263.00	3	13,058.31					5	1,784.55
Webster											1	867.91
Winnebago					1	4,901.91	1	749.87	10	2,079.71	3	2,855.18
Winneshiek	6	2,463.00									6	8,078.19
Woodbury											1	5,306.85
Worth												
Wright	1	4,071.22										
Totals	33	$ 51,151.36	15	$ 33,240.83	55	$ 226,727.35	15	$ 5,421.17	16	$ 5,204.91	253	$ 380,078.16

SUMMARY TABLE NO. 3—PART IV.

Classification of Permanent Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—County Expenditures—Annual Report of County Engineers.

County	Steel Girders Concrete Abutments		Pony Truss with Concrete Abutments and Floor		High Steel Trusses Concrete Abutments		Deck Trusses Concrete Abutments		Total Cost Permanent Bridges and Culverts Constructed
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	
Adair									$ 33,735.37
Adams									9,227.45
Allamakee									12,530.41
Appanoose									13,771.80
Audubon									27,792.16
Benton			2	$ 3,272.43					75,431.68
Black Hawk									13,400.75
Boone			2	5,711.00					63,952.64
Bremer									23,646.59
Buchanan									23,505.00
Buena Vista									25,630.17
Butler									15,667.27
Calhoun	1	$ 1,631.24	3	6,998.88					22,294.85
Carroll					1	$ 2,884.30			28,903.33
Cass									36,702.85
Cedar			1	5,298.24					13,323.22
Cerro Gordo									51,883.92
Cherokee			2	8,454.10					67,229.64
Chickasaw			7	17,027.17	1	5,698.19			88,659.39
Clarke			3	19,556.54					15,074.17
Clay			1	2,185.97					46,141.55
Clayton			3	1,364.40					46,949.47
Clinton					2	9,150.00			37,440.58
Crawford			4	17,367.26					119,283.86
Dallas			6	15,575.00					47,653.16
Davis									9,914.27
Decatur									14,372.69
Delaware									19,625.36
Des Moines									19,114.60
Dickinson			2	6,925.51					33,750.99
Dubuque			3	6,967.26					48,880.35
Emmet									8,290.83

Fayette					1	5,086.64			35,031.91
Floyd			1	78.20					22,670.90
Franklin			8	7,080.49					32,384.32
Fremont									19,245.41
Greene									39,491.24
Grundy									52,897.68
Guthrie			4	9,254.07	2	3,276.99			51,228.96
Hamilton					1	67.54			49,865.51
Hancock			1	7.50					41,353.81
Hardin	1	72.00	2	5,819.34					83,571.63
Harrison			7	18,915.14					30,297.70
Henry									45,232.85
Howard					1	419.54			18,290.06
Humboldt			2	7,116.75					40,074.89
Ida			1	2,884.62					23,022.65
Iowa			5	21,594.34					109,813.73
Jackson			2	1,965.59					35,066.37
Jasper			3	9,777.78	1	5,389.50			80,583.36
Jefferson			1	6,023.00					17,393.29
Johnson			1	6,562.76					27,357.66
Jones									25,947.97
Keokuk			2	13,001.66					52,950.89
Kossuth									2,400.82
Lee			2	16,512.46					26,870.80
Linn					1	2,371.50			41,640.75
Louisa			1	103.55					7,632.49
Lucas									24,435.70
Lyon			4	8,173.10	3	9,223.06			35,642.01
Madison									22,009.41
Mahaska					2	9,502.70			31,604.87
Marion			1	5,577.99					36,213.24
Marshall			1	3,444.28	1	9,521.40			134,929.22
Mills									20,768.57
Mitchell									38,308.82
Monona			1	63.68					14,677.48
Monroe									32,038.92
Montgomery			1	3,914.84					21,988.31
Muscatine									23,385.26
O'Brien			11	22,898.87					64,057.06
Osceola			1	3,199.64					32,261.57
Page			2	21,115.58					39,994.87
Palo Alto			4	6,451.79					32,111.89
Plymouth			3	11,327.86					41,856.51
Pocahontas			5	6,247.33					24,907.92
Polk			1	3,750.00					145,517.70
Pottawattamie	1	2,087.05							32,849.13
Poweshiek			4	12,437.89					63,375.98
Ringgold									27,242.93
Sac			2	13,984.26	1	1,884.30			93,271.57
Scott									16,619.57

SUMMARY TABLE NO. 3—PART IV.—Continued.

County	Steel Girders Concrete Abutments		Pony Truss with Concrete Abutments and Floor		High Steel Trusses Concrete Abutments		Deck Trusses Concrete Abutments		Total Cost Permanent Bridges and Culverts Constructed
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	
Shelby									29,542.68
Sioux									9,402.10
Story			1	1,914.65					30,503.67
Tama			3	36,294.87					64,451.04
Taylor									26,215.89
Union			1	4,298.85					26,777.89
Van Buren									18,777.46
Wapello			1	3,849.35					29,277.88
Warren			1	7,696.00					29,085.48
Washington									20,644.25
Wayne			1	4,733.37					14,875.67
Webster									32,707.19
Winnebago									12,526.17
Winneshiek									28,648.31
Woodbury			2	9,287.93					35,426.72
Worth			1	3,550.00					25,349.22
Wright			1	4,719.80					27,998.19
Totals	3	$ 4,693.29	135	$ 442,932.94	18	$ 64,475.66			3,578,451.65

Note—Grand total for state includes one concrete cantilever girder built by Benton County at a cost of $749.81.

SUMMARY TABLE NO. 4—PART I.

Classification of Temporary Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—County Expenditures.—Annual Reports of County Engineers.

County	Concrete Pipe Without Headwalls		Corrugated Pipe Without Headwalls		Boiler Pipe Without Headwalls		Cast Iron Pipe Without Headwalls		I-Beam Spans on Piling		Sub-total
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	
Adair	192	$ 8,477.14									$ 8,477.14
Adams	14	466.57									466.57
Allamakee	24	1,475.60		$ 29.75					1	$ 311.61	1,816.46
Appanoose			2	69.60	71	$ 3,653.21	1	$ 48.00			3,770.81
Audubon	16	750.72	5	154.68							905.40
Benton			95	2,263.04							2,263.04
Black Hawk			117	2,302.81							2,302.81
Boone				2,196.72							2,196.72
Bremer			17	497.90							497.90
Buchanan			60	1,406.81							1,406.81
Buena Vista			2	3.90							3.90
Butler									1	201.24	946.16
Calhoun	5	151.36	34	593.56							1,525.25
Carroll		30.00		1,495.25							4,114.39
Cass	27	3,856.34			5	258.05					94.80
Cedar				52.50		42.30					580.10
Cerro Gordo					25	580.10					
Cherokee											
Chickasaw											
Clarke	1	225.60	66	2,753.07					2	1,421.59	4,400.26
Clay			40	1,787.91							1,787.91
Clayton			41	1,383.57							1,383.57
Clinton			6	54.05	1	65.60					119.65
Crawford			15	826.32			3	323.00			1,149.32
Dallas			28	1,929.03							1,929.03
Davis									2	2,232.78	2,232.78
Decatur	14	959.76	1	55.50							1,015.26
Delaware			37	1,422.73							1,422.73
Des Moines											
Dickinson											
Dubuque			8	228.86							228.86
Emmet											
Fayette				656.44							656.44

SUMMARY TABLE NO. 4—PART I.—Continued.

County	Concrete Pipe Without Headwalls		Corrugated Pipe Without Headwalls		Boiler Pipe Without Headwalls		Cast Iron Pipe Without Headwalls		I-Beam Spans on Piling		Sub-total
	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	
Floyd											
Franklin			13	364.06							364.06
Fremont											
Greene	5	48.18	2	32.02							80.20
Grundy			35	1,148.94							1,148.94
Guthrie	1	41.00	8	460.74							501.74
Hamilton			119	2,814.26							2,814.26
Hancock			15	235.76							335.76
Hardin											
Harrison			4	539.50							569.50
Henry			32	1,126.48							1,126.48
Howard			4	64.34							64.34
Humboldt											
Ida	1	22.80	36	2,071.10					3	3,577.38	5,671.28
Iowa			37	1,200.69							1,200.69
Jackson			2	49.60							49.60
Jasper			62	4,316.43							4,316.43
Jefferson			30	1,608.48							1,608.48
Johnson			48	2,686.46							2,686.46
Jones			14	592.00							592.00
Keokuk			18	1,405.63							1,405.63
Kossuth			159	2,703.97							2,703.97
Lee			10	208.25	1	71.60					279.85
Linn			8	121.60							121.60
Louisa	3	145.60	40	1,007.80							1,153.40
Lucas	34	1,503.54	3	174.53	1	9.00	4	278.26			1,965.33
Lyon			4	134.90							134.90
Madison	1	225.02	27	1,902.74						498.99	2,626.75
Mahaska			54	1,460.09	39	992.06					2,452.15
Marion	2	632.00	10	180.00							812.00
Marshall			5	267.30			6	474.56			741.86
Mills											
Mitchell			115	2,057.40							2,057.40
Monona	33	2,454.41	11	724.16	1	626.20			6	3,540.87	7,345.64
Monroe	1	74.75	20	881.11							955.86
Montgomery	30	1,829.57									1,829.57
Muscatine	2	137.80	48	554.29	15	107.82					799.91

O'Brien			2	6.27							6.27
Osceola											58.10
Page	11	862.30	31	1,014.26							1,876.56
Palo Alto			127	3,084.61					1	752.20	3,836.81
Plymouth	63	3,089.46									3,089.46
Pocahontas			96	2,207.33							2,207.33
Polk	18	1,713.89	101	2,525.46							4,239.35
Pottawattamie	12	424.21	13	455.27			5	106.00	11	12,525.32	13,510.80
Poweshiek	6	360.20									360.20
Ringgold											
Sac	3	12.70	45	616.60					1	190.03	819.33
Scott				581.35		319.26					900.61
Shelby	5	507.46	36	2,458.98							2,966.44
Sioux	7	517.95	12	1,058.20							1,576.15
Story							48	4,331.40			5,731.00
Tama	10	825.92	22	573.68							
Taylor											263.58
Union			12	263.58	130	11,597.62			2	881.32	12,478.94
Van Buren											458.87
Wapello	3	447.77	1	11.10							167.80
Warren			3	167.80							3,388.00
Washington			81	3,172.00	3	216.00					776.20
Wayne	7	542.20			5	234.00					796.96
Webster	56	564.24	5	171.11			5	61.61			452.40
Winnebago			19	452.40					3	632.94	2,546.89
Winneshiek			62	1,913.95					7	6,878.39	8,382.67
Woodbury	32	1,504.28									20.60
Worth			1	20.60							752.30
Wright			37	752.30							
Total	539	$ 34,880.34	2,301	$ 76,953.68	333	$ 18,772.82	72	$ 5,622.83	40	$ 33,644.66	$ 169,873.73

SUMMARY TABLE NO. 4.—PART II.

Classification of Temporary Bridge and Culvert Construction for Which Warrants Were Issued in 1918.—County Expenditures.—Annual Reports of County Engineers.

County	Pony Trusses on Piling—Wood Floors		Wood Pile Bridges		Miscellaneous Bridges and Culverts		Sub-total	Total Cost Temporary Bridges and Culverts Constructed
	No.	Cost	No.	Cost	No.	Cost		
Adair			1	$ 629.24			$ 629.24	$ 9,106.38
Adams			14	4,060.07			4,060.07	4,526.64
Allamakee	1	$ 975.35	8	6,480.39		$ 198.60	7,649.34	9,465.70
Appanoose								3,770.81
Audubon			37	13,759.41			13,759.41	14,664.81
Benton								2,263.04
Black Hawk					18	151.38	151.38	2,454.19
Boone						959.79	959.79	3,156.51
Bremer								497.90
Buchanan								1,406 81
Buena Vista						79.12	79.12	83.02
Butler			8	6,384.00			6,384.00	6,384.00
Calhoun					13	781.20	781.20	1,727.36
Carroll				2,315.27		255.01	2,570.28	4,095.53
Cass			17	5,666.59	8	256.56	5,923.15	10,037.54
Cedar								94.80
Cerro Gordo			1	47.44	6	55.53	102.79	682.89
Cherokee			1	52.80		12.40	65.20	65.20
Chickasaw			43	12,310.39			12,310.39	12,310.39
Clarke			3	928.90			928.90	5,329.16
Clay				106.00		51.05	157.05	1,944.96
Clayton			5	1,248.31			1,248.31	2,631.88
Clinton			5	407.00			407.00	526.65
Crawford			13	1,504.00			1,504.00	2,653.42
Dallas								1,929.03
Davis			20	2,909.94			2,909.94	5,142.72
Decatur			26	3,780.88			3,780.88	4,796.14
Delaware			2	520.85			520.85	1,943.58
Des Moines								
Dickinson			2	1,157.25			1,157.25	1,157.25
Dubuque			1	669.37	1	29.00	698.37	927.23
Emmet			5	1,590.29		652.56	2,242.85	2,242.85
Fayette								656.44
Floyd	1	576.63	20	7,368.91			7,945.54	7,945.54

								364.06
Franklin			57	23,858.63		995.83	24,854.46	24,854.46
Fremont			1	868.95			868.95	949.15
Greene			7	8,802.00			8,802.00	9,950.94
Grundy			10	5,770.68	45	516.14	6,286.82	6,788.56
Guthrie								2,814.26
Hamilton			7	1,887.74			1,887.74	2,223.50
Hancock			17	7,209.45	2	169.81	7,379.26	7,379.26
Hardin	2	1,075.00	4	1,660.12			2,735.12	3,304.62
Harrison								1,126.48
Henry			36	9,183.36			9,183.36	9,247.70
Howard								
Humboldt			4	2,425.12			2,425.12	8,096.40
Ida	1	3,109.80	1	175.00	1	111.10	3,395.90	4,596.59
Iowa			3	840.94	1	364.67	1,205.61	1,255.21
Jackson								4,316.43
Jasper			3	433.78			433.78	2,042.26
Jefferson					139	2,824.16	2,824.16	5,510.62
Johnson			4	4,359.50			4,359.50	4,951.50
Jones						80.02	80.02	1,485.65
Keokuk			35	23,010.13			23,010.13	25,714.10
Kossuth			1	183.54			183.54	463.39
Lee			6	2,557.05			3,301.50	3,423.10
Linn	1	744.45	10	5,351.12		382.80	5,733.92	6,887.32
Louisa			2	164.26			164.26	2,129.59
Lucas								134.90
Lyon			11	3,242.31			3,242.31	5,869.06
Madison			3	797.87			797.87	3,250.02
Mahaska								812.00
Marion			1	556.56	13	512.55	1,069.11	1,810.97
Marshall	2	8,720.28	14	9,448.77			18,169.05	18,169.05
Mills								2,057.40
Mitchell	7	20,322.16		3,200.93		28.40	23,851.49	31,197.13
Monona			1	1,011.77			1,011.77	1,967.63
Monroe	1	2,986.79	21	5,970.08	1	39.00	8,995.87	10,825.44
Montgomery					9	32.40	32.40	832.31
Muscatine								6.27
O'Brien			16	6,542.74			6,542.74	6,600.84
Osceola	2	4,244.20	7	2,512.53			6,756.73	8,633.29
Page			3	962.56	3	465.18	1,427.74	5,264.55
Palo Alto			41	12,458.14			12,458.14	15,547.60
Plymouth			13	5,635.58		612.07	6,247.65	8,454.98
Poeahontas			10	3,593.84	3	46.44	3,640.28	7,879.63
Polk	4	8,909.96	106	52,784.69	5	329.74	62,024.39	75,535.19
Pottawattamie								360.20
Poweshiek			29	4,630.92			4,630.92	4,630.92
Ringgold			1	356.07			356.07	1,175.40
Sac			2	291.70			291.70	1,192.31
Scott			17	9,272.87			9,272.87	12,239.31
Shelby			11	8,575.47	36	910.56	9,486.03	11,062.18
Sioux								

SUMMARY TABLE NO. 4—PART II.—Continued.

County	Pony Trusses on Piling—Wood Floors		Wood Pile Bridges		Miscellaneous Bridges and Culverts		Sub-total	Total Cost Temporary Bridges and Culverts Constructed
	No.	Cost	No.	Cost	No.	Cost		
Story			5	8,214.84			8,214.84	8,214.84
Tama			44	15,067.67			15,067.67	20,708.67
Taylor			11	1,765.56	1	2,378.00	5,006.38	5,006.38
Union	1	862.82						263.58
Van Buren			7	1,032.45			1,428.19	13,997.13
Wapello	1	395.74	13	7,065.76			7,065.76	7,324.63
Warren			20	3,992.81			4,201.59	4,369.39
Washington			8	3,369.23	7	208.78	5,604.67	8,992.67
Wayne			10	2,950.00		2,235.44	2,950.00	3,726.20
Webster					15	638.47	638.47	1,435.43
Winnebago								452.40
Winneshiek	2	2,430.23	6	1,326.53	3	398.47	4,155.13	6,702.12
Woodbury			22	5,675.41			5,675.41	14,058.08
Worth			1	75.36			75.36	95.96
Wright			1	123.00			123.00	875.30
Total	26	$ 55,648.41	897	$ 355,142.69	331	$ 17,762.05	$ 428,553.15	$ 598,426.88

SUMMARY TABLE NO. 5.

Repairs to Bridges and Culverts—County Expenditures—Annual Reports of County Engineers.

County	Wooden bridges and culverts	Steel bridges and culverts	Permanent bridges and culverts	Repairs by patrolmen	Miscellaneous	Total
Adair	$ 7,903.73		$ 165.21			$ 8,068.94
Adams	5,949.11	$ 1,355.43	57.30	$ 424.26		7,786.10
Allamakee	11,583.89	192.40				11,776.29
Appanoose	8,604.20	1,204.14	43.85		$ 740.40	10,592.59
Audubon	6,086.09		12.00			6,098.09
Benton	12,175.62	346.85				12,522.47
Black Hawk	5,548.63	4,537.62	1,167.18	2,702.70	24.35	13,980.48
Boone	2,540.12	413.54	201.66	252.40		3,407.72
Bremer	3,111.67	1,914.31				5,025.98
Buchanan	2,179.45	2,578.34		1,078.97	168.13	6,004.89
Buena Vista	183.72	414.16	178.76			776.64
Butler	15,966.96			454.19	7,324.16	23,745.31
Calhoun	1,069.65	2,469.44	467.08		822.96	4,768.53
Carroll	7,544.52	1,256.42	390.39	41.00	614.39	9,846.63
Cass	11,315.12	113.00	165.16		93.30	11,686.58
Cedar	7,665.27	900.60	54.05	610.75		9,230.67
Cerro Gordo	5,381.00	1,053.58	331.25	553.57	16.31	7,335.71
Cherokee	4,328.82	969.20		852.90	4.50	6,155.42
Chickasaw	7,969.79					7,969.79
Clarke	4,758.00	655.20			174.75	5,587.95
Clay	1,062.95	290.40	6.00		69.02	1,428.37
Clayton	2,027.12	1,924.09	2,391.74			6,342.95
Clinton	982.31	990.70	2,519.86			4,492.87
Crawford	26,574.23		1,623.92			28,198.15
Dallas	4,076.37	2,892.98		62.50	53.19	7,085.04
Davis	10,920.45	2,142.11	156.10	237.45		13,456.11
Decatur	5,224.62	2,397.08		94.23	44.48	7,760.41
Delaware	5,125.07	1,108.85	6.00		644.80	6,884.72
Des Moines	1,063.70	128.65	23.33	142.45	500.00	1,858.13
Dickinson	913.98	1,274.07	245.24		277.86	2,711.15
Dubuque	328.40	6,477.23	8,468.70		261.62	15,535.95
Emmet	791.48	239.75	13.20	201.40		1,245.83
Fayette	10,275.55	4,500.00			20.99	14,796.54
Floyd	2,663.10	624.50		668.95		3,956.55
Franklin	5,159.92	1,934.72	72.00		289.45	7,456.09
Fremont	11,259.03	2,747.36	503.31	10.15	23.57	14,543.42
Greene	9,725.84		2,216.70	183.50		12,126.04
Grundy	7,889.93	409.45				8,299.38
Guthrie	6,379.68	726.48	220.68		264.60	7,591.44
Hamilton	2,480.23	11,144.29				13,624.52
Hancock	8,422.55					8,422.55
Hardin	4,582.63	214.29	57.93		20.00	4,874.85
Harrison			80.58		24,005.79	24,086.37
Henry	2,243.82		75.00			2,318.82
Howard	2,616.25	432.97	43.72	59.52	397.87	3,550.33
Humboldt	104.50	611.51		522.17	23.79	1,261.97
Ida	7,824.52	1,065.38	17.45	356.95	489.60	9,753.90
Iowa	13,589.84	3,540.83	1,515.24	897.45	4,237.30	23,780.66
Jackson	13,681.75	12,877.07	328.50		437.15	27,324.47
Jasper	32,594.62	3,495.36	276.18	34.95		36,401.11
Jefferson	2,618.97	3,169.34	1,145.47		314.17	7,247.95
Johnson	4,481.14	3,128.54	1,043.74	211.70	1,292.33	10,157.45
Jones	10,786.67	1,691.20	580.51	800.00	9.65	13,868.03
Keokuk	12,110.95	1,768.23	112.30		106.53	14,098.01
Kossuth	4,033.40	5,513.04	1,775.54			11,321.98
Lee	3,580.98	1,054.49	586.23	162.10		5,383.80
Linn	8,500.90	8,000.01	351.49	521.85	95.90	17,469.25

SUMMARY TABLE NO. 5.—Continued.

County	Wooden bridges and culverts	Steel bridges and culverts	Permanent bridges and culverts	Repairs by patrolmen	Miscellaneous	Total
Louisa	8,136.50	512.75	1,181.14	1,830.28	118.13	11,778.80
Lucas	2,073.68	1,262.06	1,222.76	292.50	111.84	4,962.84
Lyon	10,626.43	2,459.01	44.00			13,129.44
Madison	13,220.65	14.00	55.10		36.00	13,325.75
Mahaska	2,747.78	3,226.77	408.35		282.50	6,665.40
Marion	2,321.43	1,522.88	228.00		188.21	4,260.52
Marshall	10,590.87	515.53		541.70		11,648.10
Mills	11,382.90	618.00	101.00	611.00	100.00	12,812.90
Mitchell	204.95	3,030.99	1,142.25		3,658.56	8,036.75
Monona	13,992.05	505.20	182.50	1,800.80		16,480.55
Monroe	7,068.39	103.65				7,172.04
Montgomery	8,254.51	8,055.10	656.14		160.67	17,125.42
Muscatine	67.75	4,086.54	503.58	711.95	400.26	5,779.68
O'Brien	2,493.25			631.83		3,125.08
Osceola	885.16	3.75		27.50		916.41
Page	16,146.53			292.70		16,439.23
Palo Alto	1,500.76	536.66		1,000.78	16.30	3,054.50
Plymouth	6,906.28	2,641.01				9,547.29
Pocahontas	7,495.13	627.03	811.13	209.21	513.22	9,655.72
Polk	6,449.82	3,786.02	1,756.79		340.41	12,333.04
Pottawattamie	11,511.50	477.90	2,271.49	3,277.50	43.97	17,582.36
Poweshiek	16,641.80	429.55			22.73	17,094.08
Ringgold	6,864.32				1,276.87	8,141.19
Sac	1,866.62	1,588.16	317.20		36.02	3,808.00
Scott	1,659.32	906.33	51.27		486.43	3,103.35
Shelby	14,906.10	3,931.41				18,837.51
Sioux	16,919.37		655.00	289.72	77.30	17,941.39
Story	16,251.13	2,095.61	3,310.38	2,051.03		23,708.15
Tama	15,516.48	1,111.65	363.30	2,657.48		19,648.91
Taylor	8,379.72	2,529.49	189.06		129.43	11,227.70
Union	1,115.24	23.10		82.25	127.95	1,348.54
Van Buren	7,564.84	7,771.83				15,336.67
Wapello	2,449.24	8,841.97	11,586.58	138.25	206.72	23,222.76
Warren	2,659.46	3,647.77			129.48	6,446.71
Washington	3,322.20	1,107.40	333.29			4,762.89
Wayne	4,022.93					4,022.93
Webster	5,608.49	7,193.33	1,631.94		449.21	14,882.97
Winnebago	9,191.00					9,191.00
Winneshiek	3,046.66	7,117.04	672.69	163.85	272.00	11,272.24
Woodbury	12,670.18	6,850.00		116.70		19,636.88
Worth		380.95			95.45	476.40
Wright	10,542.49		3,913.48		36.60	14,492.57
Total	$683,786.12	$198,399.64	$ 63,278.97	$ 28,865.09	$ 53,196.18	$ 1,027,526.00

SUMMARY TABLE NO. 6.

Culvert Material Purchased for Townships.—County Expenditures.—Annual Report of County Engineers.

County	Corrugated pipe	Concrete pipe	Boiler pipe	Cast iron pipe	Lumber	Miscellaneous materials	Total
Adair	$ 18.12	$	$	$	$ 300.00	$ 612.72	$ 930.84
Adams	422.48	2,481.19			50.00		2,953.67
Allamakee		770.00			1,730.11		2,500.11
Appanoose	2,708.00		$ 5,746.06			67.80	8,454.06
Audubon	1,999.60	2,109.36					4,086.76
Benton	4,206.53	98.50	56.70				4,361.73
Black Hawk	3,328.14	39.89				323.28	3,368.03
Boone	3,155.21				1,000.00		3,478.49
Bremer							1,000.00
Buchanan	6,215.77						6,215.77
Buena Vista							
Butler							
Calhoun		3,783.68					3,783.68
Carroll	5,105.75	15.08			488.38	122.17	5,731.38
Cass	3,150.54	2,504.96					5,655.50
Cedar					21.60		21.60
Cerro Gordo					1,769.15		1,769.15
Cherokee					369.60		369.60
Chickasaw	7,344.03						7,344.03
Clarke	4,571.08	225.60					4,796.68
Clay	2,324.78						2,324.78
Clayton	2,824.34		60.00		930.00		3,814.34
Clinton	4,732.39		104.00		160.74	9.82	5,006.95
Crawford	10,160.96						10,160.96
Dallas	5,108.16	4,594.98					9,703.14
Davis	142.08						142.08
Decatur	1,784.98	856.00			363.01	25.26	3,029.25
Delaware	3,147.31				76.20	6.75	3,230.26
Des Moines	4,136.43						4,136.43
Dickinson		2,192.93					2,192.93
Dubuque	385.98						385.98
Emmet		481.76	36.00		46.10		527.86
Fayette	4,010.11						4,046.11

SUMMARY TABLE NO. 6.—Continued.

County	Corrugated pipe	Concrete pipe	Boiler pipe	Cast iron pipe	Lumber	Miscellaneous materials	Total
Floyd					1,000.00		1,000.00
Franklin	4,051.46						4,051.46
Fremont		3,469.00			324.80	1,825.20	5,619.00
Greene	88.88	1,178.10			188.10		1,455.08
Grundy	3,325.60						3,325.60
Guthrie	3,806.78	584.20					4,390.98
Hamilton	1,092.86						1,092.86
Hancock	5,240.63						5,240.63
Hardin	5,305.40						5,305.40
Harrison	1,284.84	47.10					1,331.94
Henry						407.12	407.12
Howard	2,099.76				882.27	5.25	2,987.28
Humboldt	2,824.96				2,462.30		5,287.26
Ida	2,313.84						2,313.84
Iowa	7,943.73						7,943.73
Jackson	70.76						70.76
Jasper	17,116.87						17,116.87
Jefferson	4,381.66		44.00		700.00		5,125.66
Johnson	4,919.70				2,762.98	10.00	7,692.68
Jones	1,800.31						1,800.31
Keokuk	1,983.71					104.30	2,088.01
Kossuth	7,020.16	68.10					7,088.26
Lee	855.56				1,609.00		2,464.56
Linn	3,690.87						3,690.87
Louisa		2,044.00			8.39		2,052.39
Lucas	4,046.74	787.00		$ 332.64	195.01	48.70	5,410.09
Lyon	2,904.73						2,904.73
Madison	8,999.88						8,999.88
Mahaska	6,121.50	2,454.96	861.46		15.12	60.77	9,513.81
Marion	4,409.88						4,409.88
Marshall	1,286.90			1,941.18			3,228.08
Mills	3,358.48						3,358.48
Mitchell	1,378.82						1,378.82
Monona	2,505.72						2,505.72
Monroe	3,490.63	126.00	79.20				3,695.83
Montgomery	206.40	3,106.14			169.53	66.65	3,548.72
Muscatine	3,543.04	91.60	72.95			163.59	3,707.59
O'Brien	2,137.75	120.65					2,421.99
Osceola		1,165.60			651.25	400.63	1,816.85
Page	5,999.52	3,777.86					10,178.01
Palo Alto	1,360.95						1,360.95
Plymouth	4,022.80						4,022.80
Pocahontas	3,706.99						3,706.99
Polk	7,303.02	438.78			18.30	185.30	7,741.80
Pottawattamie	32,022.71	528.63					32,754.04
Poweshiek	8,598.00				2,300.00	200.00	8,598.00
Ringgold	1,238.64				16.34	8.10	3,828.64
Sac	1,890.09	19.58	170.75				1,934.11
Scott	496.10						666.85
Shelby	5,288.50	323.47			1,028.28		5,611.97
Sioux					251.87	67.13	1,028.28
Story	2,833.92			160.15	336.00	8.00	3,152.92
Tama	5,888.86	64.80			850.62	105.58	6,457.81
Taylor					1,119.52		956.20
Union	1,343.54				1,018.00		2,463.06
Van Buren	1,681.60						2,699.60
Wapello	9,127.99	309.71					9,437.70
Warren	3,097.95						3,697.95
Washington	6,005.04						6,005.04
Wayne		2,856.00	423.00			79.56	3,279.00
Webster	2,257.34	2,024.72			1,027.80		4,361.62
Winnebago	3,443.78				346.36	11.60	4,471.58
Winneshiek	2,157.83						2,515.79
Woodbury		1,805.15			912.34		1,806.15
Worth	1,560.00						2,472.34
Wright	2,694.21	13.25					2,707.46
Totals	$ 320,010.96	$ 47,558.33	$ 7,654.12	$ 2,433.97	$ 27,589.07	$ 4,925.28	$ 410,171.73

SUMMARY TABLE NO. 7.

Bridge Equipment, Unused aterial, Filling Bridges and Culverts and Special Cases.—County Expenditures.—Annual Reports of County Engineers.

County	Equipment and Material			Filling bridges and culverts	Special Cases				
	Equipment incidental repairs to same	Material purchased and not used	Total		Right of way	Moving and repairing old span	Lengthening culverts	Miscellaneous	Total
Adair	$ 349.37		$ 349.37	$ 7,075.63	$ 90.00				$ 90.00
Adams	600.90	4,815.68	5,416.58	7,525.32				$ 237.42	237.42
Allamakee	568.64	3,611.83	4,180.47	455.75	200.00	$ 1,189.00		880.80	2,269.80
Appanoose		3,884.40	3,884.40	9,559.25			97.50	268.38	365.88
Audubon	400.00	2,524.21	2,924.21	2,976.02	689.58				689.58
Benton	2,025.07	955.07	2,980.14	7,258.14	17.40			1,497.04	1,514.44
Black Hawk		9,149.06	9,149.06	8,219.90			3,050.15	452.00	3,502.15
Boone	487.33	4,058.15	4,545.48	3,655.69	500.00			32.99	532.99
Brener	41.30	7,633.88	7,677.18	3,170.89					
Buchanan	32.33		32.33				288.57	15.50	304.07
Buena Vista	105.60		105.60	1,142.30				782.22	782.22
Butler	1,020.10	7,000.00	8,020.10	4,069.43	20.00				20.00
Calhoun	152.85	12,635.41	12,788.26	843.35				1,696.46	1,696.46
Carroll	560.00	4,709.60	5,269.60	967.93	29.50	4,460.82		9,969.65	14,489.97
Cass	367.94	8,284.32	8,852.26	10,766.67					
Cedar		6,106.63	6,106.63	145.88	15.00			616.08	631.08
Cerro Gordo	507.34	5,972.66	6,480.00	227.00				100.00	100.00
Cherokee	23.58	6,300.43	6,323.01	3,560.19	1,765.45			3,828.42	5,593.87
Chickasaw	380.21	5,401.92	5,791.13	1,863.41				208.65	208.65
Clarke	2,257.38	2,853.12	5,110.50	7,223.30	672.61	143.00		26.25	841.86
Clay	334.38	6,775.93	7,110.31	1,380.45				532.28	532.28
Clayton		949.36	949.36	3,187.23	99.25		120.65	385.00	605.90
Clinton	10.99	885.68	896.67	2,386.33	474.45	525.75		169.00	1,169.20
Crawford		8,000.00	8,000.00	8,343.60			7,197.34	438.41	1,625.75
Dallas	1,929.82	3,502.66	5,422.48	4,343.68	35.60	475.13			510.13
Davis	35.18	1,108.14	1,143.32	1,331.85		637.33			637.33
Decatur	2,479.35	8,270.37	10,749.92	5,978.65		886.16		2,876.05	3,462.21
Delaware	263.38	3,583.71	3,847.09	1,997.60	72.00		137.40		209.40
Des Moines	1,907.91	612.23	2,520.14	10.05		447.80	2,408.78	171.05	3,027.63

Dickinson		500.00	500.00	3,291.72	5.00	7.50		340.00	347.50
Dubuque		8,759.27	8,759.27	7,160.92		245.00		3,249.29	3,494.29
Emmet		5,860.99	5,967.62	840.85				778.91	778.91
Fayette	36.63	990.00	1,219.98	446.35	13.00	124.15	159.19	4,038.08	4,334.42
Floyd	229.98	3,717.39	5,350.21	1,341.35	30.00			377.16	407.16
Franklin	1,632.85	6,521.43	7,189.49	1,827.27				866.35	866.35
Fremont	658.97	19,841.45	20,472.45	5,553.88	25.00		151.00	55.70	231.70
Greene	631.00	10,398.18	10,564.53	1,777.69				430.13	430.13
Grundy	366.35	14,345.61	14,345.61	4,035.25	322.72			6,917.85	7,240.57
Guthrie		1,423.45	2,468.88	9,051.79	10.00	349.92	4.25	1,614.72	1,978.89
Hamilton	1,045.43	466.22	466.22	178.90	516.25			2,909.33	3,476.58
Hancock		3,178.59	3,465.14	79.68	50.00		1,326.99	256.06	1,326.99
Hardin	286.55	2,400.37	2,409.37	562.80	1,804.77	8,999.78			306.05
Harrison		1,940.26	2,277.76	1,835.10		116.50			19,714.55
Henry	337.50	5,129.09	5,228.31	1,142.19	20.00				116.50
Howard	108.22	2,641.00	2,704.48	869.54				380.40	20.00
Humboldt	63.48	3,070.00	3,129.88	3,729.63				246.19	380.40
Ida	159.88	12,685.19	13,445.80	972.86	161.67	279.00	492.55	750.00	246.19
Iowa	769.70		22.40	2,128.29	424.29			127.25	911.67
Jackson	22.40		484.14	16,543.43		532.53		106.75	831.06
Jasper	484.14	4,557.56	4,714.13	2,057.05	197.25			2,115.59	599.30
Jefferson	156.57	4,418.85	2,934.18	6,089.19	151.50			611.75	3,048.12
Johnson	515.33	3,172.95	3,172.95	327.50					789.00
Jones		9,155.21	9,214.98	2,769.55		2,238.85	21.60	351.00	151.50
Keokuk	59.77	16,000.00	16,000.00	2,483.51					2,611.45
Kossuth	4,962.66	6,072.79	11,035.45	134.75				451.00	451.00
Lee		9,764.51	9,764.51	3,425.00				170.34	170.34
Linn	1,082.82	216.93	1,299.75	526.80		953.27	342.87	407.48	1,703.62
Louisa	31.65	2,352.14	2,383.79	13,018.41	75.00			2,067.43	2,136.43
Lucas	333.32	1,300.88	1,634.20	4,804.48	12.50		294.07	1,253.54	1,530.51
Lyon	484.78	4,931.30	5,416.08	10,869.80		1,646.79	458.87	84.25	2,189.91
Madison	85.20	9,167.10	9,252.60	2,993.74		296.49		907.36	1,115.66
Mahaska	10.40	11,403.58	11,413.98	11,961.06	506.00			914.56	1,420.56
Marion	3,298.60	174.91	3,473.51	8,824.55		5,294.45	314.85	2,421.56	7,949.86
Marshall	335.19	20,217.42	20,572.61	6,571.85	146.00			2,872.98	2,518.98
Mills	2,512.43	2,999.82	5,512.25	7,501.83	19.00	1,823.76	306.90	14.75	2,163.45
Mitchell	88.97	5,200.00	5,288.97	1,974.07				1,105.00	1,105.00
Monona	696.42		696.42	2,689.87	60.00	999.33		1,237.18	2,296.50
Monroe	348.33	19,937.79	20,286.12		125.00	553.19	22.12	711.76	1,412.07
Montgomery	1,169.01	776.66	1,885.67	534.25				863.10	863.10
Muscatine	2,937.16	3,114.23	6,051.39	21.25				32.70	32.70
O'Brien	52.00	4,119.10	4,171.10	1,233.95		865.00		1,706.20	2,511.20
Osceola	106.85	750.72	857.57	13,154.93	17.00	1,062.35			1,979.35
Page	303.35	4,042.00	4,345.35	1,133.26				3,829.66	3,829.66
Palo Alto	2,352.98	34,420.96	36,773.94	2,940.79		829.25		229.16	1,059.41
Plymouth	507.97	5,227.86	5,735.83	933.54		644.25		1,906.18	2,696.78
Pocahontas	989.74	8,233.67	9,214.41	14,244.97	86.35	1,619.16	72.88	1,175.38	2,867.42
Polk	1,366.66	42,785.17	44,151.22	13,522.55	212.50			3,693.22	3,905.72
Pottawattamie	356.61	1,128.79	1,485.40	8,965.10					
Poweshiek									

SUMMARY TABLE NO. 7.—Continued.

County	Equipment and Material			Filling bridges and culverts	Special Cases				
	Equipment including repairs to same	Material purchased and not used	Total		Right of way	Moving and re-erecting old spans	Lengthening culverts	Miscellaneous	Total
Ringgold	120.00	9,537.41	9,657.41	10,731.32				116.60	116.60
Sac	286.29	3,874.91	4,161.20	1,039.55		708.68	1,776.68	2,293.19	4,778.55
Scott	1,486.44	3,483.27	4,969.71	1,616.45	463.24	150.90		3,167.44	3,781.58
Shelby		3,729.45	3,729.45	8,590.30					
Sioux	381.62	9,864.83	10,246.45	945.51			275.01	285.60	560.61
Story	105.00		105.00	857.75				9.45	9.45
Tama	724.50	2,809.42	3,533.92	2,521.34	610.00		424.00	42.60	1,076.60
Taylor	201.87	14,359.45	14,561.32	11,671.92					
Union	152.00	3,168.07	3,320.07	4,871.82				179.50	179.50
Van Buren	7,724.71	5,590.99	13,315.70	166.27			23.10	777.27	800.37
Wapello	94.52	6,372.36	6,466.88	5,564.99				138.79	138.79
Warren	3,900.51	7,855.82	11,756.33	6,422.97	37.29	167.50			204.79
Washington	40.00	9,473.02	9,513.02	102.66				117.96	117.96
Wayne		15,274.81	15,274.81	8,054.30		1,020.00			1,020.00
Webster				415.45	100.65	273.55			374.20
Winnebago	160.44	2,798.82	2,959.26						
Winneshiek	505.80	1,965.48	2,471.28	1,896.71	221.00	190.58		1,349.92	1,761.50
Woodbury	6,475.48	11,145.39	17,620.87	3,298.00				5,258.02	5,258.02
Worth	198.12	1,250.00	1,448.12	154.90		283.70	45.25	12.60	341.55
Wright	63.77		63.77	76.40		444.87			444.87
Totals	$ 71,392.85	$579,592.11	$650,984.96	$385,118.02	$ 11,024.13	$ 40,877.63	$ 14,019.09	$ 92,218.67	$ 158,139.52

SUMMARY TABLE NO. 8.

Comparison of Bridge and Culvert Construction.—1914-1915-1916-1917-1918.—Annual Reports of County Engineers.

County	November 1, 1913 to November 1, 1914	November 1, 1914 to January 1, 1916	January 1, 1916 to January 1, 1917	January 1, 1917 to January 1, 1918	January 1, 1918 to January 1, 1919	Total five-year period
Adair	$ 28,942.00	$ 39,477.24	$ 41,916.84	$ 60,781.88	$ 59,356.53	$ 230,474.49
Adams	16,389.54	36,764.09	30,842.09	42,529.93	37,673.18	164,198.83
Allamakee	21,648.86	37,300.02	36,612.58	89,150.24	43,218.53	227,930.23
Appanoose	20,569.18	40,028.99	42,099.77	71,807.42	50,398.79	224,904.15
Audubon	22,582.80	50,441.85	35,164.50	85,581.09	59,231.63	253,001.87
Benton	56,760.49	62,481.69	75,076.26	106,838.22	106,331.64	407,489.00
Black Hawk	16,560.82	80,316.88	42,107.00	69,557.59	54,074.56	262,616.85
Boone	13,374.39	24,513.51	46,207.97	55,825.49	82,729.43	222,650.79
Bremer	10,868.60	48,238.48	38,431.87	46,545.79	41,018.54	185,103.28
Buchanan	20,245.60	48,102.40	65,464.01	69,400.21	37,468.87	240,681.09
Buena Vista	45,952.05	93,326.65	113,108.63	217,809.17	28,509.95	498,716.45
Butler	23,659.72	73,666.27	23,388.96	106,242.82	57,906.11	284,863.88
Calhoun	34,231.90	58,733.92	48,195.89	76,876.46	47,902.49	265,940.66
Carroll	34,705.27	49,707.51	47,031.43	83,106.61	69,203.79	283,754.61
Cass	19,376.95	58,280.17	55,062.87	90,766.02	83,701.40	297,187.41
Cedar	48,604.57	60,968.88	61,956.12	51,061.23	29,553.88	258,144.68
Cerro Gordo	53,511.65	48,311.84	37,119.73	67,178.47	69,178.67	275,300.36
Cherokee	48,529.34	56,329.15	99,162.80	201,310.69	96,271.36	501,603.34
Chickasaw	40,374.99	32,161.02	64,462.18	43,847.49	57,267.36	238,113.04
Clarke	4,900.78	18,268.99	30,033.77	36,519.47	43,963.56	133,686.57
Clay	77,792.65	121,815.17	82,093.14	103,412.99	60,842.70	445,956.65
Clayton	24,530.05	102,244.00	46,699.54	76,780.87	63,871.13	314,225.59
Clinton	66,495.59	73,480.93	62,108.77	76,694.79	51,858.65	330,638.73
Crawford	48,872.99	81,688.44	91,660.53	215,743.16	178,265.74	616,230.86
Dallas	33,125.54	72,561.29	101,041.70	67,065.19	76,646.06	350,439.78
Davis	39,334.95	38,498.71	30,360.37	55,573.12	31,767.58	195,534.73
Decatur	7,090.55	32,109.88	21,523.36	37,011.45	50,141.05	147,876.29
Delaware	28,092.00	47,314.84	49,105.32	44,829.07	36,808.01	206,149.24
Des Moines	17,206.32	20,018.01	25,311.08	30,807.38	30,665.98	124,008.77
Dickinson	37,751.24	45,349.26	36,508.63	83,936.98	41,951.54	245,497.65
Dubuque	41,806.51	84,966.05	102,314.62	107,097.39	84,119.99	420,204.56
Emmet	27,015.48	48,221.32	35,767.11	23,815.98	19,900.75	154,720.64
Fayette	49,107.64	69,664.53	113,367.09	104,411.45	60,521.75	397,072.46

SUMMARY TABLE NO. 8.—Continued.

County	November 1, 1913 to November 1, 1914	November 1, 1914 to January 1, 1916	January 1, 1916 to January 1, 1917	January 1, 1917 to January 1, 1918	January 1, 1918 to January 1, 1919	Total five-year period
Floyd	41,996.15	51,676.90	56,230.27	56,071.78	42,671.61	248,646.71
Franklin	22,299.68	18,381.21	40,517.87	67,364.73	54,159.95	202,723.44
Fremont	45,045.41	36,639.46	37,627.10	76,873.15	90,520.32	286,705.44
Greene	25,138.91	25,558.43	28,631.87	42,758.36	66,793.86	188,881.43
Grundy	47,179.44	69,441.92	52,661.50	57,128.70	100,094.43	326,505.99
Guthrie	16,264.75	43,236.06	32,273.23	128,969.08	83,499.50	304,242.62
Hamilton	22,360.59	65,222.64	87,268.30	78,854.48	70,873.73	324,579.74
Hancock	25,167.22	22,463.45	24,399.42	43,639.91	59,212.60	174,852.60
Hardin	22,844.36	36,986.10	40,927.24	78,147.29	104,982.01	283,887.00
Harrison	15,518.97	30,035.81	113,795.57	105,411.99	72,698.35	343,460.69
Henry	30,284.10	27,139.92	22,578.68	45,066.71	53,314.63	178,384.04
Howard	60,266.75	45,873.93	46,323.07	46,576.56	40,465.87	239,506.18
Humboldt	12,354.42	34,642.53	41,487.63	44,609.73	50,518.54	183,612.85
Ida	42,269.99	39,989.23	35,747.22	57,039.63	50,292.49	225,338.56
Iowa	43,426.87	53,668.58	53,693.09	77,496.16	161,465.13	389,749.83
Jackson	2,689.35	40,616.02	36,113.87	107,567.67	66,698.55	253,685.46
Jasper	24,095.44	82,555.36	70,120.07	95,678.48	156,044.64	428,493.99
Jefferson	30,445.85	46,571.40	60,199.63	68,803.02	41,628.46	247,648.36
Johnson	34,386.04	110,305.25	52,484.76	71,896.16	60,421.78	329,493.99
Jones	23,894.70	23,049.50	35,628.73	67,549.99	50,219.76	200,342.68
Keokuk	34,358.76	33,132.44	46,763.88	55,266.55	82,607.09	252,128.72
Kossuth	49,771.65	47,886.59	73,838.19	65,580.68	67,620.42	304,697.53
Lee	23,399.31	32,240.11	38,871.93	37,575.30	46,342.75	178,429.40
Linn	43,082.31	68,005.73	60,743.64	82,844.37	79,864.48	334,540.53
Louisa	16,292.98	32,735.22	42,049.77	39,686.07	30,347.89	161,111.93
Lucas	31,721.51	28,582.63	30,808.02	70,790.10	54,044.04	215,946.30
Lyon	25,897.65	47,609.81	41,915.13	109,339.63	60,386.19	285,148.41
Madison	29,432.89	27,005.02	21,830.42	50,338.64	68,020.49	196,627.46
Mahaska	33,800.49	60,624.95	64,211.83	58,646.80	65,470.44	282,754.51
Marion	55,775.92	120,200.18	117,906.25	62,056.94	70,186.34	426,125.63
Marshall	33,592.48	33,504.76	102,606.63	162,188.16	165,334.99	497,317.02
Mills	25,990.02	48,985.92	36,032.83	66,630.89	90,194.32	267,833.98
Mitchell	21,083.12	41,519.74	53,180.17	63,051.43	65,314.85	244,149.31
Monona	18,394.96	36,942.03	48,159.82	93,932.27	74,287.37	271,716.45
Monroe	5,815.05	38,709.11	37,401.66	56,761.27	49,365.71	188,052.80
Montgomery	26,424.92	42,800.95	34,623.62	75,064.77	77,080.51	254,994.77
Muscatine	33,610.42	29,161.39	38,402.45	31,845.24	37,536.23	170,555.73
O'Brien	40,102.70	63,553.20	50,190.94	59,545.58	76,546.14	289,947.56
Osceola	39,147.60	15,785.12	48,611.41	74,198.00	47,033.42	215,775.55
Page	38,134.17	48,430.39	45,711.80	90,443.18	91,769.07	314,488.61
Palo Alto	30,754.80	35,471.57	69,782.18	84,484.99	48,349.83	268,843.37
Plymouth	65,023.47	60,455.90	72,566.49	105,804.21	114,521.50	418,371.57
Pocahontas	10,256.63	65,472.22	58,606.06	64,552.72	54,454.39	253,342.02
Polk	103,299.2	87,372.09	50,775.50	103,157.02	199,628.33	544,232.16
Pottawattamie	120,022.05	108,140.35	92,809.17	173,267.31	219,262.81	713,501.69
Poweshiek	57,083.13	56,981.36	90,846.45	135,171.69	103,484.48	443,567.11
Ringgold	10,463.07	21,951.40	25,755.20	62,077.34	64,349.01	184,596.02
Sac	32,016 23	42,865.46	65,894.25	91,778.57	110,168.38	342,722.89
Scott	31,989.60	18,001.42	20,930.59	46,042.99	31,949.82	148,914.42
Shelby	42,347.77	50,945.35	66,464.23	55,159.39	78,551.22	293,467.96
Sioux	28,916.46	57,547.48	63,052.30	97,930.24	51,186.52	298,633.00
Story	45,128.17	49,198.23	59,620.43	30,473.08	66,551.78	250,971.69
Tama	61,980.28	55,251.98	148,141.07	113,882.54	118,488.29	497,744.16
Taylor	22,385.12	27,969.36	38,722.59	71,556.19	69,639.41	230,272.67
Union	10,115.41	45,988.36	29,333.64	69,681.53	39,224.46	194,343.40
Van Buren	26,583.25	32,592.78	41,417.49	71,151.45	65,003.20	236,748.17
Wapello	20,598.88	43,832.58	58,645.43	55,313.11	81,633.63	260,023.63
Warren	26,662.84	47,317.30	69,325.16	31,925.18	61,383.62	236,614.10
Washington	22,622.04	35,398.80	41,287.88	88,690.41	50,138.43	238,137.56
Wayne	41,994.43	27,887.08	42,089.26	69,626.18	50,252.91	231,849.86
Webster	29,662.55	52,119.26	29,521.80	44,469.97	54,266.86	210,040.44
Winnebago	11,516.59	21,201.98	15,130.43	29,303.72	29,600.41	106,753.13
Winneshiek	66,462.52	70,700.72	56,089.80	84,806.37	55,267.95	333,327.36
Woodbury	43,650.00	46,205.35	38,663.59	85,177.16	97,103.72	310,859.82
Worth	20,146.80	15,554.87	17,432.05	22,213.84	30,338.49	105,686.05
Wright	9,467.71	47,334.60	51,574.30	59,833.23	46,658.56	214,928.40
Totals	$ 3,275,857.93	$ 4,886,788.82	$ 5,248,332.38	$ 7,466,796.69	$ 6,808,818.16	$ 27,686,593.98

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	$ 1,067.68		$ 2,988.89	$ 2,451.87	$ 9,596.04	$ 5,672.80	$ 963.58	$ 22,590.86
Adams	55.35		196.50	4,477.68	4,818.40	1,923.82	526.20	11,997.95
Allamakee	2,617.14		17,931.90	11,493.72	5,700.30	5,064.15	807.25	43,674.46
Appanoose				12,045.62	8,036.06	6,209.05	2,270.47	28,561.20
Audubon	11.25			5,511.95	6,507.03	879.51	354.00	13,263.74
Benton	2,233.65		8,901.06	14,035.77	5,962.35	10,378.80	215.00	41,726.63
Black Hawk	1,037.33		8,528.28	2,686.70	12,646.09	1,516.74	1,712.85	28,127.99
Boone	7,446.46		5,063.85	379.41	9,213.73	990.93	2,125.80	25,220.18
Bremer	4,213.02		4,048.63	2,099.18	5,449.66	2,554.42	2,369.64	20,734.55
Buchanan	16,709.77	$ 2,078.86	4,553.49	225.49	7,197.59	5,337.72	2,288.56	38,391.48
Buena Vista	28,794.73		251.25	5,319.34	12,427.71	5,652.73	8,349.12	60,794.88
Butler	248.86		614.57	2,646.39	12,773.48	3,017.74		19,301.04
Calhoun	26,953.00		1,807.20	2,073.12	4,048.19	4,911.54	3,345.23	43,138.37
Carroll	24,071.64		13,061.80	7,446.33	5,229.47	1,092.19	339.70	51,241.13
Cass	219.42		60.00	5,977.56	6,448.99	925.56	5,564.93	19,196.46
Cedar	570.25		2,938.15	1,574.94	7,751.10	2,227.34	176.05	15,237.83
Cerro Gordo	18,368.84	63,798.19	2,698.02	12,796.79	9,117.05	1,394.40	1,600.54	109,773.83
Cherokee	4,349.14		1,171.06	3,983.03	5,352.11	2,416.78	1,158.10	18,430.22
Chickasaw	13,162.38		2,488.22	837.80	5,741.27	2,444.36	535.45	25,209.48
Clarke			2,317.95	7,496.76	2,933.98	1,162.98	555.00	14,466.67
Clay	25,580.65			1,272.60	7,969.16	2,127.46	8,837.45	45,787.32
Clayton	4,967.95		4,234.39	416.35	18,674.29	1,439.84	50.00	29,782.82
Clinton	6,749.26		1,853.23	5,134.30	8,615.50	2,706.12	2,810.55	27,868.96
Crawford	48,129.08			16,856.72	8,491.85	1,247.99	2,915.65	77,641.29
Dallas	14,542.17		9,661.51	561.79	6,223.24	3,919.06	4,129.10	39,036.87
Davis			379.35	1,986.32	5,242.70	244.99		7,853.27
Decatur	3,355.25		3,451.97	1,364.76	12,047.77	5,073.21	2,375.07	27,668.03
Delaware	13,477.78		5,688.11		16,734.72	2,835.46	657.50	39,393.57
Des Moines	8,160.94		2,103.65	1,737.56	5,143.11	4,989.55	1,220.98	23,355.79
Dickinson	21,025.70			7,677.47	11,817.31	1,024.97	2,564.60	44,110.05
Dubuque	72,649.19		3,270.02	17,541.46	6,964.90	5,282.49	1,274.34	106,682.40
Emmet	41,223.43			1,479.20	5,344.52	184.89	224.83	48,456.87
Fayette	7,645.95		8,464.51	2,904.01	11,002.96	11,655.79	9,706.23	51,379.45

Floyd	12,716.55		1,226.54	5,690.76	8,273.28	5,597.26	542.78	34,047.27
Franklin	21,796.94		3,223.75	8,121.88	4,453.14	1,392.03	10,092.74	49,080.48
Fremont				9,145.36	12,961.07	555.81	2,348.26	25,010.50
Greene	11,548.23		2,056.80	2,635.08	4,478.03	2,001.75	1,338.06	24,057.95
Grundy	1,119.27		3,810.96	4,252.04	4,255.56	5,625.92		19,063.75
Guthrie	9,153.07		5,268.86	6,360.08	7,964.43	3,905.07	643.75	33,295.26
Hamilton	83,038.20		4,519.14	2,977.97	7,089.10	4,216.30	3,398.98	105,239.69
Hancock	8,918.29		1,308.15	2,090.37	13,723.20	2,602.12	1,714.80	30,356.93
Hardin	37,129.12		285.01	3,228.28	9,066.69	1,188.77	6,979.26	57,877.13
Harrison	2,368.60		9,547.80	6,876.86	7,191.38	995.62	4,075.58	31,055.84
Henry	4,615.32			3,461.96	13,564.66	866.69	1,039.55	23,548.18
Howard	12,407.14		1,803.49	829.35	4,488.49	1,094.23	1,248.29	21,870.99
Humboldt	36,925.17			815.60	6,864.82	305.41	957.25	45,868.25
Ida			34.00	6,362.41	4,324.94	1,353.66	482.51	12,557.52
Iowa	1,034.64		2,616.71	8,191.83	18,589.40	6,000.66		36,424.24
Jackson	3,884.00			10,933.61	5,023.89	775.07	1,629.96	22,246.53
Jasper	14,225.02		9,795.38	14,704.85	13,048.04	7,676.32	2,682.99	62,132.60
Jefferson	2,373.19		3,773.50	2,420.63	8,884.08	5,044.20	50.00	22,545.60
Johnson	120.90		12,447.70	2,981.62	14,342.43	1,667.32	351.17	31,911.14
Jones	3,776.89		11,048.51	8,087.56	11,063.04	3,974.71	793.75	38,744.46
Keokuk	101.97		2,258.43	3,861.64	9,383.58	1,170.98	40.05	16,816.65
Kossuth	21,041.52		1,575.50	6,146.91	13,287.29	1,300.26	1,901.76	45,253.24
Lee	3,760.71		7,133.49	294.12	10,576.33	2,055.73		23,820.38
Linn	26,562.50		5,837.68	10,903.00	21,551.35	4,402.22	2,143.28	71,400.03
Louisa	2,767.49		7,217.80	458.02	9,085.70	1,473.30	2,300.71	23,303.02
Lucas				4,013.97	7,674.64	2,326.32	1,501.00	15,515.93
Lyon	3,285.75		4,253.24	1,672.75	3,362.28	1,589.56	3,254.53	17,418.11
Madison			7,285.79	5,993.88	4,243.99	4,505.79	1,526.01	23,555.46
Mahaska	8,815.60		8,947.05	4,906.96	11,125.00	3,873.80	476.20	38,144.61
Marion	9,049.96	39,382.16	14,050.80	3,939.16	8,268.77	4,750.47	4,984.94	84,426.26
Marshall	48,290.65		1,728.14	2,197.10	13,655.26	3,147.51		69,018.66
Mills			5,828.98	9,701.25	7,257.61	5,830.00	625.00	29,242.84
Mitchell	5,351.78		6,202.28	5,278.04	3,617.78	4,947.92	177.62	25,575.42
Monona	4,927.61		4,175.76	2,499.72	13,248.92	2,741.98	2,665.45	30,259.44
Monroe				6,645 90	9,646.80	2,094.52	857.60	19,244.82
Montgomery	4,191.40		4,588.55	9,760.10	7,537.49	665.32	1,443.12	28,185.98
Muscatine	16,048.15		2,127.00	590.57	11,680.89	1,214.86	5,447.43	37,108.90
O'Brien	18,312.13		3,054.15	1,510.62	5,519.04	2,826.23	3,313.57	34,535.74
Osceola	1,303.63		4,268.00	1,622.98	6,685.70	884.32	230.00	14,994.63
Page	7,838.94		5,126.50	2,593 73	10,979.94	2,805.54	3,369.53	32,714.18
Palo Alto	41,249.15			1,889.33	6,193.22	294.65	2,373.13	51,999.48
Plymouth	6,769 45		2,660.78	9,5 7.92	13,706.01	2,714.37	1,729.94	37,088.47
Pocahontas	68,337.50		459.75	4,257.02	8,981.55	3,766.36	9,598.40	95,400.58
Polk	209,615.28			4,734.58	32,532.04	11,132.98	9,146.23	267,161.11
Pottawattamie			14,301.07	5,819.66	19,575.36	1,771.99	3,666.97	45,135.05
Poweshiek	3,161.70		8,166.60	8,059.90	10,388.96	1,916.00	2,164.69	33,857.85
Ringgold				1,856.70	4,521.95	1,761.02		8,139.67
Sac	73,021.89			1,811.86	5,718.54	404.27	8,723.52	89,680.08
Scott	16,969.60		7,334.62	596.07	6,191.29	3,796.33	266.00	35,093.91
Shelby	69.85		2,749.91	13,154.65	9,929.84	1,313.01	420.80	27,638.06

SUMMARY TABLE NO. 9.—Continued.

County	Permanent work (county)	Permanent work (Fed. Aid)	Temporary work	Repairs	Maintenance	Equipment and unused material	Special cases railway crossings, gravel pits, etc.	Total
Sioux	14,880.00		11,623.30	2,083.58	11,021.03	5,527.69	2,146.77	47,282.37
Story	20,172.02			3,164.58	10,144.30	824.47	2,726.48	37,031.85
Tama	18,944.86		7,552.86	4,808.29	14,250.48	6,321.15	851.10	52,728.74
Taylor			2,917.25	4,358.27	4,719.45	1,228.38	562.00	13,785.35
Union	2,455.67		3,630.13	3,398.34	5,522.05	685.33	403.07	16,094.59
Van Buren			6,333.24	2,584.41	4,547.11	2,555.39	2,405.59	18,425.74
Wapello	4,846.44			3,924.48	10,038.54	3,326.57	3,526.59	25,662.62
Warren	49.25		7,366.69	2,592.95	7,839.53	404.80	1,371.58	19,624.80
Washington			9,514.47	2,234.75	29,258.76	8,972.32	1,754.80	51,735.10
Wayne			1,415.93	1,578.97	9,694.74	4,405.66	1,655.09	18,750.39
Webster	38,356.65		1,239.69	2,936.54	8,750.48	1,807.51	1,587.91	54,678.18
Winnebago	11,878.28		693.05	4,553.45	8,483.00	135.80	2,244.13	27,987.71
Winneshiek	2,920.46		9,295.90	5,468.21	8,003.79	1,970.31	302.24	27,960.91
Woodbury	4,166.88	30,300.50	981.75	8,801.15	10,873.31	1,199.22	4,007.41	60,330.22
Worth	12,102.88			943.75	2,936.53	3,632.60	2,641.79	22,257.55
Wright	13,189.86		9,695.73	4,113.79	5,312.84	7,020.98	3,624.05	42,957.25
Totals	$1,431,534.75	$ 135,559.71	$ 395,085.72	$ 468,483.71	$ 907,996.46	$ 298,840.00	$ 218,551.53	$ 3,856,051.88

SUMMARY TABLE NO. 10

Classification of Permanent Road Construction.—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	Built to Finished Grade 3-A		Built to Temporary Grade 3-B		Permanently Surfaced. 3-C		Tile Drainage 3-D	Special Cases	Total
	Miles	Cost	Miles	Cost	Miles	Cost	Cost	Cost	
Adair	.4	$ 997.50					$ 70.18		$ 1,067.68
Adams							55.35		55.35
Allamakee	1.3	2,617.14							2,617.14
Appanoose							11.25		11.25
Audubon							519.09		2,233.65
Benton	.36	1,714.56					1,037.33		1,037.33
Black Hawk					2.65	$ 3,980.14	1,438.04	$ 173.70	7,446.46
Boone	.25	1,854.58						1,303.55	4,213.02
Bremer	1.25	2,909.47			15.0	15,167.77	1,261.31	119.14	16,709.77
Buchanan			.10	$ 161.55	25.0	28,521.15	264.68	8.90	28,794.73
Buena Vista							248.86		248.86
Butler							775.97		26,953.09
Calhoun	8.5	13,859.12			6.25	12,318.00	56.44	146.45	24,071.64
Carroll	6.0	23,681.35			.5	187.40			219.42
Cass		219.42					570.25		570.25
Cedar							1,555.04		18,368.84
Cerro Gordo	10.9	5,553.44			3.55	11,260.36			4,349.14
Cherokee	2.0	4,349.14					137.85		13,162.38
Chickasaw	11.44	7,712.78			9.87	5,311.75			
Clarke							1,228.34	346.00	25,580.65
Clay	1.25	889.97			24.25	23,116.34			4,967.95
Clayton	.45	2,774.00	.35	2,193.95					6,749.26
Clinton	.91	2,218.36			1.66	4,530.90			48,129.08
Crawford	9.61	48,129.08							14,542.17
Dallas	3.3	8,401.87			2.75	5,117.16	1,023.14		
Davis									3,355.25
Decatur			1.70	3,355.25					13,477.78
Delaware	4.75	6,211.70			7.75	6,948.00	318.08		8,160.94
Des Moines	2.12	7,160.60			2.0	356.69	217.82	425.83	21,025.70
Dickinson	5.9	5,624.27			7.6	11,065.76	2,324.82	2,010.85	72,649.19
Dubuque	.6	2,410.25			7.7	67,659.38	2,579.56		41,223.43
Emmet	20.15	22,389.70			18.8	18,638.99	194.74		7,645.95
Fayette	.25	337.65	1.0	5,143.08	3.0	1,799.12	366.10		

SUMMARY TABLE NO. 10.—Continued.

County	Built to Finished Grade 3-A		Built to Temporary Grade 3-B		Permanently Surfaced. 3-C		Tile Drainage 3-D	Special Cases	Total
	Miles	Cost	Miles	Cost	Miles	Cost	Cost	Cost	
Floyd	7.5	6,444.00			4.28	3,472.50	2,800.05		12,716.55
Franklin	11.37	10,055.66			10.25	11,470.40	248.23	22.65	21,796.94
Fremont									
Greene	1.5	1,257.36			10.5	9,359.53	739.34	192.00	11,548.23
Grundy		234.60					254.27	630.40	1,119.27
Guthrie	1.5	5,840.01	.32	2,744.04	.5	424.17	20.15	124.70	9,153.07
Hamilton	30.47	35,313.79			25.81	44,665.19	3,059.22		83,038.20
Hancock	4.0	3,661.75			3.5	3,978.71	1,079.21	198.62	8,918.29
Hardin	24.10	33,927.66			5.25	3,147.72	26.79	26.95	37,129.12
Harrison	1.65	2,368.60							2,368.60
Henry	1.0	4,418.95					196.37		4,615.32
Howard	7.0	8,646.37					3,760.77		12,407.14
Humboldt	25.75	22,709.13			17.3	13,363.65	852.39		36,925.17
Ida									
Iowa					.25	128.40	54.69	851.55	1,034.64
Jackson	1.16	3,884.00							3,884.00
Jasper	2.0	7,400.00	3.9	6,700.00			125.02		14,225.02
Jefferson								2,373.19	2,373.19
Johnson							120.90		120.90
Jones			1.1	3,451.64			325.25		3,776.89
Keokuk							101.97		101.97
Kossuth	7.41	12,945.30			6.53	7,363.67	732.55		21,041.52
Lee					.25	1,157.80		2,602.82	3,760.71
Linn	.80	3,042.00			.8	21,663.71	46.75	1,810.04	26,562.50
Louisa	.50	557.75			.33	875.38	504.11	830.25	2,767.49
Lucas									
Lyon	.25	3,285.75							3,285.75
Madison									
Mahaska	3.75	7,787.20	1.0	250.00			28.40	750.00	8,815.60
Marion	.7	8,579.58					75.48	394.90	9,049.96
Marshall	14.0	47,722.00			.74	471.40		97.25	48,290.65
Mills									
Mitchell	2.0	831.20			5.0	4,417.54	103.04		5,351.78
Monona	4.3	4,922.01					5.60		4,927.61
Monroe									
Montgomery			7.0	4,170.60			20.80		4,191.40
Muscatine	7.55	9,281.46			3.18	6,089.17	677.52		16,048.15
O'Brien	23.27	16,539.05					1,773.08		18,312.13

Osceola			5.0	1,060.00			106.13	137.50	1,303.63
Page	1.0	2,067.80	1.0	5,758.14			10.00	3.00	7,838.94
Palo Alto	32.48	38,131.16					3,117.99		41,249.15
Plymouth			3.0	6,769.45					6,769.45
Pocahontas	49.1	33,869.80			30.85	33,440.78	997.93	28.90	68,337.50
Polk	26.76	51,805.35			19.71	156,099.46	449.82	1,260.65	209,615.28
Pottawattamie									
Poweshiek			1.5	3,161.70					3,161.70
Ringgold									
Sac	34.75	60,341.47	1.15	1,596.40	8.58	10,101.21	982.81		73,021.89
Scott	3.75	14,909.33	.25	125.00	.75	1,875.27			16,909.60
Shelby							69.85		69.85
Sioux	7.1	14,880.00							14,880.00
Story	.75	920.25			21.0	18,198.05	1,053.72		20,172.02
Tama	12.10	13,466.74	.2	995.98	2.2	4,482.14			18,944.86
Taylor									
Union			1.1	2,455.67					2,455.67
Van Buren									
Wapello	.2	2,960.69	.33	1,175.71			710.04		4,846.44
Warren							49.25		49.25
Washington									
Wayne									
Webster	4.8	4,013.94			16.55	29,256.03	4,101.16	984.92	38,356.05
Winnebago	5.5	11,319.79					558.49		11,878.28
Winneshiek	.25	2,043.51						876.95	2,920.46
Woodbury	9.5	3,082.93	.36	980.50			103.45		4,166.88
Worth	6.8	7,117.41			6.95	3,970.70	1,014.77		12,102.88
Wright					4.0	11,847.22	1,342.64		13,189.86
Totals	470.06	$ 694,601.39	29.51	$ 52,248.66	343.39	$ 617,208.80	$ 48,654.24	$ 18,731.66	$ 1,431,534.75

SUMMARY TABLE NO. 11.

Classification of Permanent Road Construction.—County, State and Federal Expenditures.—Federal Aid Projects.—Annual Reports of County Engineers.

County	Project No.	Built to Finished Grade		Permanently Surfaced		Tile Drainage		Percentage Completed	Total
		Miles	Cost	Miles	Cost	Lin. Ft.	Cost		
Buchanan	5					15,623	$ 2,078.86		$ 2,078.86
Cerro Gordo	1	4	$ 7,027.58	2.6	$ 56,770.61			100	63,798.19
Marion	7	16.75	39,382.16						39,382.16
Woodbury	2	17.52	30,300.50						30,300.50
Total		38.27	$ 76,710.24	2.6	$ 56,770.61	15,623	$ 2,078.86		$ 135,559.71

SUMMARY TABLE NO. 12.

Classification of Temporary Road Construction.—County Expenditures.—Annual Reports of County Engineers.

County	Built to Natural Grade 2-A		Oiling				Special Cases	Total
	Miles	Cost	Miles	Average Width Oiled	Average Cost Per Mile	Total Cost	Cost	
Adair	41.75	$ 2,988.89						$ 2,988.89
Adams	3.00	196.50						196.50
Allamakee	35.5	17,931.90						17,931.90
Appanoose								
Audubon								
Benton	92.5	8,901.06						8,901.06
Black Hawk	40.8	8,528.28						8,528.28
Boone	55.5	5,063.85						5,063.85
Bremer	19.25	4,048.63						4,048.63
Buchanan	24.0	4,553.49						4,553.49
Buena Vista							$ 251.25	251.25
Butler	3.0	614.57						614.57
Calhoun	16.0	1,807.20						1,807.20
Carroll	41.5	13,035.60					26.20	13,061.80
Cass							60.00	60.00
Cedar	33.23	2,848.14					90.01	2,938.15
Cerro Gordo	10.4	2,698.02						2,698.02
Cherokee	6.0	1,171.06						1,171.06
Chickasaw	7.5	2,488.22						2,488.22
Clarke	22.0	2,317.95						2,317.95
Clay								
Clayton	36.25	4,234.39						4,234.39
Clinton	4.05	587.45	3.2	16 ft.	$ 363.03	$ 1,161.68	$ 104.10	1,853.23
Crawford								
Dallas	53.65	9,661.51						9,661.51
Davis	2.25	379.35						379.35
Decatur	16.75	2,185.61					1,266.36	3,451.97
Delaware	29.5	5,688.11						5,688.11
Des Moines	30.7	2,095.25					8.40	2,103.65
Dickinson								
Dubuque	8.5	1,763.60					1,506.42	3,270.02
Emmet								
Fayette	35.0	8,464.51						8,464.51
Floyd	6.0	1,226.54						1,226.54
Franklin	14.0	3,223.75						3,223.75

SUMMARY TABLE NO. 12.—Continued.

County	Built to Natural Grade 2-A		Oiling				Special Cases	Total
	Miles	Cost	Miles	Average Width Oiled	Average Cost Per Mile	Total Cost	Cost	
Fremont								
Greene	9.75	2,056.80						2,056.80
Grundy	18.0	3,810.96						3,810.96
Guthrie	11.54	1,124.55					4,144.31	5,268.86
Hamilton	46.0	4,519.14						4,519.14
Hancock	13.0	1,308.15						1,308.15
Hardin	2.0	220.00					65.01	285.01
Harrison	17.4	9,547.80						9,547.80
Henry								
Howard	11.0	1,803.49						1,803.49
Humboldt								
Ida	1.0	34.00						34.00
Iowa	16.25	2,616.71						2,616.71
Jackson								
Jasper	52.25	5,599.77	13.0	15 ft.	322.74	4,195.61		9,795.38
Jefferson	27.8	3,474.46					299.04	3,773.50
Johnson	60.7	12,447.70						12,447.70
Jones	82.0	8,533.70	13.0	14.7 ft.	165.615	2,276.05	241.76	11,048.51
Keokuk	31.0	2,258.43						2,258.43
Kossuth	10.0	1,575.50						1,575.50
Lee	36.0	2,858.63	14.0			4,222.81	52.05	7,133.49
Linn	37.5	5,757.97	1.0		79.71	79.71		5,837.68
Louisa	79.0	7,187.42				25.58	4.80	7,217.80
Lucas								
Lyon	23.4	4,253.24						4,253.24
Madison	47.5	5,783.79					1,502.00	7,285.79
Mahaska	33.0	3,402.50					5,544.55	8,947.05
Marion	43.9	14,050.80						14,050.80
Marshall	33.5	1,728.14						1,728.14
Mills	51.4	5,828.98						5,828.98
Mitchell	30.5	6,222.28						6,222.28
Monona	31.0	4,175.76						4,175.76
Monroe								
Montgomery							4,588.55	4,588.55
Muscatine	25.0	2,110.34				16.66		2,127.00
O'Brien	19.0	3,054.15						3,054.15
Osceola	24.0	4,038.00					230.00	4,268.00
Page	51.0	5,126.50						5,126.50

Palo Alto	24.0	2,660.78						2,660.78
Plymouth	5.25	459.75						459.75
Pocahontas								
Polk							14,301.07	14,301.07
Pottawattamie	14.5	5,198.30	11.0		269.84	2,968.30		8,166.60
Poweshiek								
Ringgold								
Sac	3.5	606.10	17.5	16 ft.	447.47	6,439.52	289.00	7,334.62
Scott	23.0	2,749.91						2,749.91
Shelby	50.0	8,380.10					3,243.20	11,623.30
Sioux								
Story	58.0	7,552.86						7,552.86
Tama	24.0	2,917.25						2,917.25
Taylor	38.2	3,630.13						3,630.13
Union	37.75	6,333.24						6,333.24
Van Buren								
Wapello	65.0	7,366.69						7,366.69
Warren	73.98	9,514.47						9,514.47
Washington	20.0	1,415.93						1,415.93
Wayne	10.0	1,239.69						1,239.69
Webster	6.0	693.05						693.05
Winnebago	49.75	9,258.40					37.50	9,295.90
Winneshiek	9.1	981.75						981.75
Woodbury								
Worth	39.0	9,590.86					104.87	9,695.73
Wright								
Totals	2,185.19	$ 335,739.35	72.7		$ 293.50	$ 21,385.92	$ 37,960.45	$ 395,085.72

SUMMARY TABLE NO. 13.

Road Repairs and Maintenance—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	Maintenance: Dragging: No. of miles regularly dragged	Dragging: Average No. of times dragged	Dragging: Average cost per mile of road	Dragging: Average cost per mile one round trip	Dragging: Total cost of dragging	Maintenance: Repairs by Patrolmen: No. of miles in county road system	No. of miles under patrol	No. of patrol district in county	Average length of patrol district	Average monthly salary paid patrolmen	Average cost per mile repairs and general maintenance by patrol	Total cost of repair and general maintenance by patrol	Total cost of repair not done by patrolmen	Total cost of repair and maintenance	Average cost per mile repair and maintenance
Adair	172	34	$ 27.72	$0.80	$ 4,768.40	172	81	5	16	$132.00	$ 58.49	$ 4,737.64	$ 2,451.87	$ 11,957.91	$ 69.52
Adams	126	42	34.14	.80	4,302.10	126	50	1	50	150.00	10.32	516.30	4,477.68	9,296.08	73.34
Allamakee	125	25	25.73	1.00	3,088.34	130	33	3	11	162.50	76.82	2,611.96	11,493.72	17,194.02	132.61
Appanoose	166	37	36.84	.75	6,134.17	166	69	2	34	150.00	27.56	1,901.89	12,045.62	20,081.68	120.60
Audubon	140	27	20.99	.75	2,938.93	140	140	3	46	182.00	25.48	3,568.10	5,511.95	12,018.98	85.85
Benton	214	13	19.75	.75	4,147.23	214	214	1	214	125.00	8.46	1,815.12	14,035.77	19,998.12	93.23
Black Hawk	184	40	35.34	.90	6,403.07	186	186	14	13	150.00	33.50	6,243.02	2,686.70	15,332.79	82.24
Boone	157	30	29.22	.90	4,586.63	157	157	4	39	150.00	29.47	4,627.10	379.41	9,593.14	61.10
Bremer	125	32	28.63	.90	3,597.83	125	51	3	17	125.00	36.31	1,851.83	2,099.18	7,548.84	60.15
Buchanan	175	49	17.46	.70	3,602.66	175	175	13	13	137.50	23.57	4,134.93	225.49	7,423.08	42.32
Buena Vista	170	38	34.77	.90	5,919.32	170	170	5	34	156.00	38.23	6,508.39	5,319.34	17,747.05	104.15
Butler	185	27	20.59	.75	3,823.65	185	185	13	14	150.00	48.31	8,949.83	2,646.39	15,419.87	83.04
Calhoun	173	------	23.54	------	4,048.19	173	------	------	------	------	------	------	2,073.12	6,121.31	35.26
Carroll	------	------	------	1.70	4,620.77	175	22	1	22	162.50	27.67	608.70	7,446.33	12,675.80	72.43
Cass	129	------	35.68	.80	4,595.56	142	------	------	------	------	------	1,853.43	5,977.56	12,426.55	87.05
Cedar	158	40	32.40	.80	5,185.05	158	126	4	31	150.00	20.36	2,566.05	1,574.94	9,326.04	58.91
Cerro Gordo	147	22	20.32	.80	3,017.36	155	128	9	14	150.00	47.40	6,099.69	12,796.79	21,913.84	141.06
Cherokee	149	29	26.14	.90	3,894.91	154	33	3	11	130.00	44.16	1,457.29	3,983.03	9,335.14	60.32
Chickasaw	156	22	23.62	1.01	3,685.47	156	152	16	9	132.00	13.53	2,055.80	837.80	6,579.07	42.04
Clarke	114	35	25.74	.75	2,933.98	115	------	------	------	------	------	------	7,496.76	10,430.74	90.01
Clay	150	21	20.43	.90	3,064.91	150	75	5	15	135.00	65.50	4,904.25	1,272.60	9,241.76	61.61
Clayton	201	49	39.82	.72	8,017.55	201	201	38	5	143.75	52.90	10,656.74	416.35	19,090.64	94.83
Clinton	188	35	24.79	.75	4,989.45	201	43	6	7	150.00	82.75	3,626.05	5,134.30	13,749.80	68.32
Crawford	150	44	33.62	.76	5,060.40	150	150	5	30	125.00	22.80	3,431.45	16,856.72	25,348.57	168.43
Dallas	172	14	24.42	.85	4,206.22	172	172	3	57	162.50	11.72	2,017.02	561.79	6,785.03	39.42
Davis	150	25	27.40	.70	4,108.25	155	155	20	7	100.00	7.31	1,139.45	1,986.32	7,229.02	46.40

Decatur	152	30	47.84	.40	7,279.26	152	152	8	19	120.00	30.44	4,768.51	1,364.76	13,412.53	88.23
Delaware	176	37	29.90	.78	5,278.94	176	176	8	22	150.00	64.98	11,455.78		16,734.72	94.92
Des Moines	81	26	35.18	.80	2,876.35	81	81	5	16	150.00	27.73	2,266.76	1,737.56	6,880.67	84.16
Dickinson	108	30	54.00	2.00	6,000.00	111	110	11	10	130.00	52.88	5,817.31	7,677.47	19,494.78	174.95
Dubuque	143	50	28.59	1.00	4,095.25	172	------	------	------	150.00	------	2,569.65	17,541.46	24,206.36	140.23
Emmet	103	16	11.35	.70	1,168.71	106	68	6	11	135.00	61.41	4,175.81	1,479.20	6,823.72	64.37
Fayette	202	26	24.99	.70	5,047.61	202	202	10	20	112.50	29.48	5,955.35	2,904.01	13,906.97	68.84
Floyd	144	44	34.52	.75	4,981.41	144	144	8	18	120.00	22.82	3,291.97	5,690.76	13,964.14	96.71
Franklin	152	32	25.64	.75	3,896.74	184	9	1	9	162.50	61.82	556.40	8,121.88	12,575.02	68.07
Fremont	140	2	32.80	.80	4,590.94	154	154	3	51	150.00	54.71	8,370.13	9,145.36	22,106.43	143.20
Greene	132	17	15.83	.85	2,093.94	132	38	4	9	124.00	62.73	2,384.09	2,635.08	7,113.11	53.69
Grundy	157	33	26.55	.80	4,169.01	158	------	------	------	------	------	86.55	4,252.04	8,507.60	53.85
Guthrie	196	19	29.25	1.00	5,732.84	196	60	4	15	168.75	37.20	2,231.59	6,360.08	14,324.51	73.08
Hamilton	165	31	35.10	1.00	5,788.10	193	12	1	12	150.00	106.70	1,301.00	2,977.97	10,067.07	52.06
Hancock	166	37	40.23	1.11	6,702.54	166	166	7	23	135.00	42.13	7,020.66	2,090.37	15,813.57	94.90
Hardin	178	23	23.52	.85	4,193.19	178	178	13	13	175.00	27.33	4,873.50	3,228.28	12,294.97	68.96
Harrison	168	20	24.31	.75	4,084.43	168	168	3	56	175.00	18.50	3,106.95	6,876.86	14,068.24	83.74
Henry	142	30	42.23	.70	6,010.21	142	142	7	20	100.00	53.09	7,554.45	3,461.96	17,026.62	119.65
Howard	120	19	15.26	.80	1,842.55	122	122	3	40	137.50	21.62	2,645.94	829.35	5,317.84	43.48
Humboldt	129	28	30.28	1.00	3,905.82	133	100	5	20	155.00	29.59	2,959.00	815.60	7,680.42	57.53
Ida	132	22	20.14	.90	2,657.86	132	132	5	26	175.00	12.62	1,667.08	6,362.41	10,687.35	80.96
Iowa	176	47	38.04	.80	6,714.17	176	176	9	19	125.00	67.23	11,866.23	8,191.83	26,772.23	151.68
Jackson	157	40	31.89	.78	5,023.89	157	------	------	------	------	------	------	10,933.61	15,957.50	101.32
Jasper	204	18	29.61	1.00	6,065.44	204	160	8	20	175.00	43.63	6,982.60	14,704.85	27,752.89	135.51
Jefferson	141	29	40.32	.70	5,697.97	141	141	2	70	145.00	22.56	3,186.11	2,420.63	11,304.71	80.01
Johnson	160	31	47.89	.75	7,662.07	173	173	8	21	150.00	42.28	6,680.36	2,981.62	17,324.05	100.14
Jones	180	29	34.15	.90	6,145.55	185	165	11	15	125.00	29.80	4,917.49	8,087.56	19,150.60	103.51
Keokuk	167	17	24.78	.70	4,139.59	167	162	9	18	156.00	32.37	5,243.99	3,861.64	13,245.22	79.53
Kossuth	280	32	32.36	.97	9,061.67	280	280	5	56	150.00	15.09	4,225.62	6,146.91	19,434.20	69.41
Lee	150	10	41.15	.80	6,172.04	150	150	23	6	100.00	29.36	4,404.29	294.12	10,870.45	72.67
Linn	218	47	45.70	1.00	10,000.66	218	168	21	8	150.00	68.75	11,550.69	10,903.00	32,454.35	148.33
Louisa	112	26	42.35	1.00	4,743.88	112	112	3	37	115.00	38.77	4,341.82	458.02	9,543.72	85.21
Lucas	148	25	27.38	.70	4,046.84	148	148	11	13	120.00	24.51	3,627.80	4,013.97	11,688.61	78.98
Lyon	188	20	17.84	.90	3,362.28	190	------	------	------	------	------	------	1,672.75	5,035.03	26.50
Madison	162	16	26.19	.80	4,243.99	162	------	------	------	------	------	------	5,993.88	10,237.87	63.19
Mahaska	155	25	40.76	.80	6,319.00	155	155	6	25	120.00	30.99	4,806.00	4,906.96	16,031.96	103.39
Marion	169	31	38.83	.86	6,596.77	169	47	3	15	120.00	35.39	1,672.00	3,939.16	12,207.93	71.87
Marshall	165	42	31.59	.75	5,213.87	189	189	11	17	135.00	44.71	8,441.39	2,197.10	15,852.36	83.85
Mills	110	12	29.26	.90	3,218.55	110	108	8	13	162.50	36.72	4,039.06	9,761.25	16,958.86	154.17
Mitchell	129	26	23.00	.88	2,972.98	129	3	1	3	150.00	184.23	644.80	5,278.04	8,895.82	68.83
Monona	161	28	27.75	.90	4,481.34	161	161	9	17	120.00	54.29	8,767.58	2,499.72	15,748.64	97.52
Monroe	167	27	24.90	.90	4,283.54	167	153	9	17	135.00	35.06	5,363.26	6,645.90	16,292.70	97.27
Montgomery	126	46	35.00	.70	4,436.49	126	126	6	21	150.00	24.46	3,101.00	9,760.10	17,297.59	136.47
Mucatine	136	53	48.45	.90	6,589.52	139	139	9	15	156.00	36.36	5,091.37	590.57	12,271.46	87.68
O'Brien	189	22	19.25	.85	3,657.95	189	189	5	37	140.00	9.85	1,861.09	1,510.62	7,029.66	37.19
Osceola	125	29	21.81	.75	2,726.30	132	132	12	11	140.00	30.00	3,959.40	1,622.98	8,308.68	62.95
Page	174	22	38.21	1.75	6,638.96	174	174	12	14	125.00	24.99	4,340.98	2,593.73	13,573.67	78.01
Palo Alto	164	27	22.74	.85	3,795.40	166	140	7	20	125.00	17.14	2,397.82	1,889.33	8,082.55	48.43
Plymouth	208	25	26.74	.90	5,574.41	208	208	12	17	135.00	39.00	8,131.60	9,507.92	23,213.93	111.34
Pocahontas	168	27	28.77	1.00	4,848.00	168	156	8	19	150.00	26.33	4,133.55	4,257.02	13,238.57	78.57

SUMMARY TABLE NO. 13.—Continued.

County	Maintenance: Dragging: No. of miles regularly dragged	Dragging: Average No. of times dragged	Dragging: Average cost per mile of road	Dragging: Average cost per mile one round trip	Dragging: Total cost of dragging	Repairs by Patrolmen: No. of miles in county road system	Repairs by Patrolmen: No. of miles under patrol	Repairs by Patrolmen: No. of patrol district in county	Repairs by Patrolmen: Average length of patrol district	Repairs by Patrolmen: Average monthly salary paid patrolmen	Repairs by Patrolmen: Average cost per mile repairs and general maintenance by patrol	Repairs by Patrolmen: Total cost of repair and general maintenance by patrol	Total cost of repair not done by patrolmen	Total cost of repair and maintenance	Average cost per mile repair and maintenance
Polk	191	25	48.12	1.00	9,407.19	191	165	15	11	150.00	140.15	23,124.85	4,734.58	37,266.62	194.86
Pottawattamie	255	39	40.83	.90	10,241.29	255	255	10	25	162.50	36.53	9,334.07	5,819.66	25,395.02	99.39
Poweshiek	138	25	40.33	.85	5,577.54	138	112	7	16	150.00	42.96	4,811.42	8,059.90	18,448.86	133.39
Ringgold	183	25	12.69	.51	2,321.95	183	108	3	36	143.00	20.37	2,200.00	1,856.70	6,378.65	34.76
Sac	150	18	25.65	1.00	3,851.04	150	40	2	20	150.00	46.69	1,867.50	1,811.86	7,530.40	50.14
Scott	135	37	33.45	.90	4,516.18	136	113	6	18	150.00	14.75	1,675.11	596.07	6,787.36	49.61
Shelby	157	39	29.06	.75	4,584.91	157	157	8	19	212.50	33.88	5,344.93	13,154.65	23,084.49	146.33
Sioux	216	27	26.75	1.00	5,779.98	216	171	9	19	140.00	30.65	5,241.05	2,083.58	13,104.61	60.67
Story	132	25	33.95	.85	4,498.91	132	132	7	18	150.00	42.60	5,645.39	3,164.58	13,308.88	100.44
Tama	207	20	30.62	1.00	6,338.71	207	207	10	20	162.50	38.22	7,911.77	4,808.29	19,058.77	92.07
Taylor	172	31	21.57	.65	3,710.45	172	50	1	50	126.00	20.18	1,009.00	4,358.27	9,077.72	52.72
Union	135	24	22.66	.80	3,071.24	135	132	7	18	137.50	18.50	2,450.81	3,398.34	8,920.39	65.91
Van Buren	133	39	34.19	.70	4,547.11	133							2,584.41	7,131.52	53.50
Wapello	137	70	56.60	.80	7,767.40	137	136	13	10	100.00	16.64	2,271.14	3,924.48	13,963.02	101.83
Warren	170	20	34.59	.80	5,880.79	170	170	3	56	150.00	11.52	1,958.74	2,592.95	10,432.48	61.37
Washington	192	27	45.54	.80	8,767.47	192	120	12	10	120.00	170.76	20,491.29	2,234.75	31,493.51	163.60
Wayne	172	34	34.52	1.00	5,954.72	172	172	12	14	150.00	21.50	3,740.02	1,578.97	11,273.71	65.18
Webster	185	31	31.72	1.00	5,889.45	185	185	4	46	150.00	15.50	2,870.03	2,936.54	11,687.02	63.05
Winnebago	131	49	43.85	.90	5,764.88	131	120	3	40	150.00	22.65	2,718.12	4,553.45	13,036.45	99.16
Winneshiek	202	28	28.90	.98	5,860.05	202	108	17	6	150.00	19.80	2,143.74	5,468.21	13,472.00	66.54
Woodbury	213	27	38.38	1.37	8,175.21	213	93	6	16	162.50	28.10	2,698.10	8,801.15	19,674.46	92.36
Worth	114	28	18.78	.75	2,150.83	114	36	2	18	150.00	21.83	785.70	943.75	3,880.28	33.89
Wright	169	22	19.77	.87	3,351.69	179	90	6	15	175.00	21.67	1,961.15	4,113.79	9,426.63	52.48
Total	15,765	30	$ 31.02	$ .87	$ 489,024.21	16,185	11,792	633	17	$143.43	$ 35.53	$ 418,972.25	$ 468,483.71	$1,376,480.17	$ 85.05

SUMMARY TABLE NO. 14.

Road Repairs and Maintenance—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	Equipment and Material: Cost of Equipment Including Repairs to Same	Equipment and Material: Cost of Unused	Equipment and Material: Total	Special Cases (Miscellaneous: R. R. Crossings Improved: No.	R. R. Crossings Improved: Cost	Gravel Pits Purchased: No.	Gravel Pits Purchased: Cost	Right of Way	Drainage Assessments	Miscellaneous	Total Special Cases
Adair	$ 5,672.80		$ 5,672.80					$ 903.58			$ 903.58
Adams	1,609.10	$ 314.72	1,923.82					140.00		$ 386.20	526.20
Allamakee	5,064.15		5,064.15					867.25			867.25
Appanoose	6,209.05		6,209.05					1,292.16	$ 49.00	929.31	2,270.47
Audubon	879.51		879.51					190.00		164.00	354.00
Benton	10,378.80		10,378.80					215.00			215.00
Black Hawk	1,516.74		1,516.74			1	$ 116.09			1,596.76	1,712.85
Boone	990.93		990.93						2,005.54	120.26	2,125.80
Bremer	2,002.40	552.02	2,554.42				925.00	780.00		664.64	2,369.64
Buchanan	3,870.92	1,466.80	5,337.72			7	1,985.40	59.00	45.80	198.36	2,288.56
Buena Vista	5,652.73		5,652.73			5	3,257.45	51.00	4,232.46	808.21	8,349.12
Butler	3,017.74		3,017.74								
Calhoun	4,892.34	19.20	4,911.54						2,852.55	492.68	3,345.23
Carroll	1,008.73	83.46	1,092.19					339.70			339.70
Cass	925.56		925.56					1,930.50		3,634.43	5,564.93
Cedar	2,227.34		2,227.34					175.00		1.05	176.05
Cerro Gordo	1,206.40	188.00	1,394.40					460.00	793.00	347.54	1,600.54
Cherokee	1,831.98	584.80	2,416.78					455.30		702.80	1,158.10
Chickasaw	2,444.36		2,444.36				535.45				535.45
Clarke	1,145.86	17.12	1,162.98					405.00		150.00	555.00
Clay	2,076.71	50.75	2,127.46				4,313.09	21.70		4,502.66	8,837.45
Clayton	1,100.08	339.76	1,439.84					50.00			50.00
Clinton	2,444.04	262.08	2,706.12			1	400.00	2,336.20		74.35	2,810.55
Crawford	1,247.99		1,247.99					2,579.60		336.05	2,915.65
Dallas	3,919.06		3,919.06	1	$ 1,565.29	2	460.95	802.53	939.58	360.75	4,129.10
Davis	244.90		244.90								
Decatur	5,073.21		5,073.21					970.80		1,404.27	2,375.07
Delaware	2,177.32	658.14	2,835.46	2	600.00		57.50				657.50
Des Moines	4,983.35	6.20	4,989.55					685.00		535.98	1,220.98
Dickinson	676.42	348.55	1,024.97				830.31	1,555.00		179.29	2,564.60
Dubuque	5,054.25	228.24	5,282.49					189.50		1,084.84	1,274.34

SUMMARY TABLE NO. 14.—Continued.

County	Equipment and Material			Special Cases (Miscellaneous							
	Cost of Equipment Including Repairs to Same	Cost of Unused	Total	R. R. Crossings Improved		Gravel Pits Purchased		Right of Way	Drainage Assessments	Miscellaneous	Total Special Cases
				No.	Cost	No.	Cost				
Emmet	184.89		184.89								
Fayette	9,562.00	2,093.79	11,655.79				210.00			14.83	224.83
Floyd	4,093.07	1,504.19	5,597.26					651.00		9,055.23	9,706.23
Franklin	1,162.63	229.40	1,392.03							542.78	542.78
Fremont	555.81		555.81			1	250.00	21.00	9,269.69	552.05	10,092.74
Greene	1,832.20	169.55	2,001.75					1,818.74		529.52	2,348.26
Grundy	5,625.92		5,625.92			1	86.62			1,251.44	1,338.06
Guthrie	3,880.81	24.26	3,905.07					643.75			643.75
Hamilton	4,216.30		4,216.30								
Hancock	2,154.06	448.06	2,602.12			2	700.00		216.51	3,182.47	3,398.98
Hardin	1,188.77		1,188.77					717.75	366.07	648.73	1,714.80
Harrison	995.62		995.62					2,152.20	3,360.60	2,900.91	6,979.26
Henry	866.69		866.69					52.00	50.00	1,873.38	4,075.58
Howard	1,052.08	42.15	1,094.23				990.00	45.00	213.29	987.55	1,039.55
Humboldt	305.41		305.41			1	600.00	246.75		110.50	957.25
Ida	1,353.66		1,353.66							482.51	482.51
Iowa	6,000.66		6,000.66								
Jackson	775.07		775.07					1,012.33		617.63	1,629.96
Jasper	7,676.32		7,676.32	1	507.50			1,619.60		555.89	2,682.99
Jefferson	5,044.20		5,044.20					50.00			50.00
Johnson	1,667.32		1,667.32					283.47		67.70	351.17
Jones	3,974.71		3,974.71					793.75			793.75
Keokuk	1,170.98		1,170.98					40.05			40.05
Kossuth	1,300.26		1,300.26			2	650.00		195.16	1,056.60	1,901.76
Lee	1,972.86	82.87	2,055.73								
Linn	4,402.22		4,402.22					1,868.28	275.00		2,143.28
Louisa	1,423.17	50.13	1,473.30					2,052.33		248.38	2,300.71
Lucas	2,326.32		2,326.32	1	175.80			795.80		529.40	1,501.00
Lyon	1,517.56	72.00	1,589.56	1	829.79	1	350.00	935.00		1,139.74	3,254.53
Madison	4,505.79		4,505.79					357.00	440.00	729.01	1,526.01
Mahaska	3,873.80		3,873.80		138.40			337.80			476.20
Marion	4,446.17	304.30	4,750.47					3,832.10		1,152.84	4,984.94
Marshall	3,017.78	129.73	3,147.51								
Mills	2,100.00	3,730.00	5,830.00					625.00			625.00
Mitchell	4,947.92		4,947.92					120.42		57.20	177.62
Monona	2,450.20	291.78	2,741.98	2	131.50			1,228.50		1,305.45	2,665.45

Monroe	2,067.37	27.15	2,094.52					557.35		300.25	857.60
Montgomery	665.32		665.32					150.00		1,293.12	1,443.12
Muscatine	1,214.86		1,214.86	1	980.70	3	2,026.05	2,162.00		278.68	5,447.43
O'Brien	2,826.23		2,826.23					437.80		2,875.77	3,313.57
Osceola	884.32		884.32					230.00			230.00
Page	2,065.06	740.48	2,805.54					1,043.70		2,325.83	3,369.53
Palo Alto	294.65		294.65					90.00	2,283.13		2,373.13
Plymouth	2,714.37		2,714.37					718.25		1,011.69	1,729.94
Pocahontas	3,766.36		3,766.36	1	45.00	5	1,030.28	5,078.78		3,444.34	9,598.40
Polk	11,032.11	100.87	11,132.98	1	1,390.05			1,520.40	245.80	5,989.98	9,146.23
Pottawattamie	1,771.99		1,771.99					243.65		3,423.32	3,666.97
Poweshiek	1,916.00		1,916.00					213.50		1,951.19	2,164.69
Ringgold	480.00	1,281.02	1,761.02								
Sac	404.27		404.27					4,783.90	2,198.47	1,741.15	8,723.52
Scott	3,796.33		3,796.33					266.00			266.00
Shelby	1,313.01		1,313.01					204.00		216.80	420.80
Sioux	5,527.69		5,527.69	2	921.60			217.00		1,008.17	2,146.77
Story	824.47		824.47	1	1,409.05	1	200.00	75.00	971.33	71.10	2,726.48
Tama	6,321.15		6,321.15					838.10		13.00	851.10
Taylor	1,228.38		1,228.38							562.00	562.00
Union	685.33		685.33					84.35		318.72	403.07
Van Buren	2,555.39		2,555.39					336.46		2,069.13	2,405.59
Wapello	3,326.57		3,326.57	1	150.50			1,598.21		1,777.88	3,526.59
Warren	404.80		404.80					1,121.58	250.00		1,371.58
Washington	8,972.32		8,972.32	1	1,298.00			456.80			1,754.80
Wayne	4,405.66		4,405.66	2	1,159.03			496.06			1,655.09
Webster	1,480.81	326.70	1,807.51					48.25	275.00	1,264.66	1,587.91
Winnebago	135.80		135.80			1	137.54	677.00	1,429.59		2,244.13
Winneshiek	1,970.31		1,970.31					86.74		215.50	302.24
Woodbury	1,199.22		1,199.22	1	318.06		825.00	2,040.65		823.70	4,007.41
Worth	3,632.60		3,632.60	2	658.00			1,437.57	363.93	182.29	2,641.79
Wright	2,848.12	4,172.86	7,020.98		1,178.70			44.00	1,784.54	616.81	3,624.05
Totals	$277,898.87	$ 20,941.13	$ 298,840.00	21	$ 13,456.97	34	$ 20,936.73	$ 67,010.54	$ 35,106.04	$ 82,041.25	$ 218,551.53

SUMMARY TABLE NO. 15.

Road Repairs and Maintenance—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	No. Twp. in County	No. Twp. Reporting	Road Fund	Drag Fund	Drainage Fund	All Other Sources	Total
Adair	18	18	$ 26,109.78	$ 8,329.76	$ 2,827.87		$ 37,267.41
Adams	12	12	17,084.71	4,966.71			22,051.42
Allamakee	18	18	24,127.27	5,689.98			29,817.25
Appanoose	17	17	17,859.99	5,763.92	1,950.19	$ 3,418.35	28,992.45
Audubon	12	8	16,725.53	4,405.00		35.37	21,165.90
Benton	20	20	47,397.00	12,697.70	257.07		60,544.77
Black Hawk	18	18	25,795.44	9,375.34	75.78		35,246.56
Boone	17	14	32,901.98	7,418.10	8,828.59		49,148.67
Bremer	14	9	19,451.02	4,167.54		1,122.42	24,740.98
Buchanan	16	14	25,645.25	6,539.20	403.14		32,407.59
Buena Vista	18	16	22,645.82	9,109.37	13,855.60	629.59	46,240.38
Butler	16	14	27,168.98	6,802.13		4,234.79	38,205.90
Calhoun	16	16	23,785.66	8,839.75	11,204.81		43,830.22
Carroll	16	15	23,628.54	6,667.34	4,097.52		34,393.40
Cass	16	16	27,959.53	9,198.44		58.30	37,216.27
Cedar	17	17	30,733.58	9,892.82			40,626.40
Cerro Gordo	16	15	25,235.99	8,188.05	7,086.12	431.00	40,941.16
Cherokee	16						
Chickasaw	12	12	25,175.27	5,847.77			31,023.04
Clarke	12	5	7,001.10	1,896.49		296.41	9,194.00
Clay	16	11	13,923.33	3,824.82	6,287.45		24,035.60
Clayton	22	22	28,376.86	10,671.73		5,328.43	44,377.02
Clinton	20	19	34,954.73	13,096.08			48,050.81
Crawford	20	20	48,417.08	10,690.18	690.85		59,798.11
Dallas	16	16	35,143.36	8,801.77	1,737.68	4,384.20	50,067.01
Davis	15	15	20,270.98	4,961.04			25,232.02
Decatur	16	14	18,217.02	4,746.09		13.80	22,976.91
Delaware	16	15	29,575.38	7,598.88			37,174.26
Des Moines	13	13	21,973.97	6,310.57			28,284.54
Dickinson	12	9	14,200.22	3,798.05	5,059.34		23,057.61
Dubuque	17	4	10,685.60	1,786.30			12,471.90
Emmet	12	12	15,726.96	5,423.19	11,584.64		32,734.79
Fayette	20	20	36,789.88	11,257.92			48,047.80
Floyd	12	12	27,358.23	7,236.67	1,233.55		35,828.45
Franklin	16	16	29,208.03	8,518.13	10,057.01		47,783.17
Fremont	12	12	24,712.69	8,616.11	192.66	666.92	34,188.38
Greene	15	15	30,416.73	6,354.54	18,936.11		55,707.38

Grundy	14	9	28,194.61	7,000.61	91.86		35,287.08
Guthrie	17	14	25,714.01	5,642.75	1,045.89		32,402.65
Hamilton	17	12	20,725.55	6,500.96	9,530.72		36,757.23
Hancock	16	8	11,790.43	4,372.43	7,567.37		23,730.23
Hardin	15	14	28,540.44	8,146.72	4,202.05		40,889.21
Harrison	20	20	30,828.08	10,591.77	3,938.69		45,358.54
Henry	12	10	15,892.81	6,984.67			22,877.48
Howard	12	12	15,254.92	5,835.52			21,090.44
Humboldt	12	12	17,058.64	8,888.16	11,920.56		37,867.36
Ida	12	12	20,348.19	5,122.33			25,470.52
Iowa	18	17	25,530.47	10,525.14	997.96	460.93	37,514.50
Jackson	18	14	19,886.42	7,238.57			27,124.99
Jasper	19	19	51,780.83	10,018.76			61,799.59
Jefferson	12	12	30,504.29	7,336.04			37,840.33
Johnson	21	15	25,012.78	9,687.59			34,700.37
Jones	16	16	31,421.16	9,528.39	239.77		41,189.32
Keokuk	17	15	26,266.84	9,623.76			35,890.60
Kossuth	28	14	14,957.76	7,155.23	24,690.54		46,803.53
Lee	15	15	23,458.18	8,038.18	649.58		32,145.94
Linn	20	20	37,424.54	12,867.04	582.59		50,874.17
Louisa	12	10	20,260.32	6,968.89	335.51	522.00	28,086.72
Lucas	12	12	17,918.26	4,531.40			22,449.66
Lyon	18	14	16,791.52	6,285.03			23,076.55
Madison	16	16	29,271.88	6,688.96			35,960.84
Mahaska	18	18	36,266.63	9,630.29			45,896.92
Marion	15	15	26,352.84	7,130.88	547.25		34,030.97
Marshall	18	18	29,754.48	9,481.45	505.00	5,377.82	44,718.75
Mills	13	10	12,835.49	4,639.31			17,474.80
Mitchell	16	16	19,498.69	4,608.13			24,106.82
Monona	19	19	24,713.65	7,850.05	4,943.72		37,507.42
Monroe	12	12	15,828.33	5,493.86	968.65		22,290.84
Montgomery	12	6	13,536.38	2,630.81			16,167.19
Muscatine	15	15	19,412.49	9,098.79	69.02	2,550.68	31,130.98
O'Brien	16	16	30,692.04	8,723.21			39,415.25
Osceola	12	10	12,213.60	3,881.32			16,094.92
Page	16	16	31,813.12	8,549.97	322.18		40,685.27
Palo Alto	16	8	9,722.03	3,478.63	3,150.81	69.79	16,421.26
Plymouth	24	21	22,608.61	11,219.09			33,827.70
Pocahontas	18	18	26,201.82	7,746.71	12,227.28	1,647.38	47,823.19
Polk	19	19	36,862.33	8,976.50	4.14		45,842.97
Pottawattamie	28	13	47,958.03	13,049.99	1,289.27		62,297.29
Poweshiek	16	15	36,992.28	8,332.45	795.27		46,120.00
Ringgold	18	18	14,379.76	4,299.68			18,679.44
Sac	16	16	31,913.82	9,300.60	7,019.48		48,233.90
Scott	14	14	27,898.41	8,607.44			36,505.85
Shelby	16	16	25,829.13	8,922.86			34,751.99
Sioux	23	23	28,800.32	15,542.74			44,343.06
Story	16	14	25,896.58	9,024.24	6,668.51		40,898.33
Tama	17	17	22,148.99	6,372.14	34.56	1,630.70	49,759.84
Taylor	21	18	37,695.88	10,398.70			28,451.13

SUMMARY TABLE NO. 15.—Continued.

County	No. Twp. in County	No. Twp. Reporting	Road Fund	Drag Fund	Drainage Fund	All Other Sources	Total
Union	12	9	13,174.12	3,716.68			16,890.80
Van Buren	14	13	22,980.72	3,709.15		1,734.19	28,424.06
Wapello	14	14	24,955.60	5,984.75	1,265.11		32,205.46
Warren	16	15	28,011.11	7,302.70			35,313.81
Washington	15	14	37,797.93	10,807.89			48,605.82
Wayne	16	16	18,910.19	6,919.22	569.40		26,398.81
Webster	23	23	41,475.38	11,095.55	14,999.64		67,570.57
Winnebago	12	12	16,006.21	6,522.94	9,139.78		31,668.93
Winneshiek	20	19	31,255.25	7,173.48			38,428.73
Woodbury	23	13	17,303.52	6,354.26	2,968.51		26,626.29
Worth	12	12	15,046.87	5,288.83	4,989.13		25,324.83
Wright	16						
Totals	1,613	1,412	$ 2,425,952.05	$ 726,281.67	$ 244,035.78	$ 34,613.07	$ 3,430,882.57

SUMMARY TABLE NO. 16.

Road Repairs and Maintenance—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	No. of Twp. in County	No. of Twp. Reporting	Permanent Construction	Temporary Construction	Repairs	Maintenance	Equipment and Unused Material	Special Cases	Total
Adair	18	18	$ 10,296.28	$ 4,343.02	$ 13,040.19	$ 7,814.12	$ 1,773.80		$ 37,267.41
Adams	12	12	2,518.19	2,696.04	10,285.27	4,966.71	1,585.21		22,051.42
Allamakee	18	18			23,523.28	5,689.98	603.99		29,817.25
Appanoose	17	17	1,928.38	1,833.00	15,516.81	6,577.70	1,362.15	$ 1,774.41	28,992.45
Audubon	12	8		5,894.95	7,653.38	4,619.64	2,962.56	35.37	21,165.90
Benton	20	20	4,652.90	14,429.10	3,989.10	12,697.70	14,342.60	10,233.37	60,344.77
Black Hawk	18	18	1,400.42	4,650.46	8,596.47	10,092.63	8,682.45	1,824.13	35,246.56
Boone	17	14	3,923.78	5,548.86	9,948.92	7,418.10	5,024.71	17,284.30	49,148.67
Bremer	14	9		10,375.35	5,127.27	6,943.41	1,808.96	485.99	24,740.98
Buchanan	16	14	403.14	10,498.07	9,442.36	6,359.20	3,607.03	2,097.79	32,407.59
Buena Vista	18	16	8,670.66	15,313.66	2,384.54	9,109.37	1,001.11	9,761.04	46,240.38
Butler	16	14	1,688.42	10,410.08	14,351.35	6,802.13	4,953.92		38,205.90
Calhoun	16	16	5,788.25	10,131.98	1,254.33	8,839.75	1,590.58	16,225.33	43,830.22
Carroll	16	15	9,624.85	4,322.38	9,626.72	6,970.29	1,906.32	1,942.84	34,393.40
Cass	16	16		3,306.02	16,576.64	9,198.44	4,696.91	3,438.26	37,216.27
Cedar	17	17	325.83	5,763.03	9,183.35	9,823.87	5,407.38	10,122.94	40,626.40
Cerro Gordo	16	15	3,876.77	9,003.13	10,055.52	8,188.05	1,671.98	8,145.71	40,941.16
Cherokee	16								
Chickasaw	12	12	1,860.73	8,704.38	13,487.40	5,847.77	1,122.76		31,023.04
Clarke	12	5			6,305.48	1,896.49	695.62	296.41	9,194.00
Clay	16	11	2,970.11	5,807.56	1,215.28	3,833.82	668.12	9,540.71	24,035.60
Clayton	22	22	212.04	1,460.72	27,093.77	10,671.73	2,112.11	2,826.65	44,377.02
Clinton	20	19	1,689.78	6,694.59	17,563.14	13,096.08	7,101.39	1,905.83	48,050.81
Crawford	20	20		22,500.00	14,068.00	10,329.30	5,886.49	7,014.32	59,798.11
Dallas	16	16	8,733.93	16,421.41	9,691.19	8,801.77	5,975.90	442.81	50,067.01
Davis	15	15	3,506.70	2,036.16	12,601.38	4,961.04	2,126.74		25,232.02
Decatur	16	14	3,867.46	3,954.90	6,058.05	4,746.09	976.45	3,373.96	22,976.91
Delaware	16	15	298.94	11,729.67	13,818.52	7,598.88	3,737.25		37,174.26
Des Moines	13	13	6,269.92	2,670.31	6,435.04	6,310.57	4,479.12	2,119.58	28,284.54
Dickinson	12	9	7,251.58	4,204.63	2,528.85	3,798.05	936.28	4,338.22	23,057.61
Dubuque	17	4	2,366.15	667.68	2,999.93	1,786.30	4,651.84		12,471.90
Emmet	12	12	715.37	4,913.23	6,694.99	5,352.58	2,286.44	12,772.18	32,734.79
Fayette	20	20		10,504.50	20,617.38	11,257.92	5,520.00	148.00	48,047.80
Floyd	12	12	2,657.01	9,522.62	9,042.38	7,097.86	6,571.79	936.79	35,828.45
Franklin	16	16	3,020.46	5,793.23	9,263.77	8,518.13	11,563.77	9,623.81	47,783.17
Fremont	12	12	2,183.85	670.29	18,139.10	5,184.23	483.86	7,527.05	34,188.38
Greene	15	15	5,697.66	12,699.75	11,705.58	6,354.54	3,306.28	15,943.57	55,707.38

SUMMARY TABLE NO. 16.—Continued.

County	No. of Twp. in County	No. of Twp. Reporting	Permanent Construction	Temporary Construction	Repairs	Maintenance	Equipment and Unused Material	Special Cases	Total
Grundy	14	9	2,032.94	14,256.18	5,833.31	7,000.61	6,072.18	91.86	35,287.08
Guthrie	17	14	4,603.34	4,931.53	9,782.39	5,642.75	2,221.67	5,220.97	32,402.65
Hamilton	17	12	8,464.97	7,016.63	1,634.05	6,871.99	2,166.41	10,603.18	36,757.23
Hancock	16	8	6,215.80	3,804.12	3,077.61	4,372.43	2,006.92	4,253.35	23,730.23
Hardin	15	14	5,352.02	9,763.25	10,477.57	8,146.72	4,114.55	3,035.10	40,889.21
Harrison	20	20	1,357.49	2,758.77	26,098.76	10,591.77	613.06	3,938.69	45,358.54
Henry	12	10			15,892.81	6,984.67			22,877.48
Howard	12	12	1,164.72	8,909.95	4,197.26	4,671.05	2,147.46		21,090.44
Humboldt	12	12	10,413.00	6,075.36	3,820.80	8,408.28	3,815.80	5,334.12	37,867.36
Ida	12	12	2,687.71	4,350.64	7,337.97	5,122.33	3,814.15	2,157.72	25,470.52
Iowa	18	17	2,997.92	6,443.84	8,100.53	11,717.10	957.52	7,297.59	37,514.50
Jackson	18	14	1,539.30	696.20	15,330.44	7,238.57	892.47	1,428.31	27,124.99
Jasper	19	19	7,453.03	12,423.43	19,053.69	10,018.76	9,546.35	3,304.33	61,799.59
Jefferson	12	12	2,782.02	984.89	11,569.46	7,336.04	6,825.87	8,342.05	37,840.33
Johnson	16	16	1,124.62	20,277.56	6,804.87	8,919.59	4,068.68		41,189.32
Jones	21	15	844.18	8,764.22	7,893.16	9,687.59	7,511.22		34,700.37
Keokuk	17	15	136.50		24,872.53	9,623.76	1,257.81		35,890.60
Kossuth	28	14	2,166.77	6,522.39	4,234.47	6,992.88	4,273.28	22,613.74	46,803.53
Lee	15	15	2,200.46	348.23	16,651.33	8,038.18	4,907.74		32,145.94
Linn	20	20	6,520.01	11,544.07	6,727.98	12,867.04	7,616.62	5,598.45	50,874.17
Louisa	12	10	7,224.59	3,602.36	2,832.07	6,968.89	1,430.82	6,027.99	28,086.72
Lucas	12	12	5,209.44	1,274.34	8,807.57	4,531.40	1,644.72	982.19	22,449.66
Lyon	18	14	1,252.20	9,208.28	3,905.95	6,285.03	1,283.72	1,141.37	23,076.55
Madison	16	16	6,130.29	1,333.94	17,199.56	6,688.96	2,706.46	1,901.63	35,960.84
Mahaska	18	18	4,022.91	2,578.77	13,263.32	9,630.29	10,871.38	5,530.25	45,896.92
Marion	15	15	1,643.86	141.25	22,032.51	7,130.88	1,962.60	1,119.87	34,030.97
Marshall	18	18	9,972.53	9,587.44	10,954.80	10,218.07	3,985.91		44,718.75
Mills	13	10	1,550.90	2,832.48	5,474.18	4,639.31	1,462.18	1,515.75	17,474.80
Mitchell	16	16	1,018.55	5,584.18	5,622.29	6,760.81	2,145.38	2,975.61	24,106.82
Monona	19	19	4,780.75	4,302.20	5,708.40	7,850.05	5,162.10	9,703.92	37,507.42
Monroe	12	12	3,865.28	564.25	10,622.48	5,493.86	945.26	799.71	22,290.84
Montgomery	12	6	4,043.12	7,888.09	794.36	2,105.04	810.81	525.77	16,167.19
Muscatine	15	15	1,563.07	6,103.92	10,168.31	10,328.75	1,723.65	1,303.28	31,130.98
O'Brien	16	16	7,626.79	12,457.87	4,631.30	8,723.21	2,694.28	3,281.80	39,415.25
Osceola	12	10	1,275.10	6,258.25	1,897.25	3,881.32	2,783.00		16,094.92
Page	16	16	10,187.20	10,451.99	3,573.63	8,549.97	3,249.04	4,673.44	40,685.27
Palo Alto	16	8	2,396.86	2,890.96	2,122.80	3,478.63	2,381.20	3,150.81	16,421.26
Plymouth	24	21	2,310.82	4,668.70	9,380.68	11,219.09	2,354.21	3,894.20	33,827.70
Pocahontas	18	18	5,162.80	14,963.15	5,172.11	7,735.20	1,635.45	13,154.48	47,823.19
Polk	19	19	7,469.21	8,040.43	18,886.68	9,189.86	1,403.57	853.22	45,842.97
Pottawattamie	28	13	3,671.86	10,619.70	31,407.62	13,049.99	2,258.85	1,289.27	62,297.29
Poweshiek	16	15	3,333.88	496.76	23,855.98	8,332.45	7,859.17	2,241.76	46,120.00

Ringgold	18	18	2,550.00	2,554.96	8,790.00	4,299.68	484.80		18,679.44
Sac	16	16	4,768.13	16,169.74	4,984.17	9,300.60	3,153.55	9,857.71	48,233.90
Scott	14	14	3,985.59	9,265.78	6,451.16	8,607.44	8,195.88		36,505.85
Shelby	16	16	3,074.06	526.05	21,350.63	8,922.86	878.39		34,751.99
Sioux	23	23	1,561.41	7,118.23	15,196.90	15,542.74	1,894.90	3,088.88	44,343.06
Story	16	14	7,668.73	7,255.47	9,189.81	9,003.94	1,931.57	5,939.81	40,989.33
Tama	21	18	6,991.89	8,593.42	15,956.12	10,398.70	6,711.50	2,008.21	49,759.84
Taylor	17	17	430.50	1,068.00	17,375.56	6,302.14	2,413.70	861.23	28,451.13
Union	12	9	2,061.92	2,574.56	7,269.17	3,716.68	1,268.47		16,800.80
Van Buren	14	13	3,985.00	5,018.31	10,264.53	3,709.15	3,211.89	2,234.19	28,424.06
Wapello	14	14	2,443.83	386.20	15,418.87	5,984.75	5,145.13	2,826.68	32,205.46
Warren	16	15	2,293.40	1,019.60	16,538.90	7,302.70	6,524.16	1,635.05	35,313.81
Washington	15	14	5,000.00	8,000.00	14,697.93	10,807.89	4,000.00	6,100.00	48,605.82
Wayne	16	16			18,579.00	6,719.22	1,100.59		26,398.81
Webster	23	23	9,074.21	25,020.35	11,103.66	11,095.55	3,926.60	7,350.19	67,570.57
Winnebago	12	12	8,233.83		6,602.39	6,522.94	3,400.00	6,909.77	31,668.93
Winneshiek	20	19	1,558.88	10,157.65	4,172.07	7,173.48	5,269.75	10,696.90	38,428.73
Woodbury	23	13	4,343.47	6,520.41	8,747.01	6,354.26	557.17	103.97	26,626.29
Worth	12	12	2,479.34	7,257.66	4,326.04	5,288.83	1,397.19	4,575.77	25,324.83
Wright	16								
Totals	1,613	1,412	$ 345,644.55	$ 623,701.73	$1,024,603.19	$ 729,644.96	$ 332,232.62	$ 375,055.51	$ 3,430,882.57

SUMMARY TABLE NO. 17.

Road Repairs and Maintenance.—County Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	No. Twps. in County	No. Twps. in County	Permanent Work					Temporary Work				Total Cost Township Construc'n
			Built to Finished Grade	Built to Temporary Grade	Per-manently Surfaced	Tile Drainage	Filling Bridges and Culverts	Built to Natural Grade	Oiling	Hauling and Placing Temporary Culverts	Special Cases	
Adair	18	18	$ 1,629.00			$ 118.84	$ 8,548.44	$ 3,600.07		$ 742.95		$ 14,639.30
Adams	12	12					2,518.19	462.00		3,234.04		5,214.23
Allamakee	18	18										
Appanoose	17	17					1,928.38			1,833.00		3,761.38
Audubon	12	8						5,894.95				5,894.95
Benton	20	20				168.80	4,484.10	13,786.90		642.20		19,082.00
Black Hawk	18	18				229.55	1,170.87	4,364.24		286.22		6,050.88
Boone	17	14				1,244.43	2,679.35	4,799.13		749.73		9,472.64
Bremer	14	9						10,375.35				10,375.35
Buchanan	16	14				403.14		9,121.93		1,376.14		10,901.21
Buena Vista	18	16		$ 711.20		5,712.90	2,246.56	10,875.96		183.90	$ 4,253.80	23,984.32
Butler	16	14					1,688.42	8,974.33		380.00	1,055.75	12,098.50
Calhoun	16	16		316.25	$ 943.10	3,655.02	873.88	9,914.58		217.40		15,920.23
Carroll	16	15	176.00		1,107.17	4,232.21	4,109.47	3,689.43		428.85	294.10	13,947.23
Cass	16	16						159.00		360.67	2,786.35	3,306.02
Cedar	17	17				9.20	316.63	5,659.96	$ 50.67	46.40		6,088.86
Cerro Gordo	16	15				2,581.12	1,295.65	8,648.73		354.40		12,879.90
Cherokee	16											
Chickasaw	12	12				481.59	1,379.14	8,335.48		368.90		10,565.11
Clarke	12	5										
Clay	16	11		1,290.45	235.75	626.79	817.12	5,757.56		50.00		8,777.67
Clayton	22	22					212.04	1,141.13		319.59		1,672.76
Clinton	20	19					1,689.78	6,223.89			470.70	8,384.37
Crawford	20	20						20,500.00		2,000.00		22,500.00
Dallas	16	16		1,974.10		1,349.81	5,410.02	11,194.28		796.79	4,430.34	25,155.34
Davis	15	15					3,506.70	2,014.16		22.00		5,542.86
Decatur	16	14					3,867.46	3,027.31		927.59		7,822.36
Delaware	16	15				42.14	247.80	11,553.68		175.99		12,019.61
Des Moines	13	13	395.19	3,317.15	183.00		2,374.58	2,236.01		434.30		8,940.23
Dickinson	12	9	4,587.86	586.10		1,031.98	1,045.64	3,913.93		290.70		11,456.21
Dubuque	17	4		1,692.50	80.00		593.65	656.28		11.40		3,033.83
Emmet	12	12		42.00		490.52	182.85	4,710.75		202.48		5,628.60
Fayette	20	20						10,504.50				10,504.50
Floyd	12	12			439.25	583.48	2,073.53	8,578.31		944.31		12,179.63
Franklin	16	16				433.20	2,148.01	5,283.48		509.75		8,813.69
Fremont	12	12					2,183.85			670.29		2,854.14
Greene	15	15	392.40		479.75	2,992.54	1,832.97	12,170.17		529.58		18,397.41
Grundy	14	9				384.95	1,647.99	12,379.51		1,876.67		16,289.12
Guthrie	17	14			239.75	10.50	4,353.09	4,183.20		748.33		9,534.87
Hamilton	17	12	644.35	1,918.65	421.50	4,069.39	1,411.08	6,939.63		77.00		15,481.60
Hancock	16	8	367.25	979.36	630.31	3,896.18	342.70	3,627.30		176.82		10,019.92
Hardin	15	14				1,322.85	4,029.17	9,473.55		289.70		15,115.27
Harrison	20	20					1,357.49	2,627.40		131.37		4,116.26
Henry	12	10				16.62	1,148.10	8,538.78		371.17		10,074.67
Howard	12	12				8,886.00	1,527.00	5,870.88		204.48		16,488.36
Humboldt	12	12					2,687.71	3,810.82		539.82		7,038.35
Ida	18	12			291.00	569.99	2,136.93	4,263.05		793.41	1,387.38	9,441.76
Iowa	18	17			453.30		1,086.00			696.20		2,235.50
Jackson	19	14		4,416.27		20.00	3,016.76	11,767.89		655.54		19,876.46
Jasper	12	19					2,782.02	339.50		645.39		3,766.91
Jefferson	21	12					844.18	8,504.71		259.51		9,608.40
Johnson	16	15				239.77	884.85	15,487.78		951.40	3,888.38	21,402.18
Jones	17	16				136.50						136.50
Keokuk	28	15				2,050.67	116.10	6,362.49		159.99		8,689.16
Kossuth	15	14			692.66	649.58	858.22			348.23		2,548.69
Lee	20	15	507.95	992.92	1,505.77	1,214.04	2,299.33	11,195.79		348.28		18,064.08
Linn	12	20	5,175.44			304.62	1,744.53	3,199.18		403.18		10,826.95
Louisa	12	10					5,209.44			1,274.34		6,483.78
Lucas	18	12					1,252.20	8,975.43		232.85		10,460.48
Lyon	16	14					6,130.29			1,333.94		7,464.23
Madison	18	16				168.54	3,854.37	2,000.00		578.77		6,601.68
Mahaska	15	18				547.25	1,096.61			141.25		1,785.11
Marion	18	15					9,972.53	9,275.65		311.79		19,559.97
Marshall	13	18					1,550.90	2,749.98		82.50		4,383.38
Mills	16	10					1,018.55	5,250.38		333.80		6,602.73
Mitchell	19	16		2,493.50			2,287.25	3,807.00		487.05	8.15	9,082.95
Monona	12	19					3,865.28			564.25		4,429.53
Monroe	12	12		1,663.41			2,379.71	6,074.92		1,037.05	776.12	11,931.21
Montgomery	15	6				176.02	1,327.05	5,160.84		943.08		7,606.99
Muscatine	16	15				290.61	2,452.45	12,265.27		192.60		20,084.66
O'Brien	12	16	3,342.67	1,541.06		218.40	1,056.70	6,149.75		108.50		7,533.35
Osceola	16	10					4,173.28	9,317.05		1,134.94		20,639.19
Page	16	16	893.40	5,120.52		415.89	496.02	2,890.96				5,287.82
Palo Alto	24	8		1,484.95			2,310.82	4,342.16		326.54		6,979.52
Plymouth	18	21				2,948.83	1,761.77	14,760.32		202.83		20,125.95
Pocahontas	19	18		452.20		134.11	6,101.89	7,479.03		561.40		15,509.64
Polk	28	19		805.87	427.34		3,671.86	4,023.38		1,940.44	4,655.88	14,291.56
Pottawattamie	16	13					3,333.88			496.76		3,830.64
Poweshiek	18	15					2,550.00	2,012.16		542.80		5,104.96
Ringgold	16	18				780.69	2,860.28	15,698.89		470.85		20,937.87
Sac	14	16	554.75	522.50	50.00		1,561.50	4,553.42	300.00	361.40	4,050.96	13,251.37
Scott	16	14	135.25	2,288.84		173.22	2,900.84			526.05		3,600.11
Shelby		16										

SUMMARY TABLE NO. 17.—Continued.

County	No. Twps. in County	No. Twps. in County	Permanent Work					Temporary Work				
			Built to Finished Grade	Built to Temporary Grade	Permanently Surfaced	Tile Drainage	Filling Bridges and Culverts	Built to Natural Grade	Oiling	Hauling and Placing Temporary Culverts	Special Cases	Total Cost Township Construc'n
Sioux	23	23				148.44	2,849.88	6,747.22		508.25		14,924.20
Story	16	14	307.15	1,099.81		3,411.89	1,352.97	6,268.98		849.25		8,619.64
Tama	21	18				177.02	5,914.87	7,597.95		995.47		14,685.31
Taylor	17	17					430.50	918.00		150.00		1,498.50
Union	12	9					2,061.92	2,574.56				4,636.48
Van Buren	14	13		1,219.90			2,766.09	1,738.78		1,169.29	2,110.24	9,004.30
Wapello	14	14					2,443.83			386.20		2,830.03
Warren	16	15					2,293.40			1,019.60		3,313.00
Washington	15	14					5,000.00	7,000.00		1,000.00		13,000.00
Wayne	16	16										
Webster	23	23				7,649.45	1,424.76	18,198.19		849.58	5,972.59	34,094.57
Winnebago	12	12		4,918.97		2,230.01	1,084.85					8,233.83
Winneshiek	20	19					1,558.88	9,845.32		312.33		11,716.53
Woodbury	23	13				2,864.54	1,478.93	5,889.06		631.35		10,863.88
Worth	12	12		447.70	255.00	1,245.49	531.15	7,028.58		229.08		9,737.00
Wright	16											
Totals	1,613	1,412	$ 19,108.66	$ 42,296.18	$ 8,434.65	$ 73,739.23	$202,065.83	$537,292.17	$ 356.67	$ 50,052.15	$ 36,000.74	$ 969,346.28

SUMMARY TABLE NO. 18.

Road Repairs and Maintenance.—Township Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	Maintenance								
	No. of Twps. in county	No. of Twps. reporting	No. of miles regularly dragged	Average No. of times dragged	Average cost per mile of road	Average cost per mile one round trip	Total cost of dragging	Total cost of repairs	Total cost of repairs and maintenance
Adair	18	18					$ 7,814.12	$ 13,040.19	$ 20,854.31
Adams	12	12	500.0	14.2	$ 9.93	$ 0.70	4,966.71	10,285.27	15,251.98
Allamakee	18	18					5,689.98	23,523.28	29,213.26
Appanoose	17	17	580.0	18.0	11.34	0.63	6,577.70	15,516.81	22,094.51
Audubon	12	8					4,619.64	7,653.38	12,273.02
Benton	20	20				0.75	12,697.70	3,989.10	16,686.80
Black Hawk	18	18	692.0	17.2	15.35	0.84	10,092.63	8,596.47	18,689.10
Boone	17	14					7,418.10	9,948.92	17,367.02
Bremer	14	9					6,943.41	5,127.27	12,070.68
Buchanan	16	14	450.0	23.0	14.13	0.60	6,359.20	9,442.36	15,801.56
Buena Vista	18	16				0.86	9,109.37	2,384.54	11,493.91
Butler	16	14					6,802.13	14,351.35	21,153.48
Calhoun	16	16					8,839.75	1,254.33	10,094.08
Carroll	16	15	675.0	10.0	10.33	1.00	6,970.29	9,626.72	16,597.01
Cass	16	16				0.80	9,198.44	16,576.64	25,775.08
Cedar	17	17	798.0	16.4	12.31	0.75	9,823.87	9,183.35	19,007.32
Cerro Gordo	16	15	718.0	13.0	11.40	0.75	8,188.05	10,055.52	18,243.57
Cherokee	16								
Chickasaw	12	12	712.0	8.0	8.21	0.85	5,847.77	13,487.40	19,335.17
Clarke	12	5					1,896.49	6,305.48	8,201.97
Clay	16	11				0.90	3,833.82	1,215.28	5,049.10
Clayton	22	22	700.0	21.0	15.24	0.72	10,671.73	27,093.77	37,765.50
Clinton	20	19					13,096.08	17,563.14	30,659.22
Crawford	20	20				0.75	10,329.30	14,068.00	24,397.30
Dallas	16	16	820.0	7.8	10.73	0.73	8,801.77	9,691.19	18,492.96
Davis	15	15	300.0	16.54	16.54	0.50	4,961.04	12,601.38	17,562.42
Decatur	16	14				0.63	4,746.09	6,058.05	10,804.14
Delaware	16	15				0.76	7,598.88	13,818.52	21,417.40
Des Moines	13	13	1,407.0		4.50	0.71	6,310.57	6,435.04	12,745.61

SUMMARY TABLE NO. 18.—Continued.

County	No. of Twps. in county	No. of Twps. reporting	Maintenance: No. of miles regularly dragged	Maintenance: Average No. of times dragged	Maintenance: Average cost per mile of road	Maintenance: Average cost per mile one round trip	Maintenance: Total cost of dragging	Total cost of repairs	Total cost of repairs and maintenance
Dickinson	12	9				0.70	3,798.05	2,528.85	6,326.90
Dubuque	17	4					1,786.30	2,999.93	4,786.23
Emmet	12	12	420.0	16.0	12.75	0.80	5,352.58	6,694.99	12,047.57
Fayette	20	20	850.0	20.0	13.25	0.65	11,257.92	20,617.38	31,875.30
Floyd	12	12				0.77	7,097.86	9,042.38	16,140.24
Franklin	16	16	784.0	15.0	10.87	0.72	8,518.13	9,263.77	17,781.90
Fremont	12	12				0.71	5,184.23	18,139.10	23,323.33
Greene	15	15				0.76	6,354.54	11,705.58	18,060.12
Grundy	14	9	632.0	12.8	11.07	0.86	7,000.61	5,833.31	12,833.92
Guthrie	17	14	417.0	17.0	13.55	0.80	5,642.75	9,782.89	15,425.14
Hamilton	17	12	439.0	18.0	15.66	0.87	6,871.99	1,634.05	8,506.04
Hancock	16	8				0.73	4,372.43	3,077.61	7,450.04
Hardin	15	14				0.75	8,146.72	10,477.57	18,624.29
Harrison	20	20				0.70	10,591.77	26,098.76	36,690.53
Henry	12	10					6,984.67	15,892.81	22,877.48
Howard	12	12	477.5	12.65	9.78	0.77	4,671.05	4,197.26	8,868.31
Humboldt	12	12	500.0	15.0	16.82	1.12	8,408.28	3,820.80	12,229.08
Ida	12	12		10.0	12.00	0.88	5,122.33	7,337.97	12,460.30
Iowa	18	17	970.0	15.1	12.08	0.80	11,717.10	8,100.53	19,817.63
Jackson	18	14	641.0	15.0	11.29	0.75	7,238.57	15,330.14	22,568.71
Jasper	19	19	900.0	15.9	11.13	0.70	10,018.76	19,053.69	29,072.45
Jefferson	12	12	642.0		11.43	0.70	7,336.04	11,569.46	18,905.50
Johnson	21	15	580.0	22.3	16.70	0.75	9,687.59	7,893.16	17,580.75
Jones	16	16	410.0	29.0	21.75	0.75	8,913.59	6,804.87	15,718.46
Keokuk	17	15				0.70	9,623.76	24,872.53	34,496.29
Kossuth	28	14				0.75	6,992.88	4,234.47	11,227.35
Lee	15	15	532.0	18.4	12.72	0.69	8,038.18	16,651.33	24,689.51
Linn	20	20	1,114.25	20.0	11.55	0.58	12,867.04	6,727.98	19,595.02
Louisa	12	10					6,968.80	2,832.07	9,800.96
Lucas	12	12	696.0	10.85	6.51	0.60	4,531.40	8,807.57	13,338.97
Lyon	18	14	430.0	18.0	14.62	0.814	6,285.63	3,905.95	10,190.98
Madison	16	16					6,688.96	17,199.56	23,888.52
Mahaska	18	18	820.0	16.0	11.74	0.714	9,630.29	13,263.32	22,893.61

Marion	15	15	600.0	12.0	11.88	0.75	7,130.88	22,032.51	29,163.39
Marshall	18	18	324.0	42.0	31.54	0.75	10,218.07	10,954.80	21,172.87
Mills	13	10				0.70	4,639.31	5,474.18	10,113.49
Mitchell	16	16				0.75	6,760.81	5,622.29	12,383.10
Monona	19	19	655.0	16.0	11.98	0.75	7,850.05	5,708.40	13,558.45
Monroe	12	12	400.0	16.0	13.73	0.835	5,493.86	10,622.48	16,116.34
Montgomery	12	6	210.0	10.0	10.02	1.00	2,105.04	794.36	2,899.40
Muscatine	15	15	515.5	23.0	20.04	0.86	10,328.75	10,168.31	20,497.06
O'Brien	16	16	701.0	14.6	12.44	0.85	8,723.21	4,631.30	13,354.51
Osceola	12	10	283.0	18.0	13.71	0.76	3,881.32	1,897.25	5,778.57
Page	16	16	700.0	17.0	12.21	0.70	8,549.97	3,573.63	12,123.60
Palo Alto	16	8					3,478.63	2,122.80	5,601.43
Plymouth	24	21					11,219.09	9,380.68	20,599.77
Pocahontas	18	18				0.80	7,735.20	5,172.11	12,907.31
Polk	19	19	540.0	17.0	17.00	1.00	9,189.86	18,886.68	28,076.54
Pottawattamie	28	13				0.82	13,049.99	31,407.62	44,457.61
Poweshiek	16	15				0.90	8,332.45	23,855.98	32,188.43
Ringgold	18	18				0.50	4,299.68	8,790.00	13,089.68
Sac	16	16	700.0	15.0	13.30	0.875	9,300.60	4,984.17	14,284.77
Scott	14	14	490.0	10.43	17.56	0.825	8,607.44	6,451.16	15,058.60
Shelby	16	16	780.0	15.0	11.44	0.75	8,922.86	21,350.63	30,273.49
Sioux	23	23	899.0			1.00	15,542.74	15,196.90	30,739.64
Story	16	14					9,003.94	9,189.81	18,193.75
Tama	21	18	671.0	18.67	15.50	0.83	10,398.70	15,956.12	26,354.82
Taylor	17	17	754.0	14.66	8.36	0.57	6,302.14	17,375.56	23,677.70
Union	12	9				0.60	3,716.68	7,269.17	10,985.85
Van Buren	14	13	610.0	10.0	6.08	0.65	3,709.15	10,264.53	13,973.68
Wapello	14	14	436.0	34.0	13.71	0.40	5,984.75	15,418.87	21,403.62
Warren	16	15	640.0	10.0	11.40	0.70	7,302.70	16,538.90	23,841.60
Washington	15	14					10,807.89	14,697.93	25,505.82
Wayne	16	16					6,719.22	18,579.00	25,298.22
Webster	23	23				0.90	11,095.55	11,103.66	22,199.21
Winnebago	12	12	410.0	22.0	15.91	0.722	6,522.94	6,602.39	13,125.33
Winneshiek	20	19					7,173.48	4,172.07	11,345.55
Woodbury	23	13				0.83	6,354.26	8,747.01	15,101.27
Worth	12	12	367.0	18.0	14.40	0.80	5,288.83	4,326.04	9,614.87
Wright	16								
Totals	1,613	1,412				$ 0.76	$ 729,644.96	$1,024,603.19	$ 1,754,248.15

SUMMARY TABLE NO. 19.

Road Equipment and Material and Miscellaneous Items—Township Expenditures.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	No. of Twps. in county	No. of Twp. reporting	Cost of equipment and unused material	Special Cases: R. R. Crossings Improved No.	R. R. Crossings Improved Cost	Drainage assessments	Miscellaneous	Total special cases
Adair	18	18	$ 1,773.80					
Adams	12	12	1,585.21					
Allamakee	18	18	693.99					
Appanoose	17	17	1,362.15				$ 1,774.41	$ 1,774.41
Audubon	12	8	2,962.56				35.37	35.37
Benton	20	20	14,342.60				10,233.37	10,233.37
Black Hawk	18	18	8,682.45			$ 27.35	1,796.78	1,824.13
Boone	17	14	5,024.71			7,584.16	9,700.14	17,284.30
Bremer	14	9	1,808.96				485.99	485.99
Buchanan	16	14	3,607.03				2,097.79	2,097.79
Buena Vista	18	16	1,001.11			9,131.45	629.59	9,761.04
Butler	16	14	4,953.92					
Calhoun	16	16	1,590.58			7,549.79	8,675.54	16,225.33
Carroll	16	15	1,906.32				1,942.84	1,942.84
Cass	16	16	4,696.91				3,438.26	3,438.26
Cedar	17	17	5,407.38			25.50	10,097.44	10,122.94
Cerro Gordo	16	15	1,671.98			4,505.00	3,640.71	8,145.71
Cherokee	16							
Chickasaw	12	12	1,122.76					
Clarke	12	5	695.62				296.41	296.41
Clay	16	11	608.12			5,686.55	3,854.16	9,540.71
Clayton	22	22	2,112.11				2,826.65	2,826.65
Clinton	20	19	7,101.39				1,905.83	1,905.83
Crawford	20	20	5,886.49				7,014.32	7,014.32
Dallas	16	16	5,975.90			442.81		442.81
Davis	15	15	2,126.74					
Decatur	16	14	976.45				3,373.96	3,373.96
Delaware	16	15	3,737.25					
Des Moines	13	13	4,479.12				2,119.58	2,119.58
Dickinson	12	9	936.28			3,529.95	808.26	4,338.22
Dubuque	17	4	4,651.84					
Emmet	12	12	2,286.44			11,164.57	1,607.61	12,772.18
Fayette	20	20	5,520.00				148.00	148.00
Floyd	12	12	6,571.79			634.55	302.24	936.79
Franklin	16	16	11,503.77			9,623.81		9,623.81
Fremont	12	12	483.86				7,527.05	7,527.05
Greene	15	15	3,306.28			15,943.57		15,943.57
Grundy	14	9	6,072.18			91.86		91.86
Guthrie	17	14	2,221.67			1,045.89	4,175.08	5,220.97
Hamilton	17	12	2,166.41			5,933.53	4,669.65	10,603.18
Hancock	16	8	2,006.92			3,671.19	582.16	4,253.35
Hardin	15	14	4,114.55			3,035.10		3,035.10
Harrison	20	20	613.06			3,938.69		3,938.69
Henry	12	10						
Howard	12	12	2,147.46					
Humboldt	12	12	3,815.80			4,136.04	1,198.08	5,334.12
Ida	12	12	3,814.15				2,157.72	2,157.72
Iowa	18	17	957.52				7,297.59	7,297.59
Jackson	18	14	892.47				1,428.31	1,428.31
Jasper	19	19	9,546.35				3,304.33	3,304.33
Jefferson	12	12	6,825.87				8,342.05	8,342.05
Johnson	21	15	7,511.22					
Jones	16	16	4,068.68					
Keokuk	17	15	1,257.81			22,613.74		22,613.74
Kossuth	28	14	4,273.28					
Lee	15	15	4,907.74				5,598.45	5,598.45
Linn	20	20	7,616.62			335.51	5,692.48	6,027.99
Louisa	12	10	1,430.82				982.19	982.19
Lucas	12	12	1,644.72				1,141.37	1,141.37
Lyon	18	14	1,283.72				1,901.63	1,901.63
Madison	16	16	2,706.46				4,727.65	5,530.25
Mahaska	18	18	10,871.38	1	$ 802.60		1,119.87	1,119.87
Marion	15	15	1,962.60					
Marshall	18	18	3,985.91				1,515.75	1,515.75
Mills	13	10	1,462.18			538.03	2,437.58	2,975.61
Mitchell	16	16	2,145.38			4,943.72	4,760.20	9,703.92
Monona	19	19	5,162.10				799.71	799.71
Monroe	12	12	945.26				525.77	525.77
Montgomery	12	6	810.81			6.11	1,297.17	1,303.28
Muscatine	15	15	1,723.65				3,281.80	3,281.80
O'Brien	16	16	2,694.28					
Osceola	12	10	2,783.00			320.10	4,353.34	4,673.44
Page	16	16	3,249.04			3,150.81		3,150.81
Palo Alto	16	8	2,381.20				3,894.20	3,894.20
Plymouth	24	21	2,354.21			9,361.19	3,793.29	13,154.48
Pocahontas	18	18	1,635.45				853.22	853.22
Polk	19	19	1,403.57			1,289.27		1,289.27
Pottawattamie	28	13	2,258.85				2,241.76	2,241.76
Poweshiek	16	15	7,859.17					

SUMMARY TABLE NO. 19.—Continued.

County	No. of county bridges	No. of Twp. bridges	Cost of adjustment and maintenance	Special Cases: R. R. Crossings Improved: No.	Special Cases: R. R. Crossings Improved: Cost	Special Cases: Drainage assessments	Special Cases: Miscellaneous	Total special cases
Ringgold	18	18	484.80					
Sac	16	16	3,153.55			6,238.88	3,618.83	9,857.71
Scott	14	14	8,195.88					
Shelby	16	16	878.39					
Sioux	23	23	1,894.90				3,088.88	3,088.88
Story	16	14	1,931.57			2,859.19	3,081.62	5,939.81
Tama	21	18	6,711.50				2,008.21	2,008.21
Taylor	17	17	2,413.70				861.23	861.23
Union	12	9	1,268.47					
Van Buren	14	13	3,211.89				2,234.19	2,234.19
Wapello	14	14	5,145.13				2,826.68	2,826.68
Warren	16	15	6,524.16				1,635.05	1,635.05
Washington	15	14	4,000.00				6,100.00	6,100.00
Wayne	16	16	1,100.59					
Webster	23	23	3,926.60			7,350.19		7,350.19
Winnebago	12	12	3,400.00			6,909.77		6,909.77
Winneshiek	20	19	5,269.75				10,096.90	10,096.90
Woodbury	23	13	557.17			103.97		103.97
Worth	12	12	1,397.19			3,743.64	832.13	4,575.77
Wright	16							
Totals	1,613	1,412	$ 332,232.63	1	$ 802.60	$ 167,464.49	$ 206,788.42	$ 375,055.51

SUMMARY TABLE NO. 20.

Progress Report.—County Road Surveys and Construction During 1918.

ANNUAL REPORTS OF COUNTY ENGINEERS.

County	Surveys and Profiles: No. miles surveyed	Surveys and Profiles: No. miles platted	Surveys and Profiles: No. miles grade line approved by district engineers	Surveys and Profiles: No. miles profiled approved by commission	Construction: Built to natural grade, standard width	Construction: Built to temporary grade, standard width	Construction: Built to permanent grade, standard width	Construction: Surfaced
Adair					$ 41.75			
Adams					3.00			
Allamakee					35.50		1.30	
Appanoose								
Audubon	1.50	.75	.75	.75	92.50		.36	
Benton	.36	.36	.36	.36	40.80			
Black Hawk	10.00	9.00	4.00		55.50		1.25	3.40
Boone	1.00				19.25	.10		
Brenner					24.00		1.25	15.00
Buchanan								25.00
Buena Vista								
Butler	12.00	10.00	10.00	10.00	3.00		8.50	6.25
Calhoun	6.00	6.00	6.00	6.00	16.00		6.00	.50
Carroll	1.00	.50			41.50			
Cass								
Cedar					32.23			
Cerro Gordo	1.00	1.00	1.00	1.00	10.40		16.00	6.85
Cherokee		8.00	5.00	12.00	6.00		2.00	
Chickasaw	14.00	12.00	12.00	3.00	7.50		11.00	9.75
Clarke					22.00			
Clay	3.00						1.50	24.25
Clayton	25.92	22.92	22.92	7.26	30.35	.35	.45	
Clinton	13.98	13.24	8.49	8.49	4.65		.91	1.49
Crawford			1.25	1.25			9.61	
Dallas					53.40		3.30	2.75
Davis	14.00				2.25			
Decatur	5.00	5.00	5.00	6.00	16.25	1.75	4.75	7.75
Delaware					29.51		1.75	.50
Des Moines					30.70		5.91	7.60
Dickinson	20.00	20.00	19.00					7.70
Dubuque	.39	.25			8.50		.60	18.80
Emmet	5.75	5.25	1.75	1.75			20.15	3.00
Fayette	.50	.50	13.00	13.00	35.00	1.00	.25	4.28
Floyd	12.00	10.00			6.00		7.50	10.25
Franklin	.50	.50	.50	.50	14.00		11.37	
Fremont	3.25	2.00	2.00					
Greene	1.00	17.00	2.00	1.00	9.75		1.50	10.50
Grundy	3.60	3.60	3.60	3.60	18.00			
Guthrie	7.50	26.85		26.10	11.54	.32	1.50	.50
Hamilton					46.00		30.47	25.81
Hancock	18.00	10.00	4.00	4.00	13.00		4.00	3.50
Hardin	1.65	1.65	1.28		2.00		24.10	5.25
Harrison					17.40		1.65	
Henry					17.00		1.00	
Howard	12.00	11.00	9.50	9.00	11.00		7.00	17.30
Humboldt	33.00	35.00	21.00	21.00			25.75	
Ida					1.00			.25
Iowa					16.25		16.25	
Jackson	3.00	3.00	3.00	3.00				
Jasper	5.00	4.00	4.00	4.00	52.25	3.00	1.15	
Jefferson	19.78	19.78	19.78	19.78	27.80		2.00	
Johnson	1.10	11.10	11.10	11.10	60.70			
Jones	1.10	1.10						
Keokuk					31.00			6.53
Kossuth	2.00	3.00	8.00	5.00	10.00		8.42	.50
Lee	1.00	1.00	1.00	1.00	36.00			.50
Linn	.50	.50	.50	.50	37.50			.33
Louisa					79.00			
Lucas								
Lyon	7.50				23.40			
Madison	42.50	6.00	3.00		36.50		.80	
Mahaska	.75				33.00		.50	.25
Marion	3.00	2.00	1.00	1.00	43.90	1.00	3.75	
			17.00	17.00			13.70	

SUMMARY TABLE NO. 20.—Continued.

County	Surveys and Profiles				Construction			
	No. miles surveyed	No. miles platted	No. miles grade line approved by district engineers	No. miles profiled approved by commission	Built to natural grade, standard width	Built to temporary grade, standard width	Built to permanent grade, standard width	Surfaced
Marshall	14.00	14.00	14.00	14.00	23.50	-------	14.00	-------
Mills	-------	-------	-------	-------	76.00	-------	-------	-------
Mitchell	4.25	1.25	7.75	1.50	30.50	-------	2.00	5.00
Monona	5.80	5.80	5.30	5.30	31.00	-------	4.30	-------
Monroe	8.25	8.25	8.25	8.25	-------	-------	-------	-------
Montgomery	11.50	11.50	11.50	11.50	-------	7.00	-------	-------
Muscatine	8.10	6.30	7.20	7.90	25.00	-------	7.55	3.18
O'Brien	-------	6.00	6.00	6.00	19.00	-------	5.36	-------
Osceola	31.00	-------	.50	-------	24.00	.50	-------	-------
Page	-------	-------	-------	-------	51.00	.10	.10	-------
Palo Alto	4.00	27.50	26.25	26.25	-------	-------	32.48	-------
Plymouth	3.00	3.00	-------	-------	-------	3.00	-------	-------
Pocahontas	14.00	17.00	14.00	14.00	5.25	-------	49.10	30.85
Polk	17.00	18.75	11.00	10.25	-------	-------	26.76	20.20
Pottawattamie	3.75	3.75	-------	-------	-------	-------	-------	-------
Poweshiek	7.00	7.00	3.00	-------	14.50	1.50	-------	-------
Ringgold	-------	-------	-------	-------	-------	-------	-------	-------
Sac	1.15	18.00	33.50	33.50	-------	1.15	34.75	8.58
Scott	3.00	8.00	3.25	3.25	3.25	.25	3.75	.75
Shelby	-------	-------	-------	-------	23.00	-------	-------	-------
Sioux	9.00	10.00	10.00	10.00	49.50	-------	7.10	-------
Story	-------	-------	-------	-------	-------	-------	.75	21.00
Tama	-------	10.00	11.00	11.00	58.00	.20	7.40	2.20
Taylor	-------	-------	-------	-------	24.00	-------	-------	-------
Union	40.00	23.00	11.00	-------	38.20	.80	-------	-------
Van Buren	-------	-------	-------	-------	37.75	-------	-------	-------
Wapello	.25	.25	.25	-------	-------	.33	.20	-------
Warren	-------	-------	-------	-------	65.00	-------	-------	-------
Washington	-------	-------	-------	-------	73.98	-------	-------	-------
Wayne	-------	-------	-------	-------	20.00	-------	-------	-------
Webster	-------	-------	-------	-------	10.00	-------	2.80	16.55
Winnebago	12.00	7.00	7.00	6.00	6.00	-------	5.50	-------
Winneshiek	1.25	.25	.25	-------	49.75	-------	.25	-------
Woodbury	-------	12.50	54.75	54.75	9.10	.36	17.52	-------
Worth	-------	-------	9.00	-------	-------	-------	6.25	9.00
Wright	6.00	4.00	2.50	-------	39.00	-------	-------	4.00
Totals	526.18	520.84	478.03	424.89	2,127.60	22.71	471.06	347.70

SUMMARY TABLE NO. 21.

Progress Report.—County Road Surveys and Construction.—Total Work Done to Jan. 1, 1919.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	Surveys and Profiles				Construction				Total number of miles in county system
	No. of miles surveyed	No. of miles platted	No. miles grade line approved by district engineers	No. miles profiled approved by Commission	Built to natural grade, standard width	Built to temporary grade, standard width	Built to permanent grade, standard width	Surfaced	Maintenance and repairs
Adair	37.49	16.00	10.00	4.00	85.30	68.00	6.00	-------	2.7
Adams	5.00	2.00	2.00	2.00	108.25	13.00	1.50	-------	4.00
Allamakee	25.26	25.26	12.08	7.67	53.70	-------	25.40	-------	51.15
Appanoose	37.50	37.50	6.00	6.00	75.00	18.00	2.00	-------	71.50
Audubon	32.50	32.50	6.00	82.00	139.00	.50	3.50	-------	-------
Benton	25.00	82.50	82.50	42.86	175.14	27.50	8.86	1.00	2.00
Black Hawk	79.66	51.66	43.91	43.91	143.37	.28	4.59	13.43	24.86
Boone	86.10	79.98	79.98	32.40	96.60	4.25	5.95	29.00	22.50
Bremer	71.55	79.55	38.75	55.00	52.80	-------	8.00	1.95	63.45
Buchanan	61.27	54.77	36.35	22.36	120.00	2.50	11.75	95.00	16.16
Buena Vista	20.90	20.90	15.21	4.30	-------	-------	94.50	75.50	-------
Butler	170.35	141.03	110.02	117.67	157.00	-------	8.50	1.50	18.70
Calhoun	46.75	39.75	18.25	9.50	51.62	-------	89.50	32.50	-------
Carroll	135.75	132.75	127.75	126.50	96.00	-------	42.00	1.95	32.50
Cass	124.50	46.75	53.25	35.25	-------	3.25	2.25	.50	139.75
Cedar	10.25	5.50	6.00	2.75	111.97	.25	1.33	1.00	28.70
Cerro Gordo	16.20	15.41	13.17	12.17	75.00	-------	14.40	1.00	25.35
Cherokee	85.52	90.40	81.60	79.90	83.60	-------	39.10	15.90	14.25
Chickasaw	56.25	65.50	49.54	64.54	111.00	-------	57.50	18.25	6.25
Clarke	53.50	53.25	39.00	25.00	115.88	-------	21.00	-------	-------
Clay	1.00	1.00	1.00	1.00	-------	-------	-------	-------	-------
Clayton	150.00	143.74	133.00	119.30	-------	-------	80.75	69.25	197.80
Clinton	68.25	20.00	6.75	3.50	70.00	2.00	80.50	1.00	73.21
Crawford	95.96	92.96	130.06	22.32	77.75	7.75	28.87	13.67	46.07
Dallas	115.47	101.73	25.79	91.47	-------	.99	103.44	-------	13.53
Davis	70.33	66.58	43.30	60.44	113.06	.50	19.87	26.20	42.80
Decatur	-------	3.00	2.00	-------	113.00	-------	-------	-------	111.43
Delaware	16.75	29.87	25.50	20.00	9.85	-------	-------	-------	2.30
Des Moines	50.13	37.02	14.50	10.57	30.72	1.00	20.00	15.00	11.60
	38.35				138.00	1.54	8.11	5.50	81.75
					55.00				

SUMMARY TABLE NO. 21.—Continued.

County	Surveys and Profiles				Construction					
	No. of miles surveyed	No. of miles platted	No. miles grade line approved by district engineers	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	Maintenance and repairs	Total number of miles in county system
Dickinson	126.43	126.43	100.59	103.59			76.31		35.12	111.43
Dubuque	82.14	82.14	53.00	29.00	21.50		4.85	28.75	117.45	172.55
Emmet	109.25	108.75	102.38	78.32	8.00	1.00	24.00	63.00	10.00	106.00
Fayette	39.25	22.50	19.00		165.00	1.00	22.00	6.00	8.00	202.00
Floyd	41.25	45.86	34.67	36.06	122.34		12.00	7.78	12.13	144.25
Franklin	138.50	102.60	32.50	12.85	105.12		10.50	24.63	44.50	184.75
Fremont	9.22	10.72	4.62	3.62	30.00		1.50		122.88	154.38
Greene	80.25	75.00	42.00	64.50	35.75		6.50	51.63	38.62	132.50
Grundy	130.58	59.58	2.00	8.00	149.00		3.50		5.50	158.00
Guthrie	21.65	9.40	7.52	4.09	92.24	.32	2.78	2.50	98.16	196.00
Hamilton	124.60	114.35	70.15	93.00	77.61		60.27	51.50	4.00	193.38
Hancock	100.14	80.86	62.38	66.50	43.75	9.25	21.33	17.75	74.55	166.63
Hardin	140.50	119.97	112.72	104.72	69.70		43.60	45.00	20.00	178.30
Harrison	31.90	26.00	19.13	13.25	86.55	1.40	14.75		65.30	168.00
Henry	87.10	64.00	16.00	3.00	105.00		1.50		35.80	142.30
Howard	51.41	47.41	30.75	22.25	87.55	3.00	19.50	6.25	6.00	122.30
Humboldt	105.85	104.10	83.50	66.50	60.75		30.00	42.75		133.50
Ida	9.75	9.75			83.00	1.25			47.75	132.00
Iowa	27.80	24.20	32.50	14.02	125.66	33.71	3.58	1.81	11.74	176.50
Jackson	14.50	14.50	9.25	10.25			5.15		152.35	157.50
Jasper	42.00	36.50	29.50	21.75	140.25	44.50	15.25		4.80	204.80
Jefferson	37.98	37.98	23.42	24.92	122.40		.60		18.30	141.30
Johnson	158.10	150.14	86.83	16.60	154.50	2.00	9.50	.50	6.50	173.00
Jones	24.20	25.40	11.08	7.75	107.00	10.00	6.00	7.50	55.00	185.50
Keokuk	41.85	34.80	19.34	16.07	31.00		4.09		132.71	167.80
Kossuth	84.26	74.26	63.16	47.66	191.90	.50	20.60	33.00	34.00	280.00
Lee	72.84	40.84	5.84	5.84	77.00		.75	14.00	58.25	150.00
Linn	23.55	19.20	3.40	1.00	63.75	2.90	6.65	3.22	142.28	218.80
Louisa	60.36	24.11	14.65	14.65	79.00		7.97	2.57	22.46	112.00
Lucas	2.25	2.00			60.00	1.00			87.00	148.00
Lyon	50.25	36.55	14.00	14.00	140.15	2.00	11.25		35.60	190.00
Madison	112.15	2.83	2.73	2.08	109.00	.90	1.50		50.60	162.00
Mahaska	46.50	39.50	15.88	15.88	96.25	44.75	8.75	.25	5.05	155.05

Marion	13.72	13.71	31.21	31.21	139.82	1.02	17.04		11.97	169.85
Marshall	172.04	163.34	34.20	26.85	164.69		20.00	4.36		189.05
Mills	33.90	28.65	11.17	9.20	78.00	21.50			10.50	110.00
Mitchell	14.50	10.25	7.75	1.50	56.00		4.50	15.50	53.25	129.25
Monona	36.67	33.07	21.59	17.43	131.00	5.50	14.85		10.15	161.50
Monroe	27.55	27.41	14.75	9.25	163.00	.50			4.00	167.50
Montgomery	28.00	26.00	22.50	12.50		7.00			119.75	126.75
Muscatine	74.72	58.90	50.22	32.91	100.41		26.43	4.41	8.70	139.95
O'Brien	74.73	82.79	73.22	39.50	135.42	4.44	49.14			189.00
Osceola	62.90	31.90	30.90	30.40	86.00	15.00	30.00	1.00		132.00
Page	35.57	19.49	3.25	3.00	130.00	41.00	3.00			174.00
Palo Alto	150.14	150.14	141.54	138.64	8.30	.10	131.46	2.83	24.19	166.88
Plymouth	36.41	36.41				7.00			201.50	208.50
Pocahontas	131.65	131.65	105.90	102.60	52.20		38.00	65.90	12.40	168.50
Polk	88.98	82.88	48.68	38.25	147.39		6.86	27.75	9.25	191.25
Pottawattamie	118.93	107.03	28.51	23.80	237.05	10.24	6.21	2.00		255.50
Poweshiek	19.55	18.05	11.50		121.80	11.50			5.00	138.30
Ringgold	16.00	4.00			35.25	1.75	.50		146.00	183.50
Sac	150.88	154.12	150.55	142.55		1.15	103.73	42.67	3.30	150.85
Scott	38.73	36.23	24.98	24.98	19.00	3.60	19.30	37.60	57.30	136.80
Shelby	20.77	20.77			95.00	.40	.30		62.05	157.75
Sioux	38.98	31.48	21.98	11.00	104.50		9.10		102.40	216.00
Story	132.40	131.40	131.40	131.40			80.50	52.00		132.50
Tama	75.10	80.65	66.40	62.05	169.50	2.00	28.70	2.20	4.60	207.00
Taylor	10.71	8.71	2.71	.71	110.00		.37		61.63	172.00
Union	41.00	24.50	11.00		71.00	2.00			62.50	135.50
Van Buren					125.50				7.80	133.30
Wapello	29.75	23.25	14.75	11.50	97.47	8.33	10.20	.50	20.63	137.13
Warren	23.75	8.25	1.00	4.75	155.75	.25	3.50		10.50	170.00
Washington	18.60	18.60	15.80	.50	16.96		8.90		166.04	192.50
Wayne	19.62	13.62	8.00	6.00	141.00				31.50	172.50
Webster	94.00	85.00	77.00	102.00	119.62		47.20	18.55		185.37
Winnebago	143.55	70.25	49.75	48.75	75.00	3.50	49.25		3.71	131.46
Winneshiek	9.00	.25	.25		181.40		.75		20.15	202.30
Woodbury	106.30	99.50	79.65	56.25	119.80	9.36	34.00	.17	49.67	213.00
Worth	114.50	114.50	69.75		50.50	13.00	9.00	42.00		114.50
Wright	52.25	45.25	33.75	29.25	84.00			39.00	56.63	179.63
Totals	6,234.21	5,290.19	3,729.11	3,134.96	8,818.90	491.12	1,904.46	1,116.43	3,854.61	16,185.53

SUMMARY TABLE NO. 22.

Gravel Pits Owned by County, January 1, 1919.

ANNUAL REPORT OF COUNTY ENGINEERS.

County	Number	Value	County	Number	Value
Allamakee	1	$ 1,500.00	Clinton	1	400.00
Black Hawk	7	3,400.00	Delaware	7	1,800.00
Buchanan	9	2,585.40	Dubuque	1	250.00
Butler	10	2,000.00	Floyd	4	1,100.00
Cerro Gordo	7	1,700.00	Greene	1	200.00
Clay	20	9,847.00	Hancock	7	19.00
Dallas	7	1,500.00	Howard	5	1,680.00
Dickinson	3	3,000.00	Kossuth	12	2,500.00
Emmet	6	1,000.00	Lyon	4	1,000.00
Franklin	6	3,000.00	Mitchell	2	450.00
Hamilton	2	400.00	Palo Alto	1	500.00
Hardin	4	1,000.00	Pocahontas	13	4,817.00
Humboldt	1	600.00	Scott	1	1,400.00
Linn	7	3,000.00	Winnebago	2	400.00
Marion	1	1,060.00	Worth	5	3,000.00
Muscatine	2	1,800.00	Sac	1	
Benton	1	100.00	Story	9	1,400.00
Bremer	5	1,500.00	Woodbury	1	825.00
Buena Vista	13	5,250.00	Wright	10	2,875.00
Calhoun	12	3,100.00			
Chickasaw	11	3,000.00	Totals	229	$ 74,958.40

SUMMARY TABLE NO. 23.

Amount of Road and Bridge Work Planned or Constructed by County Engineers.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	Construction			Planned		
	Road	Bridge	Total	Road	Bridge	Total
Adair	$ 30,000.00	$ 41,804.31	$ 71,804.31	$ 10,000.00	$ 66,022.92	$ 76,022.92
Adams	17,673.16	21,524.29	39,197.45		13,353.00	13,353.00
Allamakee	25,608.00	30,000.00	55,608.00	2,617.14	12,913.00	15,530.14
Appanoose	25,000.00	35,000.00	60,000.00		8,910.00	8,910.00
Audubon	6,756.71	48,555.06	55,311.77	5,000.00	36,739.00	41,739.00
Benton	30,000.00	94,000.00	124,000.00	2,233.65	91,517.95	93,751.60
Black Hawk	16,724.24	32,619.56	49,343.80		13,361.27	13,361.27
Boone	20,030.00	64,953.64	84,983.64	6,200.00	51,076.00	57,276.00
Bremer	17,000.00	38,000.00	55,000.00		32,435.00	32,435.00
Buchanan	7,803.66	24,803.74	32,607.40		24,312.40	24,312.40
Buena Vista	34,734.88	28,144.61	62,879.49		15,670.00	15,670.00
Butler	12,500.00	26,120.70	38,620.70		536.00	536.00
Calhoun	31,050.21	29,693.93	60,744.14		14,808.65	65,922.54
Carroll	43,578.00	37,500.00	81,078.00	51,114.49		51,114.49
Cass		58,426.97	58,426.97	27,500.00	17,927.80	45,427.80
Cedar	7,649.39	23,011.49	30,660.88		57,386.50	57,386.50
Cerro Gordo	97,963.82	67,879.00	165,842.82	1,000.00	29,745.00	29,745.00
Cherokee	10,960.43	73,385.06	84,345.49	40,170.00	28,596.49	28,596.49
Chickasaw	21,000.00	52,000.00	73,000.00	52,000.00	76,517.00	116,687.00
Clarke	12,748.69	20,326.58	33,075.27		14,042.76	60,042.76
Clay	26,853.25	46,527.87	73,381.12		11,185.00	11,185.00
Clayton	15,500.00	52,528.44	68,028.44	3,000.00	24,667.00	24,667.00
Clinton	9,853.00	40,748.58	50,601.58	147,000.00	11,730.00	14,730.00
Crawford	60,000.00	150,000.00	210,000.00	62,911.29	96,293.75	243,293.75
Dallas	39,000.00	71,000.00	110,000.00	2,000.00	107,573.00	170,484.29
Davis	9,185.12	30,435.73	39,620.85		15,937.33	92,025.00
Decatur	10,000.00	32,906.67	42,906.67	4,600.00	22,175.86	15,937.33
Delaware	19,165.00	22,100.00	41,265.00	12,700.00	17,930.00	26,775.86
Des Moines	12,000.00	22,000.00	34,000.00		16,811.55	30,630.00
Dickinson	40,530.17	33,000.00	73,530.17		18,029.30	16,811.55
Dubuque	56,650.00	75,000.00	131,650.00	30,000.00	8,079.00	48,029.30
Emmet	43,070.00	12,550.00	55,620.00	8,015.00	8,929.49	16,094.00
Fayette	30,000.00	45,000.00	75,000.00	6,000.00	44,112.00	14,929.49
Floyd	33,704.49	42,294.45	75,998.94	15,480.00	22,697.35	50,112.00
Franklin	32,599.00	38,460.52	70,960.52	21,160.00	19,030.00	38,177.35
						41,030.00

SUMMARY TABLE NO. 23.—Continued.

County	Construction			Planned		
	Road	Bridge	Total	Road	Bridge	Total
Fremont	9,057.03	87,906.60	96,963.63	2,500.00	33,337.41	35,837.41
Greene	28,480.30	42,218.08	70,698.38	3,870.00	32,960.66	36,830.66
Grundy	9,182.27	82,423.15	91,605.42	50,000.00	81,129.00	131,129.00
Guthrie	20,000.00	68,000.00	88,000.00	15,200.00	41,278.94	56,478.94
Hamilton	92,079.78	58,700.06	150,779.84	34,681.80	83,697.00	118,378.80
Hancock	30,356.93	59,212.60	89,569.53		22,870.42	22,870.42
Hardin	45,000.00	80,000.00	125,000.00	20,000.00	68,724.63	88,724.63
Harrison	15,416.40	48,601.00	64,017.40	3,000.00	39,108.50	42,108.50
Henry	4,615.32	53,314.63	57,929.95		25,000.00	25,000.00
Howard	15,510.00	40,465.87	55,975.87	14,700.00	30,500.00	45,200.00
Humboldt	40,000.00	42,000.00	82,000.00	43,000.00	26,750.00	69,750.00
Ida	4,760.00	31,600.00	36,360.00		52,900.00	52,900.00
Iowa	15,028.00	130,599.03	145,627.03		117,852.04	117,852.04
Jackson	10,000.00	50,000.00	60,000.00	5,000.00	35,000.00	40,000.00
Jasper	62,000.00	134,140.00	196,140.00	20,000.00	49,329.60	69,329.60
Jefferson	17,451.40	28,725.76	46,177.16		17,245.00	17,245.00
Johnson	30,000.00	55,600.00	85,600.00	65,250.00	24,710.90	89,960.90
Jones	11,677.00	35,230.00	46,907.00	3,451.64	26,187.00	29,638.64
Keokuk	16,816.65	82,607.00	99,423.65		52,972.89	52,972.89
Kossuth	30,000.00	40,320.00	70,320.00	5,000.00	24,867.77	29,867.77
Lee	21,764.65	32,717.97	54,482.62		4,560.00	4,560.00
Linn	30,543.39	43,753.00	74,296.39	24,705.71	47,152.73	71,858.44
Louisa	25,556.62	29,822.95	55,379.57	2,960.00	14,165.21	17,125.21
Lucas	20,000.00	30,000.00	50,000.00		30,952.00	30,952.00
Lyon	16,500.00	45,860.00	62,360.00	16,580.00	950.40	17,530.40
Madison	8,082.79	39,192.44	47,275.23		28,498.18	28,498.18
Mahaska	40,000.00	65,000.00	105,000.00	8,000.00	17,822.30	25,822.30
Marion	84,426.26	70,186.34	154,612.60		8,202.00	8,202.00
Marshall	52,215.89	161,861.48	214,077.37	47,722.00	86,376.20	134,098.20
Mills	35,000.00	83,622.47	118,622.47		58,300.00	58,300.00
Mitchell	11,554.06	46,952.90	58,506.96	5,000.00	29,715.00	34,715.00
Monona	32,000.00	66,000.00	98,000.00	12,585.00	41,689.00	54,274.00
Monroe	2,000.00	36,700.00	38,700.00		29,740.00	29,740.00
Montgomery	25,000.00	52,245.67	77,245.67	10,000.00	20,023.65	30,023.65
Muscatine	36,000.00	36,700.00	72,700.00	10,000.00	13,679.75	23,679.75
O'Brien	43,025.12	70,494.75	113,519.87	35,000.00	44,715.61	79,715.61
Osceola	10,000.00	33,177.98	43,177.98	1,060.00	32,261.57	33,321.57
Page	25,000.00	75,000.00	100,000.00	10,000.00	17,500.00	27,500.00
Palo Alto	42,000.00	35,000.00	77,000.00	33,000.00	55,481.09	88,481.09
Plymouth	18,505.72	90,300.00	108,805.72	6,759.45	37,155.91	43,915.36
Pocahontas	82,840.00	32,900.00	115,740.00	20,400.00	12,880.00	33,208.00
Polk	200,000.00	199,628.33	399,628.33	50,000.00	48,301.04	98,301.04
Pottawattamie	27,500.00	125,000.00	152,500.00	12,000.00	103,991.00	115,991.00
Poweshiek	20,328.00	73,000.00	93,328.00	10,000.00	23,900.00	33,900.00
Ringgold	8,139.67	64,349.01	72,488.68		27,828.54	27,828.54
Sac	81,000.00	103,055.00	184,055.00	65,000.00	69,680.35	134,680.35
Scott	30,000.00	32,000.00	62,000.00	25,000.00	17,224.60	42,224.60
Shelby	14,840.00	61,350.00	76,190.00		41,326.00	41,326.00
Sioux	30,200.00	24,277.00	54,477.00	22,000.00	650.00	22,650.00
Story	38,000.00	63,400.00	101,400.00	10,000.00	33,125.00	43,125.00
Tama	41,578.74	88,522.12	130,100.86	12,600.00	54,973.00	67,573.00
Taylor	8,284.52	52,874.63	61,159.15		25,744.64	25,744.64
Union	16,000.00	36,304.00	52,204.00	12,000.00	33,032.00	45,032.00
Van Buren	18,425.00	65,003.20	83,428.20		19,878.70	19,878.70
Wapello	16,500.00	67,520.00	84,020.00	2,900.00	25,752.00	28,652.00
Warren	19,624.80	61,383.62	81,008.42		14,518.72	14,518.72
Washington	30,005.76	26,644.25	56,650.01		38,920.82	38,920.82
Wayne	18,750.39	50,252.91	69,003.30		6,265.00	6,265.00
Webster	45,402.31	49,804.59	95,206.90		501.77	501.77
Winnebago	22,000.00	20,000.00	42,000.00	25,000.00	7,834.59	32,834.59
Winneshiek	15,000.00	30,000.00	45,000.00	1,260.99	25,500.00	26,760.99
Woodbury	40,500.00	53,806.20	94,306.20	25,000.00	49,559.00	74,559.00
Worth	13,000.00	26,405.00	39,405.00	10,000.00	16,985.00	26,985.00
Wright	42,957.25	22,648.34	65,605.59	4,000.00	13,522.81	17,522.81
Totals	$ 2,874,354.24	$ 5,388,581.13	$ 8,262,935.37	$ 1,332,828.16	$ 3,359,070.52	$ 4,691,898.68

SUMMARY TABLE NO. 24.

Cost of Engineering.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	Road			Bridge			Total Engineering Cost
	County Engineer's Salary and Expense	Assistant Engineer's Salary and Expense	Total	County Engineer's Salary and Expense	Assistant Engineer's Salary and Expense	Total	
Adair	$ 954.72	$ 400.00	$ 1,354.72	$ 1,404.28	$ 452.55	$ 1,856.83	$ 3,211.55
Adams	1,062.96	41.65	1,104.61	1,062.96	41.65	1,104.61	2,209.22
Allamakee	1,200.00	111.12	1,311.12	1,197.39	300.00	1,497.39	2,808.51
Appanoose	714.00	330.50	1,044.50	936.00	454.00	1,440.00	2,484.50
Audubon	600.00	33.58	633.58	1,800.00	100.00	1,900.00	2,533.58
Benton	758.19	15.81	774.00	2,307.01	15.00	2,322.01	3,096.01
Black Hawk	1,480.18	145.75	1,625.93	1,403.75	120.50	1,524.25	3,150.18
Boone	979.26	1,048.99	2,028.25	1,468.88	368.97	1,837.85	3,866.10
Bremer	1,284.73	349.80	1,634.53	1,024.68	340.90	1,365.58	3,000.11
Buchanan	1,070.22	17.10	1,087.32	1,070.23	17.10	1,087.33	2,174.65
Buena Vista	1,218.56	321.13	1,539.69	1,115.38	218.62	1,334.00	2,873.69
Butler	1,092.35	254.00	1,346.35	916.00	25.00	941.00	2,287.35
Calhoun	1,432.82	757.36	2,190.18	479.76	73.43	553.19	2,743.37
Carroll	1,298.60	619.63	1,918.23	1,141.58	691.65	1,833.23	3,751.46
Cass				2,200.00	88.50	2,288.50	2,288.50
Cedar	555.13	77.68	632.81	1,797.04	365.03	2,162.07	2,794.88
Cerro Gordo	1,500.20	808.00	2,308.20	1,016.00	550.90	1,566.90	3,875.10
Cherokee	1,027.78	842.64	1,870.42	1,072.22	1,241.96	2,314.18	4,184.60
Chickasaw	660.00	425.00	1,085.00	660.00	425.00	1,085.00	2,170.00
Clarke	595.27		595.27	1,633.50		1,633.50	2,228.77
Clay	1,060.93	162.20	1,223.13	1,211.72	86.85	1,298.57	2,521.70
Clayton	161.75		161.75	1,976.12		1,976.12	2,137.87
Clinton	1,613.33	1,325.67	2,939.00	987.92	1,036.61	2,024.53	4,963.53
Crawford	1,080.05	2,507.75	3,587.80	2,173.64	1,833.33	4,006.97	7,594.77
Dallas	1,300.00	46.86	1,346.86	1,620.00	45.00	1,665.00	3,011.86
Davis	600.00		600.00	900.00		900.00	1,500.00
Decatur	865.00	900.43	1,765.43	1,304.33	1,200.00	2,504.33	4,269.76
Delaware	1,090.18	189.70	1,279.88	834.00	189.70	1,023.70	2,303.58
Des Moines	1,080.09	519.40	1,599.49	954.36	399.04	1,353.40	2,952.89
Dickinson	962.57	1,362.98	2,325.55	641.86	1,246.72	1,888.58	4,214.13
Dubuque	1,546.82	352.45	1,899.27	2,302.23	528.68	2,830.91	4,730.18
Emmet	1,238.23	1,342.66	2,580.89	410.35	314.20	724.55	3,305.44
Fayette	620.80		620.80	1,241.88	300.00	1,541.88	2,162.68
Floyd	958.41	602.80	1,561.21	1,243.39	240.45	1,483.84	3,045.05
Franklin	758.16	1,409.22	2,167.38	1,254.87	1,187.64	2,442.51	4,609.89
Fremont	259.00	247.00	506.00	2,102.00	352.80	2,454.80	2,960.80
Greene	1,437.88	817.32	2,255.20	1,057.97	450.62	1,508.59	2,763.79
Grundy	499.75	408.90	908.65	2,153.00	1,636.60	3,789.60	4,698.25
Guthrie	1,086.89	437.51	1,524.40	1,463.05	320.26	1,783.31	3,307.71
Hamilton	1,205.48	2,114.86	3,320.34	1,376.40	726.98	2,103.38	5,423.72
Hancock	862.22	313.25	1,175.47	1,151.64	160.90	1,312.54	2,488.01
Hardin	1,100.00	2,623.96	3,723.96	1,565.00	1,150.00	2,715.00	6,438.96
Harrison	848.25	71.75	920.00	1,661.20	177.66	1,838.86	2,758.86
Henry	75.00		75.00	1,700.00	3.00	1,703.00	1,778.00
Howard	837.88	703.35	1,541.23	826.18	510.55	1,336.73	2,877.96
Humboldt	1,875.00	1,125.00	3,000.00	625.00	375.00	1,000.00	4,000.00
Ida	718.44	15.10	733.54	1,436.88		1,436.88	2,170.42
Iowa	706.37	315.63	1,022.00	1,835.77	1,057.82	2,893.59	3,915.59
Jackson	1,048.30	69.25	1,117.55	1,534.24	137.00	1,671.24	2,788.79
Jasper	1,014.05	214.65	1,228.70	1,291.02	624.03	1,915.05	3,143.75
Jefferson	1,117.00	496.33	1,613.33	1,149.00	80.00	1,229.00	2,842.33
Johnson	600.00	1,828.46	2,428.46	1,800.00	100.00	1,900.00	4,328.46
Jones	630.01	40.00	670.01	945.02	60.00	1,005.02	1,675.03
Keokuk	896.98	168.33	1,065.31	1,793.47	337.67	2,131.14	3,196.45
Kossuth	1,200.00	1,205.81	2,405.81	2,064.16	341.66	2,405.82	4,811.63
Lee	570.00	197.65	767.65	1,140.00	430.00	1,570.00	2,337.65
Linn	1,652.11	1,020.15	2,672.26	1,652.11	1,417.74	3,069.85	5,742.11
Louisa	510.00	200.00	710.00	510.00	200.00	710.00	1,420.00
Lucas	684.00	10.00	694.00	1,366.00	20.00	1,386.00	2,080.00
Lyon	1,145.04	532.10	1,677.14	1,156.37	429.34	1,585.71	3,262.85
Madison	642.36	451.91	1,094.27	1,793.39	1,261.59	3,054.98	4,149.25
Mahaska	1,500.00	116.50	1,616.50	944.70	80.00	1,024.70	2,641.20
Marion	1,451.80	1,226.17	2,677.97	1,391.70	257.29	1,648.99	4,326.96
Marshall	895.83	1,475.00	2,370.83	1,791.71	2,068.57	3,860.28	6,231.11
Mills	874.07		874.07	1,748.14		1,748.14	2,622.21
Mitchell	900.00	350.00	1,250.00	1,400.00	300.00	1,700.00	2,950.00
Monona	1,194.00	300.06	1,494.06	1,700.69	173.06	1,873.75	3,367.81
Monroe	500.00	151.50	651.50	1,100.00	82.65	1,182.65	1,834.15
Montgomery	700.00	311.82	1,011.82	1,400.00		1,400.00	2,411.82
Muscatine	1,121.00	1,380.55	2,501.55	1,000.00	655.09	1,655.90	4,157.45
O'Brien	1,125.65	808.81	1,934.46	1,271.48	500.00	1,771.48	3,705.94
Osceola	431.41	551.45	982.86	748.52	825.35	1,573.87	2,556.73
Page	790.55	438.30	1,228.85	1,174.38	675.00	1,849.38	3,078.23
Palo Alto	1,188.32	1,315.40	2,503.72	1,077.43	276.59	1,354.02	3,857.74
Plymouth	600.00		600.00	2,400.00		2,400.00	3,000.00
Pocahontas	1,796.00	2,365.24	4,161.24	1,028.74	397.33	1,426.07	5,587.31
Polk	1,610.37	2,989.62	4,599.99	2,194.85	3,663.46	5,858.31	10,458.30
Pottawattamie	730.00	275.00	1,005.00	2,190.00	825.00	3,015.00	4,020.00
Poweshiek	790.22	214.76	1,004.98	1,538.07	107.39	1,645.46	2,650.44
Ringgold	9,000.00	2,000.00	11,000.00	1,342.25		1,342.25	12,342.25
Sac	787.97	2,025.56	2,813.53	2,247.55	309.46	2,557.01	5,370.54
Scott	1,500.00	1,121.00	2,621.00	1,500.00	1,076.00	2,576.00	5,197.00

SUMMARY TABLE NO. 24.—Continued.

County	Road			Bridge			Total Engineering Cost
	County Engineer's Salary and Expense	Assistant Engineer's Salary and Expense	Total	County Engineer's Salary and Expense	Assistant Engineer's Salary and Expense	Total	
Shelby	1,921.85	79.57	2,001.42	613.60	39.78	653.38	2,654.80
Sioux	1,700.00	1,551.16	3,251.16	850.00		850.00	4,101.16
Story	1,224.31	50.85	1,275.16	2,040.37	15.60	2,055.97	3,331.13
Tama	911.24	610.00	1,521.24	1,800.00	363.35	2,163.35	3,684.59
Taylor	727.76	227.40	955.16	1,455.54	454.82	1,910.36	2,865.52
Union	787.73	12.27	800.00	1,456.50	78.50	1,535.00	2,335.00
Van Buren	500.00	20.00	520.00	1,055.00	33.75	1,088.75	1,608.75
Wapello	871.41	167.50	1,038.91	871.41	167.50	1,038.91	2,077.82
Warren	700.00	236.00	936.00	2,100.00	707.95	2,807.95	3,743.95
Washington	1,047.35	55.05	1,102.40	1,047.35	55.00	1,102.35	2,204.75
Wayne	1,298.16	80.00	1,378.16	1,300.00	75.00	1,375.00	2,753.16
Webster	2,073.77	603.17	2,676.94	1,067.18	576.21	1,643.39	4,320.33
Winnebago	898.65	461.58	1,360.23	800.00	400.00	1,200.00	2,560.23
Winneshiek	683.72	160.15	843.87	1,292.48		1,292.48	2,136.35
Woodbury	2,269.46	3,496.09	5,765.55	756.00	1,165.00	1,921.00	7,686.55
Worth	1,000.00	67.50	1,067.50	1,007.10	65.00	1,072.10	2,139.60
Wright	1,150.00	650.00	1,800.00	300.00	210.00	510.00	2,310.00
Totals	$ 106,189.53	$ 60,579.53	$ 166,769.06	$ 131,129.17	$ 42,482.89	$ 173,612.06	$ 340,381.12

SUMMARY TABLE NO. 25.

Financial Statement.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	County Bridge Fund					County Motor Vehicle Road Fund				
	Balance or overdraft, Jan. 1, 1918	Receipts 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919	Balance or overdraft, Jan. 1, 1918	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919
Adair	$ 21,089.66*	$ 43,992.43	$ 22,902.77	$ 51,441.70	$ 28,538.93*	$ 279.89*	$ 19,143.36	$ 18,863.47	$ 17,968.52	$ 894.95
Adams	284.76*	34,395.32	34,110.56	30,916.03	3,194.53	4,610.02	11,866.59	16,476.61	11,789.56	4,687.05
Allamakee	431.46	33,446.65	33,878.11	33,773.86	104.25	4,510.47	17,463.97	21,974.44	22,365.52	391.08*
Appanoose	3,811.05*	43,718.96	39,907.91	37,927.95	1,979.96	177.26	16,368.71	16,545.97	12,458.20	4,087.77
Audubon	1,236.52	77,949.98	79,186.50	79,028.59	157.91	4,153.39	11,507.88	15,661.27	13,136.86	2,524.41
Benton	563.76	122,332.74	122,896.50	119,078.71	3,817.79	6,342.27	18,746.64	25,088.91	22,349.39	2,739.52
Black Hawk	71.82*	69,013.45	68,941.63	76,433.50	7,491.87*	273.18*	16,769.39	16,496.21	17.65	16,478.56
Boone	2,082.89	53,611.57	55,694.46	49,314.78	6,379.68	2,357.82	15,300.20	17,658.02	4,696.78	12,961.24
Bremer	9,825.57*	39,950.60	30,125.03	30,510.43	385.40*		12,601.00	12,601.00	6,480.94	6,120.06
Buchanan	893.29	45,452.21	46,345.50	49,528.07	3,182.57*	4,079.07*	16,000.00	11,920.93	11,548.66	372.27
Buena Vista	8,665.41	71,128.76	79,794.17	91,125.81	11,331.64*	831.91	16,527.62	17,359.53	15,963.64	1,395.89
Butler	309.57	83,141.68	83,451.25	84,045.00	593.75*	1,517.90	14,675.09	16,192.99	9,057.22	7,135.77
Calhoun	3,783.07	105,071.51	108,854.58	68,599.83	40,254.75	48.87	17,000.00	17,048.87	16,832.80	216.07
Carroll	2,109.29*	93,958.73	91,849.44	104,905.33	13,055.89*	9,199.08*	14,819.92	5,620.84	32.48	5,588.36
Cass	7,015.88*	49,100.47	42,084.59	44,574.82	2,490.23*	218.13	15,060.70	15,278.83	15,434.46	155.63*
Cedar	1,136.07	56,684.82	57,820.89	34,636.18	23,184.71	31.04	16,973.70	17,004.74	5,918.54	11,086.20
Cerro Gordo	2,792.41	63,509.31	66,301.72	88,234.68	21,932.96*	6,171.49	25,690.87	31,862.36	33,912.70	2,050.34*
Cherokee	655.88	189,499.95	190,155.83	186,551.41	3,604.42	20,368.58	15,107.00	35,475.58	17,930.06	17,545.52
Chickasaw	3,570.61*	36,765.07	33,194.46	33,189.12	5.34	3,877.22	11,261.89	15,139.11	13,551.27	1,587.84
Clarke	1,888.58*	31,067.56	29,178.98	27,946.40	1,232.58	8,384.22	11,718.32	20,102.54	14,380.22	5,722.32
Clay	29,866.51	79,391.23	109,257.74	109,594.40	336.66*	759.72*	15,189.06	14,429.34	5,144.62	9,284.72
Clayton	2,628.60	52,436.16	55,064.76	53,536.62	1,528.14	2,334.92	20,993.49	23,328.41	12,263.94	11,064.47
Clinton	5,602.54	57,422.09	63,024.63	46,676.07	16,348.56	1,100.73*	18,000.00	16,899.27	4,597.02	12,302.25
Crawford	2,452.09*	209,173.82	206,721.73	206,581.85	139.88	9,361.35	19,392.23	18,753.58	10,964.77	17,788.81
Dallas	6,967.50	54,126.68	61,094.18	58,754.56	2,339.62	590.60	16,000.00	16,590.60	16,590.60	
Davis	668.23	26,516.05	27,184.28	26,335.79	848.49	1,427.88	15,372.95	16,800.83	10,271.55	6,529.28
Decatur	4,783.97	31,418.81	36,202.78	36,990.08	787.30*	543.11	14,620.28	15,163.39	11,038.36	4,125.03
Delaware	149.08	43,474.58	43,623.66	41,590.85	2,032.81	1,427.88	15,372.95	16,800.83	10,271.55	6,529.28
Des Moines	4,993.19	24,654.63	29,647.82	30,346.16	698.34*	887.01*	14,000.00	13,112.99	2,705.59	10,407.40

SUMMARY TABLE NO. 25.—Continued.

County	County Bridge Fund					County Motor Vehicle Road Fund				
	Balance or overdraft Jan. 1, 1918	Receipts 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919	Balance or overdraft, Jan. 1, 1918	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919
Dickinson	10,909.07	51,145.78	62,054.85	59,050.22	3,004.63	711.18	11,144.27	11,855.45	10,413.43	1,442.02
Dubuque	1,241.40*	139,635.64	138,394.24	157,264.47	18,870.23*	8,361.48	18,000.00	26,361.48	15,027.54	11,333.94
Emmet	794.69	23,168.56	23,963.25	21,013.30	2,949.95	27.33	11,440.37	11,467.70	11,433.27	34.43
Fayette	3,197.18*	59,608.50	56,411.32	51,900.92	4,510.40		19,584.64	19,584.64	7,570.82	12,013.82
Floyd	2,698.85*	37,776.81	35,077.96	40,674.96	5,597.00*	2,966.83	13,762.68	16,729.51	7,551.52	9,177.99
Franklin	875.31	47,794.79	48,670.10	50,738.58	2,068.48*		16,773.24	16,773.24	11,258.59	5,514.65
Fremont	5,641.52	53,389.91	59,031.43	59,524.59	493.16*	2,120.23	11,817.10	13,937.33	13,410.57	526.76
Greene	3,800.17	37,571.83	41,372.00	52,699.45	11,327.45*		16,000.00	16,000.00	16,000.00	
Grundy	3,888.94	48,122.49	52,011.43	51,073.87	937.56	40.14	13,283.47	13,323.61	13,310.18	13.43
Guthrie	2,430.25	168,794.97	171,225.22	172,957.08	1,731.84*	5,858.22	17,000.00	22,858.22	13,200.67	9,657.55
Hamilton	44.27	79,320.00	79,364.27	76,896.34	2,467.93					
Hancock	529.91*	35,371.05	34,841.14	42,609.07	7,767.93*	1,939.42	14,903.28	16,842.70	16,776.85	65.85
Hardin	1,881.04	77,373.91	79,254.95	77,477.97	1,776.98	3,967.18	15,311.13	19,278.31	11,963.11	7,315.20
Harrison	13,003.37*	52,102.61	39,099.24	39,457.70	358.46*	1,536.51	18,508.91	20,145.42	12,426.02	7,619.40
Henry	11,234.89	39,068.54	50,303.43	44,341.04	5,962.39	2,216.23	10,888.37	13,104.60	12,062.43	1,042.17
Howard	1,011.04	32,295.10	33,306.14	43,806.14	10,500.00*	193.94	11,278.78	11,472.72	12,136.02	663.30*
Humboldt	1,811.08	37,140.27	38,951.35	29,214.61	9,736.74	16,594.22	14,003.35	30,597.57	14,707.42	15,890.15
Ida	499.61	61,299.17	61,798.78	57,356.88	4,441.90	48.47	12,000.00	12,048.47	11,667.60	380.87
Iowa	2,793.04*	99,675.68	96,882.64	92,846.24	4,036.40	8,044.41	18,000.00	26,044.41	15,430.20	10,614.21
Jackson	1,260.58	135,457.02	136,717.60	132,035.50	4,682.10	4,451.14	16,884.75	21,335.89	18,493.72	2,842.17
Jasper	8,760.59*	119,150.30	110,398.71	105,735.72	5,022.99	5,121.05	17,659.17	22,780.22		22,780.22
Jefferson	5,749.34*	58,776.86	53,027.52	52,680.42	347.10	7,459.52	12,000.00	19,459.52	7,647.56	11,811.96
Johnson	3,608.76*	49,022.65	45,413.89	54,854.84	9,440.95*	12,085.42	19,677.02	31,762.44	3,740.55	28,021.89
Jones	4,773.09	45,446.67	50,219.76	49,195.84	1,023.92	4,855.55	16,700.91	21,556.46	15,050.67	6,505.79
Keokuk	8,734.75	58,531.19	67,265.94	61,902.30	5,363.64	9,532.55	17,000.00	26,532.55	26,459.46	73.09
Kossuth	4,991.07*	61,461.13	56,470.06	68,659.53	12,189.47*	4,692.58	27,979.70	32,672.28	17,213.14	15,459.14
Lee	50.20*	36,152.09	36,101.89	43,006.81	6,904.92*	1,159.61*	15,300.00	14,140.39	8,570.33	5,570.06
Linn	901.15	62,648.27	63,549.42	60,158.94	3,390.48		20,000.00	20,000.00	20,000.00	
Louisa	420.64*	35,031.54	34,610.90	32,784.72	1,826.18	11,368.28	11,711.79	23,080.07	21,733 48	1,346.59
Lucas	5,151.02	59,816.42	64,967.44	60,142.42	4,825.02		12,000.00	12,000.00	12,000.00	
Lyon	829.22	63,033.55	63,862.77	63,630.40	232.37		16,977.40	16,977.40	16,977.40	
Madison	1,093.08	36,035.98	37,129.06	42,457.08	5,328.02*	748.84	15,627.72	16,376.56	16,341.16	35.40
Mahaska	809.13	79,684.69	80,493.82	80,693.46	199.64*	5,982.12	17,635.23	23,617.35	23,354.15	263.20
Marion	4,612.04	44,680.89	49,292.93	46,387.21	2,905.72					
Marshall	1,138.73*	178,966.77	177,828.04	178,784.35	956.31*	8.04*	14,510.28 16,311.17	14,510.28 16,303.13	14,510.28 13,216.85	3,086.28
Mills	1,931.93*	83,622.47	81,690.54	81,495.17	195.37					
Mitchell	4,292.05*	42,455.99	38,233.94	41,396.26	3,162.32	2,317.52*	14,529.13	12,211.61	14,639.29	2,427.68*
Monona	7,488.66*	46,405.95	38,917.29	41,180.60	2,263.31*	367.93*	17,706.24	17,338.31	14,819.18	2,519.13
Monroe	10,699.88*	26,616.61	15,916.73	19,935.77	4,019.04*		12,000.00	12,000.00	12,000.00	
Montgomery	569.26*	39,646.98	39,077.72	41,289.46	2,211.74*	4,472.01	11,603.95	16,075.96	3,316.22	12,759.74
Muscatine	4,023.96	37,958.47	41,982.43	37,559.49	4,422.94	2,129.01	13,750.86	15,888.87	15,834.84	54.03
O'Brien	404.37	69,605.21	70,009.58	68,850.72	1,158.86	36.24	16,926.38	16,962.62	16,678.58	284.04
Osceola	16,702.38*	57,289.91	40,587.53	38,719.52	1,868.01	12,725.20	11,538.14	24,263.34	17,689.34	6,574.00
Page	13,771.68*	53,160.73	39,389.05	47,920.80	8,531.75*	4,059.56	14,406.08	18,465.64	18,525.29	59.65*
Palo Alto	6,731.24	75,940.86	82,672.10	81,709.10	963.00	2,333.05	14,942.25	17,275.30	6,563.87	10,711.43
Plymouth	882.34	105,000.96	105,883.30	101,801.48	4,081.82	2,205.30	33,148.65	35,353.95	4,720.34	30,633.61
Pocahontas	2,615.37*	45,153.74	42,538.37	35,690.63	6,847.74					
Polk	1,497.88*	192,200.26	190,702.38	186,704.15	3,998.23	23,397.89	22,360.40	45,658.29	28,603.00	17,055.29
Pottawattamie	4,752.58	71,911.05	76,663.63	70,542.44	6,121.19	19,959.21	22,534.40	42,493.61	34,393.85	8,099.76
Poweshiek	245.05	119,723.57	119,968.62	117,892.18	2,076.44	2,531.76*	15,473.09	12,941.33	12,775.08	166.25
Ringgold	7,658.25*	30,359.00	22,700.75	21,841.68	859.07	314.49	16,199.27	16,513.76	18,313.34	1,799.58*
Sac	548.68	90,241.49	90,790.17	90,415.70	374.47	2,616.19	14,936.62	17,552.81	15,775.26	1,777.55
Scott	16,159.82	46,242.72	62,402.54	35,112.16	27,290.38	86.16	14,418.00	14,504.16	14,445.89	58.27
Shelby	339.55	50,046.61	50,386.16	49,630.98	755.18	80.22	14,400.00	14,480.22	14,012.70	467.52
Sioux	47,997.62*	76,303.11	28,305.49	34,719.61	6,414.12*	5,656.70	21,265.72	26,922.42	530.22	26,392.20
Story	6,876.09	47,604.21	54,480.30	53,856.85	623.45	6,421.98	17,073.00	23,494.98	19,971.61	3,523.37
Tama	969.83	134,693.57	135,663.40	129,348.80	6,315.32	6,090.00	21,000.00	27,090.00	24,925.85	2,164.15
Taylor	1,822.88	90,881.81	92,704.69	81,865.09	10,839.60	439.40	15,873.46	16,312.86	13,658.14	2,654.72
Union	3,470.96*	40,519.65	37,048.69	32,407.66	4,641.03	1,348.11	13,596.37	14,944.48	13,788.41	1,156.07
Van Buren	934.94	28,195.96	29,130.90	26,690.22	2,440.68	48.06	13,067.36	13,115.42	12,519.48	595.94
Wapello	15,366.12	26,501.03	41,767.15	41,874.86	107.71*	388.46	12,600.00	12,988.46	12,857.81	130.65
Warren	22,637.14	38,873.12	61,510.26	55,856.55	5,653.71		17,000.00	17,000.00	17,000.00	
Washington	508.02	119,094.76	119,602.78	92,949.42	26,653.36	1,662.73	15,007.00	16,669.73	20,957.87	4,288.14*
Wayne	1,425.66	35,886.77	37,312.43	40,076.70	2,764.27*	1,293.27	16,000.00	17,293.27	17,653.04	359.77*
Webster	245.49	50,476.88	50,722.37	54,193.32	3,470.95*	8,966.25*	21,600.00	12,633.75	25,602.67	12,968.92*
Winnebago	2,627.96*	25,876.75	23,148.79	29,921.66	6,772.87*	57.68*	9,657.64	9,599.96	10,668.46	1,068.50*
Winneshiek	624.51*	42,743.38	42,118.87	44,442.79	2,323.92*	228.24*	19,430.70	19,202.46	18,442.24	760.22
Woodbury	137.38	88,551.41	88,688.79	94,962.32	6,273.53*	6,318.58	20,930.64	27,249.22	10,456.03	16,793.19
Worth	4,433.17*	20,563.18	16,130.01	30,338.49	14,208.48*	24,050.00	13,000.00	37,050.00		37,050.00
Wright	4,360.64*	48,377.45	44,016.81	46,898.05	2,881.24*					
Totals	$ 5,032.44	$6,425,692.07	$6,430,724.51	$6,385,911.49	$ 44,813.02	$296,125.28	$1,523,102.89	$1,819,228.17	$1,293,466.36	$ 525,761.81

*Overdraft.

SUMMARY TABLE NO. 26.

Financial Statement.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	County Road Cash Fund					Township Road, Drag and Drainage Funds				
	Balance or overdraft, Jan. 1, 1918	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1918	Balance or overdraft, Jan. 1, 1919	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919
Adair	$ 4,134.93	$ 19,124.76	$ 23,259.69	$ 16,491.88	$ 6,767.81	$ 3,486.37	$ 40,114.44	$ 43,600.81	$ 40,536.95	$ 3,063.86
Adams	10,375.96	24,614.16	34,990.12	19,340.48	15,649.64	6,411.31	23,523.41	29,934.72	22,451.42	7,483.30
Allamakee	3,475.94	17,444.48	20,920.42	23,970.05	3,049.63*	795.55	34,252.77	35,048.32	34,188.35	859.97
Appanoose	3,901.03*	39,089.37	35,188.31	43,218.86	8,030.52*	4,962.57	29,990.78	34,953.35	29,116.78	5,836.57
Audubon	2,302.96	27,039.10	29,342.06	13,254.49	16,087.57	7,477.27	20,820.28	28,297.55	21,165.90	7,131.65
Benton	445.70	36,769.17	37,214.87	34,809.23	2,405.64	6,168.40	63,124.09	69,292.49	60,344.77	8,947.72
Black Hawk	5,380.50	37,381.01	42,761.51	32,407.33	10,354.18	6,776.53	40,753.34	47,529.87	35,946.56	11,583.31
Boone	410.44	27,647.59	28,058.03	25,677.53	2,380.50	11,687.32	44,409.30	56,096.62	48,579.43	7,517.19
Bremer	8,993.95	15,945.16	24,939.11	23,905.44	1,033.67	199.90	23,660.19	23,860.09	23,618.56	241.53
Buchanan	21,724.12	30,607.03	52,331.15	38,728.96	13,602.19	2,488.96	34,173.18	36,662.14	32,904.36	3,757.78
Buena Vista	5,554.62	97,612.59	103,167.21	109,101.14	5,933.93*	4,493.16	54,552.31	59,045.47	45,781.68	13,263.79
Butler	255.28*	45,615.52	45,360.24	32,628.09	12,732.15	7,473.23	39,526.40	46,999.63	38,630.50	8,369.13
Calhoun	3,651.61	84,150.80	87,802.41	49,658.91	38,143.50	23,282.26	51,747.95	75,030.21	43,830.22	31,199.99
Carroll	18,047.73*	27,544.41	9,496.68	53,092.59	43,595.91-	6,177.14	42,379.56	48,556.70	35,343.69	13,213.01
Cass	3,065.34	27,376.06	30,441.40	30,112.24	329.16	15,742.27	36,730.61	52,472.88	37,316.27	15,156.61
Cedar	7,017.44	25,602.20	32,619.64	26,5 8.90	6,110.74	5,497.50	45,400.83	50,898.33	42,323.71	8,574.62
Cerro Gordo	2,707.14	59,162.20	61,869.34	59,896.68	1,972.66	4,667.29	58,081.63	62,748.92	45,516.99	17,231.93
Cherokee	1,411.10*	49,683.04	48,271.94	46,533.46	1,738.48					
Chickasaw	440.99*	19,289.09	18,848.10	15,035.36	3,812.74	922.22	34,286.45	35,208.67	31,069.89	4,138.78
Clarke	543.00*	14,147.65	13,604.65	14,024.90	420.25*	2,063.80	8,384.81	10,448.61	8,997.59	1,451.02
Clay	69.64*	80,840.94	80,771.30	76,935.85	3,835.45	10,119.47	27,992.82	38,112.29	24,035.60	14,076.69
Clayton	4,348.00	27,632.15	31,980.15	31,104.78	875.37	14,801.31	42,396.81	57,198.12	39,048.59	18,149.53
Clinton	4,180.50	33,622.79	37,803.29	28,055.27	9,748.02	8,603.28	47,017.78	55,621.06	48,140.59	7,480.47
Crawford	13,028.78	166,635.46	179,664.24	178,490.82	1,173.42	7,983.37	56,264.57	64,247.94	59,798.11	4,449.83
Dallas	1,418.36	36,101.56	37,519.92	28,733.74	8,786.18	5,218.94	56,269.95	61,488.89	50,771.21	10,717.68
Davis	1,133.16	19,046.58	20,179.74	9,592.69	10,587.05	2,828.80	28,324.48	31,153.28	25,232.02	5,921.26
Decatur	101.12*	29,600.93	29,499.81	26,673.95	2,825.86	2,504.23	24,164.88	26,669.11	23,303.58	3,365.53
Delaware	145.58	32,425.62	32,571.20	33,235.29	664.09*	2,194.67	38,899.14	41,093.81	37,502.53	3,591.28

Des Moines	8,255.26	17,393.75	25,649.01	28,176.58	2,527.57*	4,811.00	28,770.23	33,581.23	29,576.64	4,004.59
Dickinson	19,943.90	63,959.33	83,894.23	80,409.13	3,485.10	3,940.81	27,829.63	31,770.44	23,682.61	8,087.83
Dubuque	121.14	117,905.54	118,026.68	158,317.98	40,291.30*	6,780.58	40,228.26	47,008.84	39,116.19	7,892.65
Emmet	613.38	47,897.36	48,510.74	47,326.46	1,184.28	5,981.24	38,620.42	44,601.66	32,734.79	11,866.87
Fayette	23,800.94	33,719.00	57,519.94	51,379.45	6,140.49	4,600.45	50,400.74	55,001.19	48,047.80	6,953.39
Floyd	2,112.59	41,605.45	43,718.04	26,169.21	17,548.83	1,527.22	37,342.37	38,869.59	35,828.45	3,041.14
Franklin		41,914.20	41,914.20	47,172.41	5,258.21*	10,201.72	61,015.36	71,217.08	48,253.34	22,963.74
Fremont	728.44*	26,307.62	25,579.18	24,218.82	1,360.36	3,647.66	29,152.00	32,799.66	30,089.58	2,710.08
Greene	79.10	41,141.40	41,220.50	38,851.81	2,368.69	17,858.25	60,886.50	78,744.75	57,707.38	21,037.37
Grundy	1,425.52*	25,722.10	24,296.58	25,018.83	722.25*	7,437.18	36,889.79	44,326.97	35,684.45	8,642.52
Guthrie	1,337.26	23,448.44	24,785.70	21,902.96	2,882.74	4,641.51	32,458.89	37,100.40	32,950.57	4,149.83
Hamilton	151.78*	98,795.30	98,643.52	101,115.48	2,471.96*	25,294.21	43,620.72	68,914.93	37,673.93	31,241.00
Hancock	3,337.59*	26,626.63	23,289.04	23,087.46	201.58	6,303.76	27,195.75	33,499.51	23,730.23	9,767.28
Hardin	110.28	39,188.29	39,298.57	38,774.09	524.48	10,685.42	44,868.25	55,553.67	41,730.50	13,823.17
Harrison	6,049.01*	27,945.43	21,896.42	21,998.80	102.38*	8,784.30	54,793.60	63,577.90	45,646.08	17,931.82
Henry	4,679.03	22,726.30	27,405.33	26,295.02	1,110.31	2,923.87	23,004.62	25,928.49	22,877.48	3,051.01
Howard	2,158.54*	15,673.17	13,514.63	12,809.50	705.13	4,254.14	23,743.40	27,997.54	21,090.44	6,907.10
Humboldt	2,746.78	26,253.89	29,000.67	33,153.25	4,152.58*	11,052.82	42,682.36	53,735.18	37,867.36	15,867.82
Ida	442.66	21,872.80	22,315.46	9,971.38	12,344.08	11,404.88	32,452.02	43,856.90	25,470.52	18,386.38
Iowa	339.49	43,126.26	43,465.75	43,436.83	28.92	12,527.43	39,745.58	52,273.01	37,053.57	15,219.44
Jackson	682.35	21,304.23	21,986.58	21,742.13	244.45	7,512.52	28,805.82	36,318.34	27,124.99	9,193.35
Jasper	453.20*	94,756.41	94,303.21	92,513.02	1,790.19	6,576.79	60,640.57	67,217.36	62,025.54	5,191.82
Jefferson	196.45	28,623.71	28,820.16	29,119.02	298.86*	851.61	37,388.16	38,239.77	37,840.33	399.44
Johnson	1,462.88	31,061.97	32,524.85	36,562.56	4,037.71*	5,089.48	34,201.72	39,291.20	34,700.37	4,590.83
Jones	685.04	23,808.75	24,493.79	23,763.49	730.30	2,824.36	40,906.67	43,731.03	41,189.32	2,541.71
Keokuk	11,240.73	26,585.46	37,826.19	17,045.25	20,780.94	5,757.42	38,735.18	44,492.60	35,890.60	8,602.00
Kossuth	16,777.56	44,852.44	28,074.88	29,139.26	1,064.38*	10,983.57	45,829.47	56,813.04	47,003.53	9,809.51
Lee	5,241.38*	28,757.72	23,516.34	23,871.86	355.52*	13,107.44	32,825.88	45,933.32	32,645.94	13,287.38
Linn	2,237.53*	49,215.30	46,977.77	46,667.50	310.27	4,204.44	51,884.82	56,089.26	51,919.17	4,170.09
Louisa	724.04*	17,991.85	17,267.81	6,148.97	11,118.84	3,212.05	28,221.39	31,433.44	27,564.72	3,868.72
Lucas	219.32	14,190.36	14,409.68	11,028.06	3,381.62	2,098.93	23,126.49	25,225.42	22,775.40	2,450.02
Lyon	2,737.79*	36,896.24	34,158.45	33,265.11	893.34	10,798.75	27,427.12	38,225.87	24,768.88	13,456.99
Madison	6,225.16*	22,488.07	16,262.91	16,339.36	76.45*	4,753.15	36,482.74	41,235.89	37,209.53	4,026.36
Mahaska	49.89*	31,885.06	31,835.17	31,573.39	261.78	1,340.16	47,466.00	48,806.16	45,996.92	2,809.24
Marion	10,015.94	49,751.54	59,767.48	61,651.47	1,889.99*	4,398.97	39,705.23	44,104.20	34,219.68	9,884.52
Marshall	643.64*	56,623.98	55,980.34	56,015.38	35.04*	6,830.77	50,600.12	57,430.89	47,620.20	9,810.69
Mills	707.87*	35,871.72	35,163.85	35,106.82	57.03	4,503.45	26,409.88	30,913.33	17,474.80	13,438.53
Mitchell	3,672.56*	18,561.95	14,889.39	25,561.57	10,672.18*	5,582.26	26,392.40	31,974.66	24,779.89	7,194.77
Monona	11,549.35*	25,977.38	14,428.03	18,722.97	4,294.94*	14,335.00	41,232.33	55,567.33	37,597.42	18,059.91
Monroe	9,178.82*	20,302.26	11,123.44	34,633.83	23,510.39*	5,153.37	22,172.59	27,325.96	22,290.84	5,035.12
Montgomery	993.22	19,933.61	20,926.83	22,655.31	1,728.48*	3,529.09	15,971.75	19,500.84	16,167.19	3,333.65
Muscatine	182.86	22,018.96	22,201.82	21,212.48	989.34	9,244.41	28,204.87	37,449.28	27,350.34	10,098.94
O'Brien	4,057.27	29,854.92	33,912.19	29,144.88	4,767.31	14,122.08	39,296.72	53,418.80	40,994.29	12,424.51
Osceola	4,829.33	36,535.37	41,364.70	34,210.51	7,154.19	317.20*	28,705.19	28,387.99	27,648.35	739.64
Page	6,611.95*	33,019.91	26,407.96	24,660.47	1,747.49	9,551.25	42,368.18	51,919.43	41,835.27	10,084.16
Palo Alto	14,661.66*	58,219.16	43,557.50	20,796.08	22,761.42	5,336.23	19,626.53	24,962.76	17,247.62	7,715.14
Plymouth	5,651.44	33,172.19	38,823.63	38,916.01	92.38*	22,697.11	40,028.24	62,725.35	33,827.70	28,897.65
Pocahontas	17,256.18	56,581.79	73,837.97	67,098.55	6,739.42	19,570.66	59,850.65	79,421.31	47,775.81	31,645.50
Polk	6,616.92*	351,374.68	344,757.76	335,059.89	9,697.87	8,461.94	46,589.86	55,051.80	45,892.47	9,159.33
Pottawattamie	4,663.40	43,363.61	48,027.01	45,985.71	2,041.30	10,889.59	66,552.66	77,412.25	62,980.15	14,432.10

SUMMARY TABLE NO. 26.—Continued.

County	County Road Cash Fund					Township Road, Drag and Drainage Funds				
	Balance or overdraft, Jan. 1, 1918	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1918	Balance or overdraft, Jan. 1, 1919	Receipts, 1918	Total	Disbursements, 1918	Balance or overdraft, Jan. 1, 1919
Poweshiek	244.16	42,452.52	42,696.68	42,000.31	696.37	8,603.00	42,858.33	51,461.42	47,449.02	4,012.40
Ringgold	1,937.59*	17,365.48	15,427.89	16,505.77	1,077.88*	2,550.99	24,436.84	26,987.83	18,679.12	8,308.71
Sac	2,396.40	47,356.81	49,753.21	50,671.84	918.63*	10,549.42	55,597.71	66,147.13	50,273.21	15,873.92
Scott	3,520.84*	20,427.76	16,906.92	17,462.59	555.67*	7,779.46	37,095.35	44,874.81	36,505.85	8,368.96
Shelby	7,016.13	26,599.74	33,615.87	33,273.68	342.19	8,413.78	4,2038.32	50,452.10	34,751.99	15,700.11
Sioux	26,301.08	27,000.18	53,301.26	49,147.73	4,153.53	22,125.57	47,874.46	70,000.03	45,171.13	24,828.90
Story	1,869.94	43,359.26	45,229.20	36,034.69	9,194.51	6,875.19	55,114.87	61,990.06	42,444.10	19,545.96
Tama	825.49	35,149.59	35,975.08	42,682.52	6,707.44*	4,836.52	49,599.75	54,436.27	49,850.68	4,585.59
Taylor	2,202.24	51,336.46	53,538.70	53,007.43	531.27	10,866.85	33,114.34	43,981.19	28,451.13	15,530.06
Union	1,423.44*	16,245.37	14,821.93	18,914.48	4,092.55*	802.69	22,858.82	23,661.51	23,183.86	477.65
Van Buren	3.77	14,912.66	14,916.43	13,552.42	1,364.01	2,758.55	27,814.99	30,573.54	26,589.04	3,984.50
Wapello	3,629.97	16,222.19	19,852.16	22,266.27	2,914.11*	5,380.65	31,571.06	36,951.71	32,852.63	4,099.08
Warren	2,189.71	27,059.55	29,249.26	26,917.99	2,331.27	7,777.53	34,094.96	41,872.49	35,499.27	6,373.22
Washington	42.85*	27,928.21	27,885.38	44,638.00	16,752.62*	3,314.39	47,346.18	50,660.57	48,605.82	2,054.75
Wayne	7,620.12*	22,081.39	14,461.27	17,353.40	2,892.13*	5,256.01	24,093.79	29,349.80	26,398.81	2,950.99
Webster	10,595.77	40,210.51	50,806.28	31,442.04	19,364.24	24,465.48	75,481.25	99,946.73	67,695.57	32,251.16
Winnebago	5,445.45	69,155.77	74,601.22	77,583.47	2,982.25*	6,648.31	35,427.04	42,075.35	31,668.93	10,406.42
Winneshiek	1,055.77*	30,737.70	29,681.93	31,346.84	1,664.91*	3,237.38	39,671.50	42,908.88	39,268.30	3,640.58
Woodbury	2,226.58	54,948.57	57,175.15	51,201.47	5,973.68	17,686.01	25,882.98	43,568.99	23,869.03	19,699.96
Worth	8,479.34*	14,240.12	5,760.78	22,257.55	16,496.77*	5,726.62	25,582.56	31,309.18	25,324.83	5,984.35
Wright	7,410.54*	53,669.03	46,258.49	47,192.11	933.62*					
Totals	$131,513.93	$3,947,848.38	$4,079,362.31	$3,938,890.40	$140,471.91	$728,339.71	$3,278,117.58	$4,456,457.29	$3,501,107.34	$ 955,349.95

SUMMARY TABLE NO. 27.

Bonded Indebtedness of Counties.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	Road Funds				Bridge Funds				Total road and bridge bonds outstanding Jan. 1, 1919
	Bonds outstanding Jan. 1, 1918	Bonds issued in 1918	Bonds paid in 1918	Bonds outstanding Jan. 1, 1919	Bonds outstanding Jan. 1, 1918	Bonds issued in 1918	Bonds paid in 1918	Bonds outstanding Jan. 1, 1919	
Adair									
Adams									
Allamakee					$ 126,000.00		$ 5,000.00	$ 121,000.00	$ 121,000.00
Appanoose	$ 4,800.00	$ 21,720.00		$ 26,520.00	35,000.00	$ 9,339.52		44,339.52	70,859.52
Audubon					89,000.00	40,000.00		129,000.00	129,000.00
Benton	6,400.00	3,000.00		9,400.00	29,600.00	58,000.00		87,600.00	97,000.00
Black Hawk					13,000.00	24,000.00		37,000.00	37,000.00
Boone					37,450.00		8,000.00	29,450.00	29,450.00
Bremer									
Buchanan	27,377.70			27,377.70	34,093.61			34,093.61	61,471.31
Buena Vista	130,500.00	63,000.00		193,500.00	273,000.00	49,000.00	6,000.00	316,000.00	509,500.00
Butler	10,000.00	7,000.00		17,000.00	20,000.00	33,000.00		53,000.00	70,000.00
Calhoun	35,000.00	47,000.00	$ 10,000.00	72,000.00	40,125.00	53,000.00	5,000.00	88,125.00	160,125.00
Carroll					95,000.00	40,000.00		135,000.00	135,000.00
Cass					71,000.00		3,000.00	68,000.00	68,000.00
Cedar					5,000.00		5,000.00		
Cerro Gordo	39,348.00	17,689.27		57,037.27	27,000.00	18,000.00		45,000.00	102,037.27
Cherokee		19,587.40		19,587.40	100,228.05	136,028.41	2,362.50	233,893.96	253,481.36
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	67,529.57	50,000.00		117,529.57	226,470.43	40,000.00		266,470.43	384,000.00
Clayton	17,000.00			17,000.00	62,000.00			62,000.00	79,000.00
Clinton					107,000.00		5,000.00	102,000.00	102,000.00
Crawford	59,000.00	120,000.00		179,000.00	130,000.00	140,000.00	8,000.00	262,000.00	441,000.00
Dallas					96,000.00			96,000.00	96,000.00
Davis					56,500.00		2,000.00	54,500.00	54,500.00
Decatur	10,874.32	12,045.00		22,919.32	51,585.99		5,000.00	46,585.99	69,505.31
Delaware									
Des Moines	14,500.00		2,000.00	12,500.00	20,500.00		5,000.00	15,500.00	28,000.00

SUMMARY TABLE NO. 27.—Continued.

County	Road Funds				Bridge Funds				Total road and bridge bonds outstanding Jan. 1, 1919
	Bonds outstanding Jan. 1, 1918	Bonds issued in 1918	Bonds paid in 1918	Bonds outstanding Jan. 1, 1919	Bonds outstanding Jan. 1, 1918	Bonds issued in 1918	Bonds paid in 1918	Bonds outstanding Jan. 1, 1919	
Dickinson									
Dubuque		77,300.00		77,300.00	188,000.00	88,000.00		276,000.00	353,300.00
Emmet	77,500.00	33,000.00		110,500.00					110,500.00
Fayette					147,000.00		7,000.00	140,000.00	140,000.00
Floyd	17,486.49			17,486.49	182,234.14			182,234.14	199,720.63
Franklin					26,500.00		1,300.00	25,200.00	25,200.00
Fremont		6,500.00		6,500.00	241,000.00	16,500.00	11,000.00	246,500.00	253,000.00
Greene									
Grundy					30,000.00			30,000.00	30,000.00
Guthrie					28,000.00	124,000.00	2,000.00	150,000.00	150,000.00
Hamilton	37,000.00	47,200.82		84,200.82	46,000.00	30,119.18		76,119.18	160,320.00
Hancock									
Hardin	18,000.00	11,294.10		29,294.10		22,704.22		22,704.22	51,998.32
Harrison					168,051.00			168,051.00	168,051.00
Henry									
Howard	17,300.00			17,300.00	56,200.00			56,200.00	73,500.00
Humboldt									
Ida						20,000.00		20,000.00	20,000.00
Iowa	1,463.85	17,721.15		19,185.00	55,800.00	52,278.85	10,000.00	98,078.85	117,263.85
Jackson					118,000.00	90,000.00	10,000.00	198,000.00	198,000.00
Jasper		56,000.00		56,000.00	65,000.00	52,000.00		117,000.00	173,000.00
Jefferson	41,368.00	11,300.00		52,868.00	42,632.00	24,200.00		66,832.00	119,500.00
Johnson	8,000.00			8,000.00	107,000.00		8,880.00	98,120.00	106,120.00
Jones									
Keokuk	16,514.28			16,514.28	35,394.26			35,394.26	51,908.54
Kossuth					201,500.00		7,000.00	194,500.00	194,500.00
Lee					15,000.00		5,000.00	10,000.00	10,000.00
Linn									
Louisa					33,500.00			33,500.00	33,500.00
Lucas					66,600.00	30,000.00	5,500.00	91,100.00	91,100.00
Lyon									
Madison					37,068.38		2,000.00	35,068.38	35,068.38
Mahaska	28,523.81	4,000.00	2,000.00	30,523.81	90,872.77	24,500.00	7,000.00	108,372.77	138,896.58
Marion	25,442.39			25,442.39	315,448.88		10,000.00	305,448.88	330,891.27
Marshall		22,000.00		22,000.00	29,000.00	185,000.00		232,000.00	254,000.00
Mills		5,000.00		5,000.00	76,000.00	50,000.00	10,000.00	116,000.00	121,000.00
Mitchell	6,556.00			6,556.00	22,444.00			22,444.00	29,000.00
Monona									
Monroe	27,500.00			27,500.00	10,000.00			10,000.00	37,500.00
Montgomery	40,545.71			40,545.71	30,409.29			30,409.29	70,955.00
Muscatine									
O'Brien						13,000.00		13,000.00	13,000.00
Osceola		20,000.00		20,000.00	47,000.00	50,000.00	1,000.00	96,000.00	116,000.00
Page	25,000.00			25,000.00	88,260.00			82,260.00	113,260.00
Palo Alto		32,000.00		32,000.00	67,000.00	40,000.00		107,000.00	139,000.00
Plymouth					2,839.14			2,839.14	2,839.14
Pocahontas					111,000.00		3,000.00	108,000.00	108,000.00
Polk		298,000.00		298,000.00	333,000.00	138,000.00	6,000.00	465,000.00	763,000.00
Pottawattamie	65,000.00			65,000.00	225,000.00			225,000.00	290,000.00
Poweshiek		11,500.00		11,500.00	50,000.00	63,000.00		113,000.00	124,500.00
Ringgold					14,080.60		1,920.00	12,160.00	12,160.00
Sac	28,800.00	10,000.00		38,800.00	35,200.00	35,000.00		70,200.00	109,000.00
Scott									
Shelby									
Sioux									
Story									
Tama					100,500.00	68,000.00		168,500.00	168,500.00
Taylor		29,902.89		29,902.89		50,097.11		50,097.11	80,000.00
Union					99,000.00	20,000.00	11,000.00	108,000.00	108,000.00
Van Buren									
Wapello	49,000.00			49,000.00	163,500.00		7,000.00	156,500.00	205,500.00
Warren					82,500.00		20,000.00	62,500.00	62,500.00
Washington						65,000.00		65,000.00	65,000.00
Wayne	930.20			930.20	18,388.40			18,388.40	19,318.60
Webster									
Winnebago		50,000.00		50,000.00					50,000.00
Winneshiek					237,000.00			237,000.00	237,000.00
Woodbury					27,000.00	38,000.00	18,000.00	47,000.00	47,000.00
Worth									
Wright					119,500.00		8,000.00	111,500.00	111,500.00
Totals	$ 964,260.32	$1,163,760.63	$ 14,000.00	$2,054,020.95	$6,206,475.34	$1,979,767.29	$ 231,962.50	$7,954,280.13	$10,008,301.08

SUMMARY TABLE NO. 28.

Total Indebtedness of Counties for Road and Bridge Work, January 1, 1919.

ANNUAL REPORTS BY COUNTY ENGINEERS.

County	Road Funds					Bridge Funds					Total indebtedness of county
	Outstanding bills	Warrants issued and stamped by treasurer	Warrants issued and not presented for payment	Bonds outstanding	Total	Outstanding bills	Warrants issued and stamped by treasurer	Warrants issued and not presented for payment	Bonds outstanding	Total	
Adair	$ 175.32	$ 971.00	$ 237.88		$ 1,384.20	$ 1,638.98	4,956.90	$ 205.56		$ 6,801.44	$ 8,185.64
Adams	306.00		166.50		472.50	419.21	20,388.76	2.05		20,810.02	81,282.52
Allamakee		14,483.23			14,483.23		15,807.50		$ 121,000.00	136,807.50	151,290.73
Appanoose			272.48	$ 26,520.00	26,792.48				44,339.52	44,339.52	71,132.00
Audubon	200.00		200.00		400.00	500.00	5,766.14	300.00	129,000.00	135,566.14	135,966.14
Benton	2,000.00	12,189.20		9,400.00	23,589.20	2,000.00			87,600.00	89,600.00	113,189.20
Black Hawk	1,508.23		1,944.47		3,452.70	1,932.20		4,149.46	37,000.00	43,081.66	46,534.36
Boone	848.50	1,718.16			2,566.66	6,099.47	53,181.06		29,450.00	88,730.53	91,297.19
Bremer							856.28			856.28	856.28
Buchanan	1,826.18			27,377.70	29,203.88	850.58		300.88	34,093.61	35,245.07	64,448.95
Buena Vista	300.00	3,273.89		193,500.00	197,073.89	300.00			316,000.00	316,300.00	513,373.89
Butler	2,020.55			17,000.00	19,020.55	1,491.66	27,826.52		53,000.00	82,318.18	99,338.73
Calhoun		28,941.51	2,589.94	72,000.00	103,531.45		16,548.09		88,125.00	104,673.09	208,204.54
Carroll	2,450.00		50.00		2,500.00	500.00	7,270.89	482.58	135,000.00	143,253.47	145,753.47
Cass	988.00				988.00	442.87	26,239.44		68,000.00	94,682.31	95,670.31
Cedar	381.64		163.75		545.39	1,707.11		64.45		1,771.56	2,316.95
Cerro Gordo	263.90	5,890.98		57,037.27	63,192.15	836.69	1,178.01		45,000.00	47,014.70	110,206.85
Cherokee			602.20	19,587.40	20,189.60	4,441.74	24,000.00	1,209.17	233,893.96	163,544.87	283,734.47
Chickasaw		275.00			275.00	210.00	26,299.51	100.00	75,500.00	102,109.51	102,384.51
Clarke	508.05	2,807.95		10,000.00	13,316.00	21.40	7,193.66		32,000.00	39,215.06	52,531.06
Clay		33,570.40	2,136.28	117,529.57	153,236.25		15,111.67	1,485.97	266,470.43	283,068.07	436,304.32
Clayton	100.00		780.00	17,000.00	17,880.00	100.00	9,302.60	700.00	62,000.00	72,102.60	89,982.60
Clinton	940.00		250.75		1,190.75	4,200.00		112.07	102,000.00	106,312.07	107,502.82
Crawford	500.00	11,682.32	198.17	179,000.00	191,380.49	1,000.00	94,138.39	10,585.80	262,000.00	367,724.19	559,104.68
Dallas	2,000.00	157.18	309.38		2,466.56	3,500.00	30,853.99	20.80	96,000.00	130,374.79	132,841.35
Davis	528.61		300.69		829.30	363.30	5,849.75	462.05	54,500.00	61,175.10	62,004.40
Decatur	79.40	8,409.06	865.48	22,919.32	32,273.26	7,568.61	2,221.10	776.98	46,585.99	57,152.68	91,425.94
Delaware	600.15		4,044.80		4,644.95	94.68				94.68	4,739.63
Des Moines			45.45	12,500.00	12,545.45			38.35	15,500.00	15,538.35	28,083.80

Dickinson		19,228.80			19,228.80	500.00	11,176.46			11,676.46	30,905.26
Dubuque	50.00		300.00	77,300.00	77,650.00	200.00		35.00	276,000.00	276,235.00	353,885.00
Emmet	6,000.00	14,416.84	54.55	110,500.00	130,971.39	400.00		211.78		611.78	131,583.17
Fayette	800.00		545.25		1,345.25	1,000.00	29,538.67	330.18	140,000.00	170,868.85	172,214.10
Floyd	38.84		599.80	17,486.49	18,125.13	162.57	252.80	482.00	182,234.14	183,131.51	201,256.64
Franklin	1,482.57		282.10		1,764.67	1,724.38	7,760.17	53.95	25,200.00	34,738.50	36,503.17
Fremont	300.00	10,980.00	187.00	6,500.00	17,967.00	400.00	63,153.00	287.00	246,500.00	310,340.00	328,307.00
Greene	1,143.11				1,143.11	2,158.33	11,781.17			13,939.50	15,082.61
Grundy	350.00	8,413.26	1,439.87		10,203.13	6,365.65	38,937.33	708.58	30,000.00	76,011.56	86,214.69
Guthrie	1,500.00	14,972.25			16,472.25	1,500.00	5,832.17		150,000.00	157,332.17	173,804.42
Hamilton		36,784.33	1,032.24	84,200.82	122,017.39		26,196.91	649.45	76,119.18	102,965.54	224,982.93
Hancock	400.00	1,099.09			1,499.09	500.00	10,809.07	2,739.95		14,049.02	15,548.11
Hardin	3,500.00	22,982.87	344.45	29,294.10	56,121.42	2,500.00	42,443.85	3,525.15	22,704.22	71,173.22	127,294.64
Harrison	500.00	6,048.53			6,548.53	1,500.00	48,798.60		168,051.00	218,349.60	224,898.13
Henry	1,431.00		150.75		1,581.75	2,200.00		87.85		2,287.85	3,869.60
Howard	545.39		4.55	17,300.00	17,849.94	667.47		16.53	56,200.00	56,884.00	74,733.94
Humboldt	5,000.00				5,000.00	1,000.00	47,337.31			48,337.31	53,337.31
Ida	2,245.20				2,245.20	3,103.08	9,298.11		20,000.00	32,401.19	34,646.39
Iowa	1,400.84	1,622.16		19,185.00	22,208.00	11,000.00	55,343.99	4,503.55	98,078.85	168,926.39	191,134.39
Jackson		2,834.16			2,834.16		14,155.13		198,000.00	212,155.13	214,989.29
Jasper	1,500.00	35,196.25	2,400.26	56,000.00	95,096.51	2,500.00	48,776.82	384.36	117,000.00	168,661.18	263,757.69
Jefferson	1,488.00			52,668.00	54,156.00	1,023.77	3,523.99		66,832.00	71,379.76	125,535.76
Johnson	300.00		561.60	8,000.00	8,861.60	350.00		1,057.80	98,120.00	99,527.80	107,389.40
Jones	609.32	6,192.27			6,801.59	779.50	40,756.86			41,536.36	48,337.95
Keokuk	2,486.43			16,514.28	19,000.71	460.14			35,394.26	35,854.40	54,855.11
Kossuth	3,000.00		1,040.60		4,040.60	500.00		110.40	194,500.00	195,110.40	199,151.00
Lee			986.49		986.49			726.54	10,000.00	10,726.54	11,713.03
Linn	3,675.00	8,872.95	2,500.00		15,047.95	1,200.00	32,234.59	2,500.00		35,934.59	50,982.54
Louisa	300.00		263.08		563.08	4,000.00	16,139.93	49.86	33,500.00	53,689.79	54,252.87
Lucas	100.00	9,764.44			9,864.44	600.00	18,601.12		91,100.00	110,301.12	120,165.56
Lyon	675.00		796.35		1,471.35	2,450.00	56,291.00	810.39		59,551.39	61,022.74
Madison	2,565.00	18,215.31			20,780.31	31.91			35,068.38	35,100.29	55,880.60
Mahaska	918.63		409.36	30,523.81	31,851.80	23,000.00		19.41	108,372.77	131,392.18	163,243.98
Marion	15,000.00	382.68	200.00	25,442.39	41,025.07	3,000.00	23,689.55	260.00	305,448.88	332,398.43	373,423.50
Marshall	26.90	19,869.96	75.00	22,000.00	41,971.86	249.42	63,888.63	175.25	232,000.00	296,313.30	338,285.16
Mills	3,000.00	11,815.31	4.31	5,000.00	19,819.62	1,600.00	20,256.60	72.15	116,000.00	137,928.75	157,748.37
Mitchell		7,365.36	521.78	6,556.00	14,443.14		11,220.38	6,224.45	22,444.00	39,888.83	54,331.97
Monona		17,838.64			17,838.64		45,402.34			45,402.34	63,240.98
Monroe		23,510.39		27,500.00	51,010.39		4,019.04	2,040.93	10,000.00	16,059.97	67,070.36
Montgomery	200.00	22,945.46	2,250.98	40,545.71	65,942.15	500.00	62,815.07	37,587.94	30,409.29	131,312.30	197,254.45
Muscatine	700.00		10.80		710.80	100.00		80.18		180.18	890.98
O'Brien	1,431.35		205.55		1,636.90	1,692.25	3,347.65	1,713.20	13,000.00	19,753.10	21,390.00
Osceola	500.00		500.00	20,000.00	21,000.00	500.00	300.00	200.00	96,000.00	97,000.00	118,000.00
Page	505.87	14,910.42	329.05	25,000.00	40,745.34	841.25	22,509.80	323.81	88,260.00	111,934.86	152,680.20
Palo Alto	88.50	39,671.66	275.00	32,000.00	72,035.16	1,250.00	2,529.37	1,035.44	107,000.00	111,814.81	183,849.97
Plymouth							36,748.83		2,839.14	39,587.97	39,587.97
Pocahontas	200.00	69,527.49			69,727.49	800.00	25,765.52		108,000.00	134,565.52	204,293.01
Polk	1,000.00	53,311.79	14,316.17	298,000.00	366,627.96	100.00	45,227.20		460,500.00	510,327.20	876,955.16
Pottawattamie	800.00	29,318.05	600.00	65,000.00	95,718.05	2,500.00	180,366.12	* 800.00	225,000.00	408,666.12	504,384.17
Poweshiek	400.00	8,642.58		11,500.00	20,542.58	2,000.00	31,418.87		113,000.00	146,418.87	166,961.45

SUMMARY TABLE NO. 28.—Continued.

County	Road Funds					Bridge Funds					Total indebtedness of county
	Outstanding bills	Warrants issued and stamped by treasurer	Warrants issued and not presented for payment	Bonds outstanding	Total	Outstanding bills	Warrants issued and stamped by treasurer	Warrants issued and not presented for payment	Bonds outstanding	Total	
Ringgold		945.87			945.87	1,715.95	32,633.53		12,160.00	46,509.48	47,464.35
Sac		33,988.91	633.03	38,800.00	73,421.94	694.20	57,819.73	79.35	70,200.00	128,793.28	202,215.22
Scott	383.74		41.25		426.99	234.44		9.16		243.60	670.59
Shelby		3,574.30			3,574.30		5,582.05			5,582.05	9,156.36
Sioux	1,182.76				1,182.76						1,182.76
Story	3,000.00		698.75		3,698.75	4,500.00				4,500.00	8,198.75
Tama	5,792.55	20,073.15			25,865.70	5,905.88	46,182.89		168,500.00	220,588.77	246,454.47
Taylor	909.59			29,902.89	30,812.48	812.46			50,097.11	50,909.57	81,722.05
Union	500.00	546.49	248.45		1,294.94	6,000.00	10,671.84	284.61	108,000.00	124,956.45	126,257.39
Van Buren		25,756.23			25,756.23		76,068.76			76,068.76	101,824.99
Wapello	750.00	17,132.47	1,159.52	49,000.00	68,041.99	100.00	60,570.64	423.08	156,500.00	217,603.72	285,645.71
Warren	100.00		475.20		575.20	150.00		118.05	62,500.00	62,768.05	63,343.25
Washington		5,926.60			5,926.60		13,552.18		65,000.00	78,552.18	84,478.78
Wayne		263.00		930.20	1,193.20		9,446.31		18,388.40	27,834.71	29,027.91
Webster	4,000.00	2,915.00	200.00		7,115.60	2,000.00	10,853.33	200.00		13,053.33	20,168.33
Winnebago	1,500.00			50,000.00	51,500.00	2,500.00				2,500.00	54,000.00
Winneshiek	2,528.84	4.00	117.50		2,650.34	1,168.90	31,229.14		237,000.00	269,398.04	272,048.38
Worth	200.00				200.00	2,500.00	20,639.11		47,000.00	70,139.11	85,970.71
Woodbury	4,000.00	11,831.60			15,831.60	500.00				500.00	700.00
Wright			108.73		108.73		742.96	151.47	111,500.00	112,394.43	112,503.16
Totals	$ 114,530.96	$ 784,069.80	$53,068.19	$ 2,054,020.95	$ 3,005,689.90	$ 157,910.05	$ 1,989,626.75	$92,074.97	$ 7,954,280.13	$10,193,891.90	$13,199,581.80

SUMMARY TABLE NO. 29—PART I.

Inventory of Equipment and Machinery Showing Estimated Value January 1, 1919.—Owned by County.

ANNUAL REPORT OF COUNTY ENGINEERS.

County	Tractors		Trucks		Concrete Mixers		Pile Drivers		Blade Graders		Wheeled Scrapers		Slip Scrapers	
	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value
Adair	2	$ 2,582.34	5	$ 3,625.00	5	$ 1,200.00	1	$ 120.00	6	$ 2,488.00	16	$ 300.00	20	$ 40.00
Adams							1	200.00	3	830.00	12	425.00	21	125.00
Allamakee	3	3,750.00	1	400.00			1	125.00	7	1,390.00	8	100.00	9	120.00
Appanoose	1	3,000.00					1	60.00	11	1,175.00	12	500.00	6	40.00
Audubon							1	1,000.00	6	1,850.00	5	250.00	6	65.00
Benton	2	2,000.00	3	8,020.60	2	800.00	1	100.00	7	1,200.00	11	300.00	6	25.00
Black Hawk	2	1,400.00	1	2,300.00	2	80.00			6	1,675.00	10	200.00	19	105.00
Boone	2	4,500.00	2	50.00	3	125.00	2	150.00	9	2,442.00	7	50.00	4	8.00
Bremer	2	2,500.00			2	375.00	1	60.00	4	1,500.00	15	275.00		
Buchanan	1	3,000.00			1	200.00	1	125.00	5	1,800.00	30	500.00	6	12.00
Buena Vista	3	4,700.00			3	300.00			10	1,565.00	12	200.00	12	85.00
Butler	4	3,500.00	2	2,000.00	3	350.00	2	175.00	8	1,450.00	22	1,350.00	25	200.00
Calhoun	1	500.00							9	3,300.00	29	525.00	14	20.00
Carroll									1	98.00	1	14.10		
Cass							1		4	1,500.00		4.00		
Cedar									7	1,774.00	12	150.00	10	20.00
Cerro Gordo					2	490.00			10	2,200.00	12	200.00		
Cherokee							1	25.00	10	2,094.00	1	148.00	12	80.00
Chickasaw	1	400.00			4	600.00	2	500.00	18	4,853.00	17	928.96	35	338.25
Clarke			1	1,000.00			1	100.00	4	600.00	21	300.00	16	32.00
Clay					3	415.00	1	225.00	8	2,350.00	17	395.00	10	40.00
Clayton	1	2,000.00							23	2,100.00	18	280.00	30	200.00
Clinton									16	2,005.00				
Crawford									7	625.00				
Dallas	3	5,000.00			4	750.00	1	75.00	5	2,200.00	6	50.00	3	13.00
Davis					3	120.00	4	125.00	4	1,100.00	16	50.00		
Decatur	1	4,000.00	2	2,150.00	2	700.00			10	1,572.00	11	220.00	6	48.00
Delaware	1	1,150.00			1	50.00	1	350.00	10	1,750.00	19	350.00	17	100.00
Des Moines	1	2,000.00	1	2,000.00	2	700.80	1	25.00	8	1,000.00	5	75.00	11	30.00
Dickinson														
Dubuque	1	500.00	1	400.00					4	475.00				
Emmet	1	800.00			1	300.00	1	50.00	8	1,060.00	20	200.00	20	40.00
Fayette	2	5,500.00			3	630.00	2	640.00	6	1,125.00	15	600.00	15	100.00
Floyd	2	2,000.00			4	740.25	1	200.00	11	1,800.00	12	100.00	18	30.00

SUMMARY TABLE NO. 29—PART I.—Continued.

County	Tractors		Trucks		Concrete Mixers		Pile Drivers		Blade Graders		Wheeled Scrapers		Slip Scrapers	
	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value
Franklin					3	300.00	4	280.00	7	1,100.00	22	375.00	12	35.00
Fremont					2	300.00			6	1,650.00	6	42.00	7	14.00
Greene	1	1,800.00			2	50.00	1	150.00	9	1,200.00	16	400.00	7	2.00
Grundy	2	4,900.00							3	300.00	30	1,840.00	3	10.00
Guthrie	2	2,000.00	1	2,000.00	1	200.00	1	125.00	4	475.00	11	400.00		
Hamilton	3	6,200.00	1	10.00					10	2,500.00	5	150.00		
Hancock							1	170.00	10	780.00	14	240.00	14	40.00
Hardin	1	800.00			3	300.00	1		5	1,100.00	8	60.00	5	70.00
Harrison					1	90.00			5	900.00	13	150.00	20	75.00
Henry	1	500.00			4	700.00	1	25.00	2	800.00	12	1,700.00	12	128.00
Howard	1	500.00			1	100.00	1	250.00	7	975.00	16	200.00	11	25.00
Humboldt									3	600.00	25	250.00	19	40.00
Ida	1	800.00			1	90.00	2	150.00	7	2,050.00	13	200.00	12	40.00
Iowa	1	2,500.00			1	600.00			15	1,800.00	29	520.00	15	350.00
Jackson									2	1,553.00				
Jasper	3	6,300.00			2	300.00	1	50.00	3	125.00	18	400.00	5	70.00
Jefferson	1	3,400.00			3	750.00	1	150.00	17	2,275.00	14	1,075.00	10	30.00
Johnson					1	30.88	1	30.85	2	503.15	2	70.00	10	114.00
Jones	2	2,649.00							12	1,643.09	8	111.00	5	10.00
Keokuk	2	1,600.00							7	1,400.00				
Kossuth									11	1,868.00				
Lee	1	500.00	1	3,649.37	3	450.00	1	75.00	4	350.00	7	100.00	12	60.00
Linn	1	1,000.00							25	3,800.00	9	250.00	18	125.00
Louisa	1	800.00			1	644.00	2	200.00	4	2,200.00				
Lucas									13	1,900.00	16	350.00	18	72.50
Lyon	1	2,300.00			1	300.00	1	100.00	6	2,030.00	27	375.00	36	60.00
Madison	2	4,200.00			3	300.00			6	2,225.00	7	125.00		
Mahaska	2	4,200.00	1	1,300.00					13	4,025.00	18	900.00	11	75.00
Marion	1	2,500.00					2	140.00	8	1,200.00	24	400.00	44	205.00
Marshall	1	2,000.00	1	1,750.00	3	350.00	1	60.00	15	4,486.00	16	586.00		
Mills							3	150.00	2	1,200.00	2	100.00	6	48.00
Mitchell	2	3,500.00	1	3,000.00	6	875.00			9	2,100.00				
Monona	1	2,000.00			1	350.00	1	45.00	7	2,450.00	2	55.00	5	40.00
Monroe	2	2,400.00	1	200.00			1	75.00	9	1,470.00	14	500.00	14	70.00
Montgomery					2	600.00	2	200.00			19	255.00	51	176.40
Muscatine			1	1,000.00			1	300.00	6	2,172.00	3	60.00	8	65.00
O'Brien	2	1,296.88	1	2,407.10					1	190.00				
Osceola					5	500.00			12	1,800.00	12	150.00	13	50.00
Page														
Palo Alto					8	300.00	1	50.00	10	1,600.00	46	100.00	29	20.00
Plymouth	1	400.00			1	360.00	2	300.00	18	2,275.00	4	100.00	44	172.00
Pocahontas	2	3,480.00			1	175.00			11	960.00	24	224.00	19	32.00
Polk	3	3,000.00			1	400.00	2	150.00	13	2,700.00	18	250.00	6	30.00
Pottawattamie					1	600.00	2	750.00	13	7,375.00	10	200.00	15	200.00
Poweshiek					3	450.00	2	100.00	5	1,380.00	12	200.00	15	35.00
Ringgold	1	500.00			3	300.00			6	1,450.00	10	150.00		
Sac	1	500.00			1	25.00			5	210.00	13	100.00	7	13.00
Scott	1	1,200.00	3	3,900.00	3	400.00	1	100.00	7	720.00	12	180.00	6	30.00
Shelby							1	85.00	8	1,431.14			13	73.75
Sioux	1	2,000.00					2	370.00	16	3,370.00	4	175.00	8	96.00
Story	2	1,800.00					1	100.00	10	1,660.00	1	40.00	7	45.00
Tama	2	4,000.00			1	300.00	2	210.00	15	2,660.00	16	250.00	24	250.00
Taylor							1	60.00	6	1,980.00	16	351.00	4	28.00
Union									7	1,500.00	2	102.00	45	750.00
Van Buren	3	3,658.72			3	324.00			3	300.00				
Wapello	1	1,700.00	2	4,450.00					10	1,735.00	4	30.00	4	10.00
Warren	2	4,000.00	2	3,100.00	3	225.00	1	50.00	6	1,800.00	10	150.00	21	89.00
Washington	3	6,572.50			3	150.00	1	75.00	11	4,075.00	24	400.00	19	125.00
Wayne	2	4,199.97	1	1,800.00	1	100.00	1	50.00	6	730.00	18	333.00	13	64.00
Webster	1	2,100.00			2	150.00	1	25.00	10	2,050.00	22	250.00	8	45.00
Winnebago	3	1,200.00							5	700.00			2	
Winneshiek									7	1,425.00			24	225.00
Woodbury			1	25.00	4	725.00	3	350.00	17	2,540.00	9	270.00	29	122.00
Worth	1	2,000.00			2	350.00			6	1,500.00				
Wright	1	1,600.00	1	1,570.00	1	150.00	1	90.00	4	1,525.00	35	400.00	7	14.00
Totals	106	$159,339.41	38	$ 52,107.07	137	$ 22,589.93	84	$ 10,070.85	787	$163,822.38	1,143	$ 25,684.06	1,123	$ 6,474.90

SUMMARY TABLE NO. 29—PART II.

Inventory of Equipment and Machinery Showing Estimated Value January 1, 1919.—Owned by County.

ANNUAL REPORT OF COUNTY ENGINEERS.

County	Drags		Fresnoes		Road Planers		Plows		Gas Engines		Small Tools and Misc'llaneous	Total Estimated Value
	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No	Estimated Value	No.	Estimated Value	Estimated Value	
Adair	61	$ 650.00	23	$ 250.00	1	$ 425.00	6	80.00			919.50	2,909.50
Adams	48	300.00	6	30.00			9	$ 27.20			$ 2,879.00	$ 14,586.54
Allamakee	21	200.00	4	150.00			2	10.00			1,611.00	7,856.00
Appanoose	18	450.00					7	110.00			500.00	5,835.00
Audubon	58	675.00					4	75.00			650.00	4,565.00
Benton	80	814.00	2	40.00	2	500.00	2	30.00			757.00	14,586.60
Black Hawk	42	351.00					6	72.00			900.00	7,083.00
Boone	25	250.00					4	29.00	2	$ 25.00	1,285.00	8,914.00
Bremer	14	90.00					5	40.00			587.00	5,427.00
Buchanan	53	300.00					7	35.00			569.00	6,541.00
Buena Vista	34	365.00			2	60.00					1,415.00	8,690.00
Butler	3	200.00									1,665.00	10,890.00
Calhoun	69	600.00	12	80.00	2	50.00	11	100.00			2,255.00	7,430.00
Carroll	2	80.00									472.83	664.93
Cass	15	350.00									500.00	2,354.00
Cedar	36	238.00					1	3.00				2,185.00
Cerro Gordo	29	490.00									350.00	3,730.00
Cherokee	42	623.00					3	53.00			65.50	3,088.50
Chickasaw	25	642.50					9	141.00			1,100.00	9,503.71
Clarke	12	240.00					8	30.00			65.00	2,367.00
Clay	29	505.00			1	700.00	2	27.00			2,585.00	7,242.00
Clayton	49	700.00					18	140.00			2,710.00	8,130.00
Clinton	61	208.00			2	147.50						2,360.50
Crawford	58	345.00			1	700.00						1,670.00
Dallas	88	350.00			7	100.00					750.00	9,288.00
Davis	39	195.00	3	10.00			5	35.00			35.00	1,670.00
Decatur	103	580.00	3	30.00			13	245.00			740.00	10,285.00
Delaware							11	70.00			220.00	4,040.00
Des Moines	20	300.00					9	103.00			973.00	7,206.80
Dickinson												
Dubuque	21	90.00									1,260.00	2,725.00
Emmet	15	105.00			3	45.00	4	50.00			584.00	3,234.00
Fayette									1	50.00	1,233.00	9,878.00
Floyd	27	150.00			1	26.75	2	65.00			2,187.40	7,299.40
Franklin	5	70.00			1	10.00	4	30.00	1	100.00	887.50	3,187.50
Fremont							3	30.00			585.00	2,621.00
Greene	11	260.00			1	600.00	4	36.00	1	75.00	188.00	4,761.00
Grundy	44	540.00			1	20.00	3	15.00			505.00	8,130.00
Guthrie	71	900.00					2	30.00			1,383.00	7,513.00
Hamilton	42	450.00					3	10.00			1,375.00	10,695.00
Hancock	17	70.00					7	80.00			1,260.00	2,640.00
Hardin	50	200.00			1	700.00	6	55.50	1	450.00	2,040.00	5,775.50
Harrison	41	425.00	6	60.00			3	15.00			415.00	2,130.00
Henry	46	640.00	2	25.00			3	40.00			1,082.50	5,640.50
Howard	22	203.00					6	50.00			952.00	3,255.00
Humboldt	8	75.00			7	70.00	4	30.00				1,065.00
Ida	33	335.00					2	35.00			485.00	4,185.00
Iowa	62	345.00					8	175.00			1,099.00	7,389.00
Jackson											797.47	2,350.47
Jasper	9	145.00	3	40.00	3	1,700.00	2	37.00			1,515.00	10,682.00
Jefferson	72	300.00	5	15.00			12	150.00			305.00	8,450.00
Johnson	5	297.00									1,137.77	2,183.65
Jones	30	465.00							1	75.00	1,170.00	6,123.09
Keokuk	76	550.00					6	100.00			265.00	3,915.00
Kossuth	72	577.00			5	200.00	1	13.00				2,688.00
Lee	34	210.00					3	15.00	1	500.00	320.00	6,229.37
Linn	56	740.00					4	50.00			250.00	6,215.00
Louisa	35	700.00							1	130.95	1,642.45	6,317.40
Lucas	49	397.00	10	136.00			17	265.00				3,120.50
Lyon	2	60.00					3	15.00	1	250.00	1,617.00	7,107.00
Madison	6	30.00					2	10.00			1,828.00	8,718.00
Mahaska	60	575.00	3	60.00			13	130.00			1,025.00	12,290.00
Marion	65	460.00	10	75.00			16	250.00	1	810.00	1,270.00	7,310.00
Marshall			1	30.00			16	300.00	3	250.00	1,180.70	10,992.70
Mills	13	100.00					1				857.19	2,455.19
Mitchell									3	650.00	3,925.00	14,050.00
Monona	3	48.40	3	54.00			1	5.00			621.00	5,668.40
Monroe	44	595.00	2	20.00			2	90.00			700.00	6,120.00
Montgomery							2	74.80			1,295.00	2,601.20
Muscatine	43	510.00	1	16.00			3	50.00			1,162.80	5,335.80
O'Brien	3	122.20					1	15.00	1	197.00	1,133.39	5,361.57
Osceola	33	400.00					8	80.00	1	45.00	945.00	3,970.00
Page												
Palo Alto	3	100.00					1	30.00			1,124.00	3,324.00
Plymouth	40	960.00	6	180.00							2,635.00	7,382.00
Pocahontas	40	614.00					8	52.00			2,305.00	7,842.00
Polk	13	747.00					7	25.00			975.00	8,277.00
Pottawattamie	40	850.00			3	2,400.00	5	125.00	1	90.00	2,170.00	14,760.00
Poweshiek	15	400.00									4,135.00	6,700.00
Ringgold							7	75.00			125.00	2,600.00
Sac	53	490.00					1	25.00			653.50	2,016.50
Scott	33	200.00					3	30.00			5,627.00	12,377.00

SUMMARY TABLE NO. 29—PART II.—Continued.

County	Drags		Fresnoes		Road Planers		Plows		Gas Engines		Small Tools and Misc'llaneous	Total Estimated Value
	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	No.	Estimated Value	Estimated Value	
Shelby	47	737.61	16	316.00			3	61.11				2,705.51
Sioux	5	92.00	4	88.00			7	98.00			1,041.75	7,330.75
Story	49	700.00			1	15.00	3	20.00			150.00	4,530.00
Tama	68	710.00	2	60.00			3	70.00			1,530.00	10,040.00
Taylor	22	443.00			1	23.00	3	100.00			1,382.30	4,348.30
Union	21	250.00					5	100.00			100.00	2,802.00
Van Buren	2	54.00									1,737.99	6,074.71
Wapello	51	575.00					8	130.00			1,725.00	10,355.00
Warren	40	300.00					4	15.00			937.00	10,996.00
Washington							6	50.00			2,243.00	13,690.50
Wayne	24	245.00	3	10.00			18	326.20			1,295.80	9,153.97
Webster	75	720.00					4	69.00			665.00	6,104.00
Winnebago											590.00	2,490.00
Winneshiek									1	30.00	698.60	2,378.00
Woodbury	71	695.00	7	57.00			7	80.00	2	45.00	901.40	5,810.40
Worth											375.00	4,225.00
Wright							8	85.00			400.00	5,834.00
Totals	3,103	$ 33,113.71	137	$ 1,832.90	46	$ 8,492.25	433	$ 5,417.81	23	$ 3,772.95	$ 104,575.74	$ 597,293.96

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